Scientific Refereed Quarterly

Sosyoekonomi

Vol. 34 (70) October 2026 ISSN 1305-5577

Editor-in-Chief
Ahmet Burçin YERELİ

Editorial Board
Hale AKBULUT
Ahmet Tayfur AKCAN
Tekin AKDEMİR
Barış ALPASLAN
Emre ATSAN
Hakan AY
Mehmet Fatih ÇAPANOĞLU
Başak DALGIÇ
Burcu FAZLIOĞLU
Ali Gökhan GÖLÇEK
Sevilay GÜMÜŞ-ÖZUYAR
Tuğay GÜNEL
Egemen İPEK
Fatih KALECİ
Mustafa KIZILTAN
Altuğ Murat KÖKTAŞ
Zuhal KURUL
Aslı Ceren SARAL
Ayşen SİVRİKAYA

The Impact of Insurance Market Regulation on Companies' Financial Growth Prospects: The Case of Georgia
Tea KASRADZE & Giorgi ABASHISHVILI & Salome LIPARTELIANI

The Role of Financial Inclusion in Firms' Performance: A Multidimensional Analysis in Developing Countries
Hilal OK-ERGÜN & Ahmet KURTARAN

Perceived Corruption, Public Trust, and Socioeconomic Inequalities: The Roles of Income and Education in Türkiye
Müslüm KAYACI

The Effect of Good Governance Indicators on Productive Capacity Index in G20 Countries
Yusuf KAHREMAN & Merve EKİCİ

The Relationship Between CO^2 Emissions, Economic Growth, Energy Intensity, Urbanisation, Life Expectancy at Birth, And Renewable Energy Consumption in BRICS Countries
Zeynep KÖSE & Eda DİNERİ & Gözde TUĞAN-MERAL & Yakup DURMAZ

Evaluation of Financial Performance of the Ministry of Health with Entropy-Based TOPSIS Method
Tuğba ŞAHİN-ÇİÇEK & Fatma BENK

Firm-Level Profitability Under Macroeconomic Stress: Evidence from Interest Rate, Exchange Rate, And Pandemic Regime Sensitivities in Indonesia's ILQ45 Firms
Andewi ROKHMAWATI & Nurhidayah YAHYA & Yusni MAULIDA & Aulia Pinto ATAMI

Export-Led Growth, Foreign Direct Investment, and Carbon Emissions: CCE-Based Panel ARDL Evidence from Newly Industrialised Countries
Ahmet DEMİRALP & Ayşe CEBECİ

Common Correlated Effects Estimation of the Relationship between Foreign Direct Investment and Welfare: A Case Study of Tax Havens in Europe
Özge ÖNKAN & Yağmur SAĞLAM

The Impact of Managerial Overconfidence on Financing Decisions: Evidence from Türkiye's Chemical Industry
Öznur Dilara TAŞ & Turhan KORKMAZ & Serdar YAMAN

The Impact of Monetary Policy on Income Inequality in Türkiye: A Structural VAR Approach
Merve CİN & Nagehan KESKİN

Mapping Scientific Research Output at the National Level: A Study of Post-Soviet Kyrgyzstan
Azamat MAKSUDUNOV & Junus GANİEV

Tax Competitiveness Performance: An Examination of OECD Countries via MARCOS
Simla GÜZEL & Dilek MURAT

Taxpayers' View of the Tax Concept: A Metaphorical Analysis
Tamer BUDAK & Serkan BENK & Osman GEYİK

Technological Unemployment and Its Reflection in Cities: The Case of Zonguldak Province
Gökhan OFLUOĞLU

Green Policies and Transport Decarbonization in the EU: The Role of Environmental Taxes and Renewable Energy Use
Salih YILDIRIM & Yasemin KAYA

Indication of Economic Populism Through Public Finance Measures: An Empirical Study of the Largest Cities in Czechia and Türkiye
Cenay BABAOĞLU & Robert BATA & Jan FUKA & Altuğ Murat KÖKTAŞ & Onur KULAÇ & Pavel ZDRAŽIL & Oğuzhan ERDOĞAN

Türk Dünyasında Sosyal Yardımların Etkileri ve Karşılaştırmalı Analizi
Alparslan Abdurrahman BAŞARAN & Erdem Utku EKE

Orta Çağ Yahudilerinin Ekonomik Dönüşümü
Seda ÖZMEN

OECD Ülkelerinde Toplumsal Cinsiyet Eşitsizliğinin Ekonomik Büyüme Üzerindeki Etkisi: Dinamik Panel Bulguları
Damla GEBOLOĞLU & Berna TÜRKEKUL

INDEXED IN EMERGING SOURCES CITATION INDEX THOMSON REUTERS
TÜBİTAK ULAKBİM
Scopus®

SOSYOEKONOMİ

Peer-Reviewed, Scientific, Quarterly Hakemli, Bilimsel, Süreli

Sosyoekonomi Society Sosyoekonomi Derneği

October 2026, Vol. 34(70) / ISSN: 1305-5577 / e-ISSN: 3149-9775

www.sosyoekonomijournal.org

Publisher / Derginin Sahibi **Editor-in-Chief / Yayın Kurulu Başkanı** **(Sorumlu Yazı İşleri Müdürü)**	:	On Behalf of Sosyoekonomi Society / Sosyoekonomi Derneği Adına **Ahmet Burçin YERELİ** editor@sosyoekonomijournal.org
Co-Editors-in-Chief / **Yayın Kurulu Bşk. Yrd.** **(Sorumlu Yazı İşleri Müdür Yrd.)**	:	**Emre ATSAN** **Mehmet Fatih ÇAPANOĞLU** **Ali Gökhan GÖLÇEK** info@sosyoekonomijournal.org
Title of Journal / **Yayının Adı**	:	Sosyoekonomi Journal Sosyoekonomi Dergisi
Type of Journal / **Yayının Türü**	:	Periodical Yaygın, Süreli Yayın
Frequency and Language / **Yayının Şekli ve Dili**	:	Quarterly, English & Turkish 3 Aylık, İngilizce & Türkçe
Directorial Address / **Yayının İdare Adresi**	:	Sosyoekonomi Derneği, Cihan Sokak, 27/7 06430 Sıhhiye / ANKARA Tel: +90 312 229 49 11 Fax: +90 312 230 76 23
Printing House / **Basım Yeri**	:	Sonçağ Yayıncılık Matbaacılık Reklam San. Tic. Ltd. Şti. İstanbul Caddesi, İstanbul Çarşısı, 48/48, İskitler / ANKARA Tel: +90 312 341 36 67
Place and Date of Print / **Basım Yeri ve Tarihi**	:	Ankara, 31.10.2026
Abstracting-Ranking-Indexing / **Dizin**	:	*Emerging Sources Citation Index (ESCI), Tübitak - ULAKBİM TR Dizin, Scopus, EconLit, EBSCO, SOBIAD, ProQuest, RePEc (Research Papers in Economics), IDEAS, EconPapers.*

Bu derginin her türlü yayım ve telif hakkı Sosyoekonomi Dergisi'ne aittir. 5846 sayılı Fikir ve Sanat Eserleri Kanunu hükümlerine göre, fotokopi, dijital ve benzeri yöntemlerle herhangi bir bölümü veya tamamı Dergi Sahibinin veya Yayın Kurulu Başkanının izni olmadan basılamaz ve çoğaltılamaz. Bilimsel etik kurallarına uygun olmayan alıntı yapılamaz. Dergide yayımlanan makalelerin fikri sorumluluğu yazarlara aittir.

©2026

Editorial Board / Yayın Kurulu

Ahmet Burçin	YERELİ	Hacettepe University, Türkiye
Emre	ATSAN	Niğde Ömer Halisdemir University, Türkiye
Mehmet Fatih	ÇAPANOĞLU	Hakkâri University, Türkiye
Ali Gökhan	GÖLÇEK	Niğde Ömer Halisdemir University, Türkiye
Hale	AKBULUT	Hacettepe University, Türkiye
Ahmet Tayfur	AKCAN	Necmettin Erbakan University, Türkiye
Tekin	AKDEMİR	Ankara Yıldırım Beyazıt University, Türkiye
Barış	ALPASLAN	Social Sciences University of Ankara, Türkiye
Hakan	AY	Dokuz Eylül University, Türkiye
Başak	DALGIÇ	Hacettepe University, Türkiye
Burcu	FAZLIOĞLU	TOBB University of Economics and Technology, Türkiye
Sevilay Ece	GÜMÜŞ-ÖZUYAR	Necmettin Erbakan University, Türkiye
Tuğay	GÜNEL	Çukurova University, Türkiye
Egemen	İPEK	Tarsus University, Türkiye
Fatih	KALECİ	Necmettin Erbakan University, Türkiye
Mustafa	KIZILTAN	Hacettepe University, Türkiye
Altuğ Murat	KÖKTAŞ	Ankara University, Türkiye
Zuhal	KURUL	Hacettepe University, Türkiye
Aslı Ceren	SARAL	Ankara University, Türkiye
Ayşen	SİVRİKAYA	Hacettepe University, Türkiye

Editorial Advisory Board / Uluslararası Danışma Kurulu

Fatih	AKBAYIR	Necmettin Erbakan University, Türkiye
Abdilahi	ALI	University of Salford, United Kingdom
Nunzio	ANGIOLA	University of Foggia, Italy
Ahmet Yılmaz	ATA	Gaziantep University, Türkiye
Shafiul	AZAM	Aberystwyth University, United Kingdom
Necmiddin	BAĞDADİOĞLU	Hacettepe University, Türkiye
Elshan	BAGIRZADEH	Azerbaijan State University of Economics, Azerbaijan
Serdal	BAHÇE	Ankara University, Türkiye
Alparslan Abdurrahman	BAŞARAN	Hacettepe University, Türkiye
Duran	BÜLBÜL	Atılım University, Türkiye
Caterina	DE LUCIA	University of Foggia, Italy
Matthias	FINGER	École Polytechnique Fédérale de Lausanne, Switzerland
Ömer	GÖKÇEKUŞ	Seton Hall University, U.S.A.
Aleksandra	GÓRECKA	Warsaw University of Life Sciences, Poland
Katsushi	IMAI	University of Manchester, United Kingdom
Kamalbek	KARYMSHAKOV	Kyrgyz-Turkish MANAS University, Kyrgyzstan
Ayşegül	KAYAOĞLU-YILMAZ	İstanbul Technical University, Türkiye
King Yoong	LIM	Xi'an Jiaotong-Liverpool University, P.R. China
Mehmed	MURIĆ	University for Peace, Serbia
Joaquín	NAVAL	University of Girona, Spain
Maria Paola	RANA	University of Salford, United Kingdom
Uğur	SADİOĞLU	Hacettepe University, Türkiye
Antonio	SAVOIA	University of Manchester, United Kingdom
M. Mahruf C.	SHOHEL	Aberystwyth University, United Kingdom
Biagio	SIMONETTI	Università degli Studi del Sannio, Italy
Joseph	SZYLIOWICZ	University of Denver, U.S.A.
Bican	ŞAHİN	Hacettepe University, Türkiye
Nevzat	ŞİMŞEK	Fatih Sultan Mehmet Vakıf University, Türkiye
Mustafa Erdinç	TELATAR	Atılım University, Türkiye
Ayşe Yasemin	YALTA	Hacettepe University, Türkiye

Referees of This Issue / Bu Sayının Hakemleri

Sevda	AKAR	Bandırma Onyedi Eylül University, Türkiye
Hale	AKBULUT	Hacettepe University, Türkiye
Nesrin	AKCA	Kırıkkale University, Türkiye
Hakan	AKIN	Yüksek İhtisas University, Türkiye
Çiğdem	AKMAN	Süleyman Demirel University, Türkiye
İnci Merve	ALTAN	Bandırma Onyedi Eylül University, Türkiye
Ahmet Yılmaz	ATA	Gaziantep University, Türkiye
Hakan	AY	Dokuz Eylül University, Türkiye
Şehnaz	BAKIR-YİĞİTBAŞ	Çanakkale Onsekiz Mart University, Türkiye
Hale	BALSEVEN	Akdeniz University, Türkiye
Altan	BOZDOĞAN	Marmara University, Türkiye
Zarife Göknur	BÜYÜKKARA	Hacettepe University, Türkiye
Zeynep Gizem	CAN	Adana Alparslan Türkeş Science and Technology University, Türkiye
Abderrahim	CHIBI	University Centre of Maghnia, Algeria
İbrahim Tolga	COŞKUN	Çukurova University, Türkiye
Bahadır Murat	ÇAKMAKLI	Sinop University, Türkiye
Tanzer	ÇELİKTÜRK	Pamukkale University, Türkiye
Nahide Işıl	ÇETİNKAYA-İSTİKBAL	İstanbul Medeniyet University, Türkiye
Lamia	DALY	University of Tunis El Manar, Tunisia
Gülay	DEMİR	Sivas Cumhuriyet University, Türkiye
Engin	DEMİREL	Trakya University, Türkiye
Dian Masita	DEWI	Lambung Mangkurat University, Indonesia
Sedat	DURMUŞKAYA	Sakarya University of Applied Sciences, Türkiye
Chidiadi	ESI-UBANI	Abia State University, Nigeria
Bilal	GÖDE	Pamukkale University, Türkiye
Berat	HARMAN	Giresun University, Türkiye
Nono	HERYANA	University of Singaperbangsa Karawang, Indonesia
Berna	HIZARCI-BEŞER	Kütahya Dumlupınar University, Türkiye
Ahmet	İNNECİ	Pamukkale University, Türkiye
Abdulaziz Ahmed	JASHAN	University of Aden, Yemen
Batuhan	KARABİBER	İstanbul Aydın University, Türkiye
Vahap	KARAÇADIR	Isparta University of Applied Sciences, Türkiye
Erdinç	KARADENİZ	Mersin University, Türkiye
Çağlar	KARAMAŞA	Anadolu University, Türkiye
Hakkı	KIYMIK	Burdur Mehmet Akif Ersoy University, Türkiye
Youssef	LAABABID	Hassan I University, Morocco
Robert W.	McGEE	Fayetteville State University, U.S.A.
John Victor	MENSAH	University of Cape Coast, Ghana
Samir	MERADI	Djillali Liabés University of Sidi Bel Abbés, Algeria
Umutcan	METİN	Turkish Court of Accounts, Türkiye
Selin	METİN-CAMGÖZ	Hacettepe University, Türkiye
Işıl Fulya	ORKUNOĞLU	Ankara Hacı Bayram Veli University, Türkiye
Zamira	OSKONBAEVA	Kyrgyz-Turkish MANAS University, Kyrgyzstan
Tuncer	ÖZDİL	Manisa Celal Bayar University, Türkiye
Dragan	PAMUCAR	University of Belgrade, Serbia
Adis	PUSKA	Government of Brčko District, Bosnia & Herzegovina
Serap	PÜREN	Zonguldak Bülent Ecevit University, Türkiye
Işıl Şirin	SELÇUK	Bolu Abant İzzet Baysal University, Türkiye
Selami	SEZGİN	Anadolu University, Türkiye
Tarika	SIKARWAR	Prestige Institute of Management and Research, India
Ayşen	SİVRİKAYA	Hacettepe University, Türkiye
Oğuzhan	SUNGUR	Recep Tayyip Erdoğan University, Türkiye
Güller	ŞAHİN	Kütahya Health Sciences University, Türkiye
Ilham	THAIB	Padang State University, Indonesia
Vilma	TOMCO	University of Tirana, Albania
Fatih Sefa	TOPÇU	Ministry of Treasury and Finance, Türkiye
Mehtap	TUNÇ	Dokuz Eylül University, Türkiye
Haldun	TURAN	İstanbul Rumeli University, Türkiye
Derya	YAYMAN	Akdeniz University, Türkiye
Hakan	YILDIRIM	İstanbul Gelişim University, Türkiye
Mine	YILMAZER	Manisa Celal Bayar University, Türkiye

Content

	Author(s)	Title	pp.
		Executive Summary	6
		Editörün Notu	8
Research Article	Tea KASRADZE Giorgi ABASHISHVILI Salome LIPARTELIANI	**The Impact of Insurance Market Regulation on Companies' Financial Growth Prospects: The Case of Georgia** Sigorta Piyasasındaki Düzenlemelerin Sigorta Şirketlerinin Finansal Büyümesi Üzerindeki Etkisi: Gürcistan Deneyimi	11
Research Article	Hilal OK-ERGÜN Ahmet KURTARAN	**The Role of Financial Inclusion in Firms' Performance: A Multidimensional Analysis in Developing Countries** Firma Performansında Finansal Erişimin Rolü: Gelişmekte Olan Ülkeler Üzerine Çok Boyutlu Bir Analiz	27
Research Article	Müslüm KAYACI	**Perceived Corruption, Public Trust, and Socioeconomic Inequalities: The Roles of Income and Education in Türkiye** Algılanan Yolsuzluk, Kamuya Güven ve Sosyoekonomik Eşitsizlikler: Türkiye'de Gelir ve Eğitimin Rolü	51
Research Article	Yusuf KAHREMAN Merve EKİCİ	**The Effect of Good Governance Indicators on Productive Capacity Index in G20 Countries** G20 Ülkelerinde İyi Yönetişim Göstergelerinin Üretken Kapasite Endeksi Üzerindeki Etkisi	75
Research Article	Zeynep KÖSE Eda DİNERİ Gözde TUĞAN-MERAL Yakup DURMAZ	**The Relationship Between CO_2 Emissions, Economic Growth, Energy Intensity, Urbanisation, Life Expectancy at Birth, And Renewable Energy Consumption in BRICS Countries** BRICS Ülkelerinde CO_2 Emisyonları, Ekonomik Büyüme, Enerji Yoğunluğu, Kentleşme, Doğumda Beklenen Yaşam Süresi ve Yenilenebilir Enerji Tüketimi Arasındaki İlişki	101
Research Article	Tuğba ŞAHİN-ÇİÇEK Fatma BENK	**Evaluation of Financial Performance of the Ministry of Health with Entropy-Based TOPSIS Method** T.C. Sağlık Bakanlığı'nın Entropi Tabanlı TOPSIS Yöntemiyle Finansal Performansının Değerlendirilmesi	131
Research Article	Andewi ROKHMAWATI Nurhidayah YAHYA Yusni MAULIDA Aulia Pinto ATAMI	**Firm-Level Profitability Under Macroeconomic Stress: Evidence from Interest Rate, Exchange Rate, And Pandemic Regime Sensitivities in Indonesia's ILQ45 Firms** Makroekonomik Baskı Altında Firma Düzeyinde Karlılık: Endonezya'nın ILQ45 Şirketlerinde Faiz Oranı, Döviz Kuru ve Pandemi Rejimi Duyarlılıklarından Kanıtlar	155
Research Article	Ahmet DEMİRALP Ayşe CEBECİ	**Export-Led Growth, Foreign Direct Investment, and Carbon Emissions: CCE-Based Panel ARDL Evidence from Newly Industrialised Countries** İhracat Odaklı Büyüme, Doğrudan Yabancı Yatırım ve Karbon Emisyonu: Yeni Sanayileşmiş Ülkelerden CCE Tabanlı Panel ARDL Kanıtları	189
Research Article	Özge ÖNKAN Yağmur SAĞLAM	**Common Correlated Effects Estimation of the Relationship between Foreign Direct Investment and Welfare: A Case Study of Tax Havens in Europe** Gelir Eşitsizliği ve Doğrudan Yabancı Yatırım Arasındaki İlişkinin Ortak Korelasyon Etkileri Tahmini: Avrupa'daki Vergi Cennetleri Üzerine Bir Vaka Çalışması	217
Research Article	Öznur Dilara TAŞ Turhan KORKMAZ Serdar YAMAN	**The Impact of Managerial Overconfidence on Financing Decisions: Evidence from Türkiye's Chemical Industry** Yönetsel Aşırı Güvenin Finansman Kararlarına Etkisi: Türkiye Kimya Sektöründen Bulgular	231

Research Article	Merve CİN Nagehan KESKİN	**The Impact of Monetary Policy on Income Inequality in Türkiye: A Structural VAR Approach** Türkiye'de Para Politikasının Gelir Eşitsizliği Üzerindeki Etkisi: Yapısal VAR Yaklaşımı	259
Research Article	Azamat MAKSUDUNOV Junus GANIEV	**Mapping Scientific Research Output at the National Level: A Study of Post-Soviet Kyrgyzstan** Ulusal Düzeyde Bilimsel Araştırma Çıktılarının Haritalandırılması: Sovyet Sonrası Kırgızistan Üzerine Bir Çalışma	289
Research Article	Simla GÜZEL Dilek MURAT	**Tax Competitiveness Performance: An Examination of OECD Countries via MARCOS** Vergi Rekabetçiliği Performansı: MARCOS ile OECD Ülkeleri Üzerine Bir İnceleme	311
Research Article	Tamer BUDAK Serkan BENK Osman GEYİK	**Taxpayers' View of the Tax Concept: A Metaphorical Analysis** Vergi Mükelleflerinin Vergi Kavramına Bakışı: Metaforik Bir Analiz	331
Research Article	Gökhan OFLUOĞLU	**Technological Unemployment and Its Reflection in Cities: The Case of Zonguldak Province** Teknolojik İşsizlik ve Kentlere Yansıması: Zonguldak İli Örneği	353
Research Article	Salih YILDIRIM Yasemin KAYA	**Green Policies and Transport Decarbonization in the EU: The Role of Environmental Taxes and Renewable Energy Use** AB'de Yeşil Politikalar ve Ulaşımın Karbonsuzlaşması: Çevre Vergileri ve Yenilenebilir Enerji Kullanımının Rolü	377
Research Article	Cenay BABAOĞLU Robert BAŤA Jan FUKA Altuğ Murat KÖKTAŞ Onur KULAÇ Pavel ZDRAŽIL Oğuzhan ERDOĞAN	**Indication of Economic Populism Through Public Finance Measures: An Empirical Study of the Largest Cities in Czechia and Türkiye** Kamu Mali Verileriyle Ekonomik Popülizmin Ölçülmesi: Çekya ve Türkiye'deki En Büyük Şehirler Üzerine Görgül Bir Çalışma	393
Research Article	Alparslan Abdurrahman BAŞARAN Erdem Utku EKE	**Türk Dünyasında Sosyal Yardımların Etkileri ve Karşılaştırmalı Analizi** Effects and Comparative Analysis of Social Assistance in the Turkic World	419
Research Article	Seda ÖZMEN	**Orta Çağ Yahudilerinin Ekonomik Dönüşümü** The Economic Transformation of Medieval Jews	441
Research Article	Damla GEBOLOĞLU Berna TÜRKEKUL	**OECD Ülkelerinde Toplumsal Cinsiyet Eşitsizliğinin Ekonomik Büyüme Üzerindeki Etkisi: Dinamik Panel Bulguları** The Effect of Gender Inequality on Economic Growth in OECD Countries: Evidence from Dynamic Panel Data	473
Notes for Contributors			504
Yazarlara Duyuru			505

Executive Summary

Issue 70 (Volume 34) of Sosyoekonomi Journal for 2026 features 20 original research articles covering a broad range of fields, including economics, finance, public finance, environment, governance, social policy, labour economics, and economic history. The articles in this issue address contemporary socioeconomic challenges such as financial inclusion, income inequality, tax policies, environmental sustainability, economic governance, gender, technological transformation, and social protection through diverse country and regional perspectives, thereby offering multidimensional contributions to the literature.

In the first article, Kasradze, Abashishvili, and Liparteliani examine the impact of insurance market regulation on the financial performance of companies in Georgia from 2016 to 2024 using a Regulatory Stringency Index and multiple linear regression. They find that regulatory reforms strengthened capital adequacy and financial stability, while more stringent regulations may constrain return on equity and profit margins. In the second article, Ok-Ergün and Kurtaran investigate the role of financial inclusion in firm performance through multidimensional panel data analysis covering 42,744 firms across 82 developing countries, finding that access to financial products and services positively affects firm sales and performance. In the third article, Kayacı uses Wave 7 of the World Values Survey to examine the effect of perceived corruption on trust in government and public administration in Türkiye, showing that higher perceptions of corruption reduce institutional trust, while income and education levels do not consistently alter this relationship.

The fourth article, authored by Kahreman and Ekici, explores the relationship between good governance indicators and the Productive Capacity Index in G20 countries for the 2002-2022 period using CCEMG and causality analyses, revealing that the effects of governance indicators on productive capacity vary across countries. In the fifth article, Köse, Dineri, Tuğan-Meral, and Durmaz investigate the relationships among CO_2 emissions, economic growth, energy intensity, life expectancy, urbanisation, and renewable energy consumption in BRICS countries using panel data methods. Their findings indicate bidirectional causality between CO_2 emissions and energy intensity, economic growth, and life expectancy, while unidirectional causality is identified from renewable energy consumption and urbanisation to CO_2 emissions. In the sixth article, Şahin-Çiçek and Benk evaluate the financial performance of the Ministry of Health of the Republic of Türkiye over the 2015-2023 period using the Entropy-based TOPSIS method, finding that the highest performance was recorded in 2015 and the lowest in 2023, with the deterioration in performance associated with receivables collection, short-term liabilities, liquidity, and operational efficiency.

In the seventh article, Rokhmawati, Yahya, Maulida, and Atami analyse the profitability of Indonesia's ILQ45 companies during 2017-2023 in terms of interest-rate and exchange-rate sensitivities and the pre-, during-, and post-COVID-19 periods. They find that firms more sensitive to interest-rate movements may perform better, whereas higher leverage negatively affects profitability. In the eighth article, Demiralp and Cebeci examine the effects of economic growth, exports, and foreign direct investment on CO_2 emissions in newly industrialised countries using CCE-based Panel ARDL and causality tests. Their results provide no long-run support for the Environmental Kuznets Curve hypothesis and identify exports as the most prominent transmission channel to carbon emissions. In the ninth article, Önkan and Sağlam analyse the relationship among foreign direct investment, corporate tax revenues, and welfare in six European tax havens using second-generation panel data methods, revealing that foreign direct investment is largely financialised and that its long-run welfare effects differ considerably across countries.

In the tenth article of this issue, Taş, Korkmaz, and Yaman examine the impact of managerial overconfidence on financing decisions in chemical companies listed on Borsa Istanbul using panel data analysis, demonstrating that managerial overconfidence has a significant and distinct effect on financing decisions. In the eleventh article, Cin and Keskin investigate the impact of conventional monetary policy on income inequality in Türkiye from 1988 to 2021 using a long-run restricted Structural VAR model. Their findings indicate that contractionary monetary policy shocks reduce income inequality and that inflation and stock prices are important channels through which monetary policy affects distribution. In the twelfth article, Maksüdünov and Ganiev evaluate Kyrgyzstan's international scientific publication performance during 1991-2023 through bibliometric analysis based on Web of Science and Scopus data, showing a marked rise in scientific output, particularly after 2012, and identifying Russia, Türkiye, and the United States among the country's principal international collaboration partners.

In the thirteenth article, Güzel and Murat assess OECD countries' tax competitiveness performance over 2022-2024 using the LOPCOW-based MARCOS method. They find that Estonia and Latvia display the strongest performance, while cross-border tax regulations and corporate income taxation emerge as the most influential components of tax competitiveness. The fourteenth article, authored by Budak, Benk, and Geyik, examines

taxpayers' perceptions of the concept of tax in Türkiye through metaphor analysis. The findings show that most metaphors are neutral, while negative perceptions tend to centre on burden, coercion, and punishment, and positive perceptions emphasise social responsibility and collective contribution. In the fifteenth article, Ofluoğlu focuses on workers in the manufacturing sector in Zonguldak who migrated from rural to urban areas and examines their adaptation to technological developments and concerns about technological unemployment, addressing the relationship among technological transformation, urbanisation, employment, and the workforce's adaptation to emerging skill requirements.

In the sixteenth article, Yıldırım and Kaya analyse the impact of environmental taxes and renewable energy use on transport-related CO_2 emissions in 27 European Union countries over 2015-2023 using a panel fixed-effects model, showing that both policy instruments help reduce transport emissions. In the seventeenth article, Babaoğlu, Bat'a, Fuka, Köktaş, Kulaç, Zdražil, and Erdoğan investigate economic populism in major cities in Czechia and Türkiye using the Mixed Populism Indication approach based on local public finance indicators. While they find no pronounced evidence of economic populism overall, they identify some indications in Istanbul and Izmir in Türkiye and Prague and Pilsen in Czechia. In the eighteenth article, Başaran and Eke compare social assistance systems in Turkic states after 1990 in terms of legal frameworks, financing, coverage, and institutional organisation. Using World Bank ASPIRE data, they show that the effects of social assistance on poverty and income inequality vary considerably across countries and contribute to the discussion on developing a common social assistance model for the Organisation of Turkic States.

In the nineteenth article, Özmen examines the economic activities of medieval Jewish communities from a historical perspective, focusing on the transition from an economy based on agriculture, craftsmanship, and trade in the early Middle Ages toward credit- and interest-centred activities in the later period. The article explores the role of Church pressure, the fiscal needs of secular authorities, expulsions, and property losses in this transformation and, while focusing primarily on Western Europe, also provides comparative assessments of Jewish communities in the Islamic world and Byzantium, thereby highlighting the multidimensional nature of this historical economic transformation. In the final article of this issue, Geboloğlu and Türkekul examine the impact of gender inequality on economic growth using data for 38 OECD countries over the 1990-2021 period and Difference GMM and System GMM estimators. Their findings indicate that women's parliamentary representation and secondary school parity have positive and significant effects on per capita income, whereas female labour force participation remains largely insignificant. The article also considers different dimensions of gender inequality, agricultural growth, and Türkiye's position within the OECD.

The year 2026 represents a multifaceted period of transformation in which the global economy continues to face geopolitical tensions, volatility in energy markets, inflationary pressures, high borrowing costs, and growing uncertainty in international trade, while technological innovations - particularly artificial intelligence - are simultaneously reshaping production, investment, and working life. Economies' resilience to these transformations is uneven across countries and social groups, bringing issues such as income distribution, quality employment, social protection, fiscal sustainability, and environmental transition to the forefront of debates over the nature and inclusiveness of economic growth. As efforts to combat climate change and accelerate the energy transition bring fiscal and environmental policies closer together, investments in digitalisation and artificial intelligence create new opportunities for productivity gains while also raising policy challenges around workforce adaptation, changing skill requirements, and the distributional consequences of technological transformation. Likewise, global capital movements and international tax competition require governments to balance sustainable public revenues with the need to attract investment, while governance quality and institutional trust continue to play a central role in strengthening economic and social resilience. Against this background, we believe that the 20 articles presented in this issue, ranging from financial systems and public policy to taxation, income distribution, environmental sustainability, technological transformation, social protection, and economic history, contribute to a deeper understanding of the multidimensional socioeconomic transformation shaping the contemporary world.

We extend our sincere thanks to all our authors whose valuable studies contribute to maintaining the scientific quality and interdisciplinary research tradition of Sosyoekonomi Journal, to our esteemed reviewers whose rigorous and constructive evaluations strengthen the academic quality of the articles, and to our editorial board for their dedicated efforts at every stage of the publication process. We hope that the articles published in this issue will generate new research questions, enrich academic debates, and provide diverse perspectives for policy discussions addressing today's complex socioeconomic challenges. We wish all our readers productive and inspiring reading.

Dr. Emre ATSAN
Co-Editor-in-Chief

Editörün Notu

Sosyoekonomi Dergisi'nin 2026 yılına ait 70. Sayısı (Cilt: 34), iktisat, finans, kamu maliyesi, çevre, yönetişim, sosyal politika, çalışma ekonomisi ve iktisat tarihi gibi farklı alanları kapsayan 20 özgün araştırma makalesine ev sahipliği yapmaktadır. Bu sayıda yer alan makaleler, finansal kapsayıcılık, gelir eşitsizliği, vergi politikaları, çevresel sürdürülebilirlik, ekonomik yönetişim, toplumsal cinsiyet, teknolojik dönüşüm ve sosyal koruma gibi güncel sosyoekonomik sorunları farklı ülke ve bölge örnekleri üzerinden ele alarak literatüre çok yönlü katkılar sunmaktadır.

İlk makalede Kasradze, Abashishvili ve Liparteliani, 2016-2024 döneminde Gürcistan sigorta piyasasındaki düzenlemelerin şirketlerin finansal performansı üzerindeki etkisini Düzenleyici Sıkılık Endeksi ve çoklu doğrusal regresyon yöntemiyle incelemekte; düzenleyici reformların sermaye yeterliliğini ve finansal istikrarı güçlendirdiğini, ancak daha sıkı düzenlemelerin öz sermaye getirisi ve kâr marjları üzerinde sınırlayıcı etkiler yaratabildiğini ortaya koymaktadır. İkinci makalede Ok-Ergün ve Kurtaran, 82 gelişmekte olan ülkede 42.744 firmayı kapsayan çok boyutlu panel veri analiziyle finansal kapsayıcılığın firma performansındaki rolünü araştırmakta; finansal ürün ve hizmetlere erişimin firma satışlarını ve performansını olumlu yönde etkilediğini saptamaktadır. Üçüncü makalede Kayacı, Dünya Değerler Araştırması'nın 7. Dalga verilerinden yararlanarak Türkiye'de algılanan yolsuzluğun hükümete ve kamu yönetimine duyulan güven üzerindeki etkisini incelemekte; yüksek yolsuzluk algısının kurumsal güveni azalttığını, gelir ve eğitim düzeylerinin ise bu ilişkiyi tutarlı biçimde değiştirmediğini göstermektedir.

Kahreman ve Ekici tarafından kaleme alınan dördüncü makalede, G20 ülkelerinde 2002-2022 dönemi için iyi yönetişim göstergeleri ile Üretken Kapasite Endeksi arasındaki ilişki CCEMG ve nedensellik analizleriyle ele alınmakta; yönetişim göstergelerinin üretken kapasite üzerindeki etkilerinin ülkeler arasında farklılaştığı belirlenmektedir. Beşinci makalede Köse, Dineri, Tuğan-Meral ve Durmaz, BRICS ülkelerinde CO_2 emisyonları ile ekonomik büyüme, enerji yoğunluğu, yaşam beklentisi, kentleşme ve yenilenebilir enerji tüketimi arasındaki ilişkileri panel veri yöntemleriyle incelemekte; enerji yoğunluğu, ekonomik büyüme ve yaşam beklentisi ile CO_2 emisyonları arasında çift yönlü, yenilenebilir enerji tüketimi ve kentleşmeden CO_2 emisyonlarına doğru ise tek yönlü nedensellik bulunduğunu ortaya koymaktadır. Altıncı makalede Şahin-Çiçek ve Benk, Türkiye Cumhuriyeti Sağlık Bakanlığı'nın 2015-2023 dönemindeki finansal performansını Entropi tabanlı TOPSIS yöntemiyle değerlendirmekte; en yüksek performansın 2015 yılında, en düşük performansın ise 2023 yılında gerçekleştiğini ve performanstaki zayıflamanın tahsilat, kısa vadeli borçlanma, likidite ve faaliyet verimliliğiyle ilişkili olduğunu saptamaktadır.

Yedinci makalede Rokhmawati, Yahya, Maulida ve Atami, Endonezya'daki ILQ45 şirketlerinin 2017-2023 dönemindeki kârlılığını faiz ve döviz kuru duyarlılığı açısından COVID-19 öncesi, sırası ve sonrası dönemler çerçevesinde analiz etmekte; faiz oranlarına daha duyarlı firmaların daha yüksek performans gösterebildiğini, yüksek borçluluğun ise kârlılığı olumsuz etkilediğini belirlemektedir. Sekizinci makalede Demiralp ve Cebeci, yeni sanayileşmiş ülkelerde ekonomik büyüme, ihracat ve doğrudan yabancı yatırımların CO_2 emisyonları üzerindeki etkilerini CCE tabanlı Panel ARDL ve nedensellik testleriyle incelemekte; uzun dönemde Çevresel Kuznets Eğrisi hipotezini destekleyen bir bulgu elde edilemediğini ve ihracatın karbon emisyonlarına yönelik en belirgin aktarım kanalı olduğunu göstermektedir. Dokuzuncu makalede Önkan ve Sağlam, altı Avrupa vergi cennetinde doğrudan yabancı yatırımlar, kurumlar vergisi gelirleri ve refah arasındaki ilişkiyi ikinci nesil panel veri yöntemleriyle analiz etmekte; doğrudan yabancı yatırımların büyük ölçüde finansallaşmış bir yapı sergilediğini ve refah üzerindeki uzun dönem etkilerinin ülkeler arasında önemli ölçüde farklılaştığını ortaya koymaktadır.

Bu sayının onuncu makalesinde Taş, Korkmaz ve Yaman, Borsa İstanbul'da işlem gören kimya sektörü şirketleri üzerinden yöneticilerin aşırı güven davranışının finansman kararları üzerindeki etkisini panel veri analiziyle incelemekte; yönetsel aşırı güvenin finansman kararları üzerinde anlamlı ve belirgin bir etkiye sahip olduğunu saptamaktadır. On birinci makalede Cin ve Keskin, Türkiye'de 1988-2021 döneminde geleneksel para politikasının gelir eşitsizliği üzerindeki etkisini uzun dönem kısıtlamalı Yapısal VAR modeliyle araştırmakta; daraltıcı para politikası şoklarının gelir eşitsizliğini azalttığını ve para politikasının dağılımsal etkilerinde enflasyon ile hisse senedi fiyatlarının önemli kanallar olduğunu göstermektedir. On ikinci makalede Maksüdünov ve Ganiev, Kırgızistan'ın 1991-2023 dönemindeki uluslararası bilimsel yayın performansını Web of Science ve Scopus verilerine dayalı bibliyometrik analizle değerlendirmekte; özellikle 2012 sonrasında bilimsel üretimde belirgin bir artış yaşandığını ve Rusya, Türkiye ile ABD'nin başlıca uluslararası işbirliği ortakları arasında yer aldığını ortaya koymaktadır.

On üçüncü makalede Güzel ve Murat, OECD ülkelerinin 2022-2024 dönemindeki vergi rekabetçiliği performansını LOPCOW tabanlı MARCOS yöntemiyle değerlendirmekte; Estonya ve Letonya'nın en yüksek performansı sergilediğini, sınır ötesi vergi düzenlemeleri ile kurumlar vergisinin vergi rekabetçiliğini belirleyen en

önemli unsurlar olduğunu saptamaktadır. On dördüncü sıradaki Budak, Benk ve Geyik imzalı makalede, Türkiye'de vergi mükelleflerinin vergi kavramına ilişkin algıları metafor analizi aracılığıyla incelenmekte; metaforların çoğunun nötr nitelikte olduğu, olumsuz algıların yük, zorlama ve ceza etrafında, olumlu algıların ise sosyal sorumluluk ve ortak katkı kavramları etrafında şekillendiği belirlenmektedir. On beşinci makalede Ofluoğlu, Zonguldak örneğinde kırsal alanlardan kente gelerek imalat sanayinde çalışan bireylerin teknolojik gelişmelere uyum durumlarını ve teknolojik işsizlik kaygılarını ele almakta; teknolojik dönüşüm, kentleşme, istihdam ve işgücünün yeni becerilere uyum sağlaması arasındaki ilişkiye odaklanmaktadır.

On altıncı makalede Yıldırım ve Kaya, 27 Avrupa Birliği ülkesinde 2015-2023 döneminde çevre vergileri ve yenilenebilir enerji kullanımının ulaşım kaynaklı CO_2 emisyonları üzerindeki etkisini panel sabit etkiler modeliyle analiz etmekte; her iki politika aracının da ulaşım emisyonlarını azaltıcı yönde etkili olduğunu göstermektedir. On yedinci makalede Babaoğlu, Bat'a, Fuka, Köktaş, Kulaç, Zdražil ve Erdoğan, Çekya ve Türkiye'nin büyük şehirlerinde ekonomik popülizmi yerel kamu maliyesi göstergeleri üzerinden Karma Popülizm Göstergesi yaklaşımıyla incelemekte; genel olarak belirgin ekonomik popülizm belirtilerine ulaşılamamakla birlikte Türkiye'de İstanbul ve İzmir, Çekya'da ise Prag ve Pilsen bakımından bazı emareler tespit etmektedir. On sekizinci makalede Başaran ve Eke, 1990 sonrası Türk devletlerindeki sosyal yardım sistemlerini hukuki yapı, finansman, kapsam ve kurumsal örgütlenme boyutlarıyla karşılaştırmakta; Dünya Bankası ASPIRE verileri üzerinden sosyal yardımların yoksulluk ve gelir eşitsizliği üzerindeki etkilerinin ülkeler arasında önemli farklılıklar gösterdiğini belirleyerek Türk Devletleri Teşkilatı için ortak bir sosyal yardım modelinin geliştirilmesine katkı sunmaktadır.

On dokuzuncu makalede Özmen, Orta Çağ Yahudi topluluklarının ekonomik faaliyetlerini tarihsel bir perspektifle ele almakta; erken Orta Çağ'daki tarım, zanaatkârlık ve ticarete dayalı ekonomik yapıdan geç Orta Çağ'da kredi ve faiz merkezli faaliyetlere yönelişte Kilise baskısı, seküler otoritelerin mali ihtiyaçları, sürgünler ve mülkiyet kayıplarının rolünü incelemektedir. Batı Avrupa'yı merkeze alan makale, İslam dünyası ve Bizans'taki Yahudi topluluklarına ilişkin karşılaştırmalı değerlendirmelerle söz konusu ekonomik dönüşümün çok boyutlu niteliğini ortaya koymaktadır. Bu sayının son makalesinde Geboloğlu ve Türkekul, 38 OECD ülkesinin 1990-2021 dönemine ait verilerini Fark GMM ve Sistem GMM yöntemleriyle analiz ederek toplumsal cinsiyet eşitsizliğinin ekonomik büyüme üzerindeki etkisini incelemekte; kadınların parlamentodaki temsili ile ortaöğretim paritesinin kişi başına gelir üzerinde olumlu ve anlamlı etkiler yarattığını, kadınların işgücüne katılımının ise büyük ölçüde anlamlı bir etki göstermediğini belirlemektedir. Makale ayrıca toplumsal cinsiyet eşitsizliğinin farklı boyutlarını, tarımsal büyümeyi ve Türkiye'nin OECD içindeki konumunu birlikte değerlendirmektedir.

2026 yılı, küresel ekonominin bir yandan jeopolitik gerilimler, enerji piyasalarındaki dalgalanmalar, enflasyonist baskılar, yüksek borçlanma maliyetleri ve uluslararası ticarette artan belirsizliklerle sınandığı, diğer yandan yapay zekâ başta olmak üzere teknolojik yeniliklerin üretim, yatırım ve çalışma hayatını yeniden şekillendirdiği çok katmanlı bir dönüşüm dönemine işaret etmektedir. Ekonomilerin bu dönüşümlere gösterdiği direnç, ülkeler ve toplumsal kesimler arasında eşit dağılmamakta; gelir dağılımı, nitelikli istihdam, sosyal koruma, mali sürdürülebilirlik ve çevresel dönüşüm gibi meseleler, ekonomik büyümenin niteliğine ilişkin tartışmaları giderek daha fazla öne çıkarmaktadır. İklim değişikliğiyle mücadele ve enerji dönüşümü maliye politikası ile çevre politikalarını birbirine yaklaştırırken, dijitalleşme ve yapay zekâ yatırımları verimlilik artışı açısından yeni fırsatlar yaratmakta; aynı zamanda işgücünün değişen beceri gereksinimlerine uyumu ve teknolojik dönüşümün dağılımsal sonuçları yeni politika sorunlarını beraberinde getirmektedir. Benzer biçimde, küresel sermaye hareketleri ve uluslararası vergi rekabeti kamu gelirlerinin sürdürülebilirliği ile yatırım çekme hedefleri arasında yeni dengeler kurulmasını gerekli kılarken, yönetişim kalitesi ve kurumsal güven ekonomik ve toplumsal dayanıklılığın temel unsurları arasında önemini korumaktadır. Bu sayıda yer alan 20 makalenin, finansal sistemlerden kamu politikalarına, vergilemeden gelir dağılımına, çevresel sürdürülebilirlikten teknolojik dönüşüme ve sosyal korumadan iktisat tarihine uzanan geniş konu yelpazesiyle, içinde bulunduğumuz dönemin çok boyutlu sosyoekonomik dönüşümünü farklı açılardan anlamaya katkı sağlayacağını düşünüyoruz.

Sosyoekonomi Dergisi'nin bilimsel niteliğinin ve disiplinlerarası araştırma geleneğinin sürdürülmesine değerli çalışmalarıyla katkı sunan tüm yazarlarımıza, titiz ve yapıcı değerlendirmeleriyle makalelerin akademik niteliğinin geliştirilmesine destek olan kıymetli hakemlerimize ve yayın sürecinin her aşamasında özveriyle görev alan yayın kurulumuza teşekkür ederiz. Bu sayıda yayımlanan makalelerin yeni araştırma sorularına zemin hazırlamasını, akademik tartışmaları geliştirmesini ve günümüzün karmaşık sosyoekonomik sorunlarına ilişkin politika arayışlarına farklı perspektifler kazandırmasını temenni eder; tüm okurlarımıza verimli okumalar dileriz.

Dr. Emre ATSAN

Yayın Kurulu Başkan Yardımcısı

Sosyoekonomi

2026, Vol. 34(70), 11-26

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.01
Date Submitted: 19.06.2025
Date Revised: 20.11.2025
Date Accepted: 19.07.2026

The Impact of Insurance Market Regulation on Companies' Financial Growth Prospects: The Case of Georgia

Tea KASRADZE *(https://orcid.org/0000-0002-3515-7046), Ivane Javakhishvili Tbilisi State University & Caucasus International University, Georgia; tea.kasradze@tsu.ge; tea.kasradze@ciu.edu.ge*

Giorgi ABASHISHVILI *(https://orcid.org/0009-0001-6183-4872), Alte University, Georgia; g.abashishvili@alte.edu.ge*

Salome LIPARTELIANI *(https://orcid.org/0009-0005-9567-5282), Caucasus International University, Georgia; salome.liparteliani@ciu.edu.ge*

Sigorta Piyasasındaki Düzenlemelerin Sigorta Şirketlerinin Finansal Büyümesi Üzerindeki Etkisi: Gürcistan Deneyimi

Abstract

This paper examines the impact of regulations on the financial performance of Georgian insurance companies. The research period covers 2016-2024. The research employs deductive reasoning and multiple linear regression using a constructed Regulatory Stringency Index (RSI) and secondary data. The findings indicate that Georgia's insurance market experienced rapid growth alongside a substantial strengthening of capital adequacy and solvency measures following regulatory reforms, confirming that enhanced oversight has bolstered financial stability. However, the results also reveal a trade-off: stricter regulations are associated with lower return on equity and profit margins, suggesting that compliance costs and higher capital buffers modestly constrain profitability.

Keywords : Financial Performance, Insurance, Insurance Sector, Regulation, Regulatory Stringency Index (RSI).

JEL Classification Codes : E02, E44, G22, G28, G32.

Öz

Bu makale, piyasa düzenlemelerinin Gürcistan'daki sigorta şirketlerinin finansal performansı üzerindeki etkisini incelemektedir. Araştırma dönemi 2016-2024 yılları arasını kapsamaktadır. Araştırma, yapılandırılmış bir Düzenleyici Sıkılık Endeksi (RSI) ve ikincil veriler kullanılarak tümdengelimli muhakeme ile çoklu doğrusal regresyon yöntemlerini kullanmaktadır. Bulgular, Gürcistan sigorta piyasasının düzenleyici reformların ardından sermaye yeterliliği ve ödeme gücü önlemlerinde önemli bir güçlenmenin yanı sıra hızlı bir büyüme yaşadığını ve gelişmiş denetimin finansal istikrarı desteklediğini doğrulamaktadır. Ancak sonuçlar bir dengeyi de ortaya koymaktadır: daha sıkı düzenlemeler, daha düşük öz sermaye getirisi ve kâr marjlarıyla örtüşmekte; bu da uyum maliyetlerinin ve daha yüksek sermaye tamponlarının kârlılığı kısmen kısıtladığını göstermektedir.

Anahtar Sözcükler : Sigorta, Finansal Performans, Piyasa Düzenlemesi, Düzenleyici Sıkılık Endeksi (RSI), Sigorta Sektörü.

1. Introduction

Insurance is a vital component of the financial sector, contributing to economic stability and growth by facilitating risk transfer and financial intermediation (Gaganis et al., 2020: 257-258). At the level of national economies, the insurance industry can contribute to stable economic growth, which, in turn, stems from its essential functions in financial intermediation and financial compensation (Zhang & Cao, 2023: 3-4)**.** Insurance is equally important for individuals and organisations, as risk can lead to negative consequences. This is why insurance is widespread worldwide, and as its use increases, the degree of government involvement in regulating the sector is increasing (Klein & Skipper, 1999: 485; Ranade & Ahuja, 2000: 332).

Empirical studies have shown that a well-developed insurance sector can positively influence long-run economic growth by enhancing financial stability and mobilising savings (Gaganis et al., 2020: 260-262). However, regulation in the insurance industry is a double-edged sword. While prudent regulation protects policyholders and ensures the sector's stability, excessive or poorly designed regulation may increase insurers' costs and constrain their operations (Bhaskar et al., 2023: 2552-2553).

As noted by Kavubu (2024), regulatory features such as higher capital adequacy requirements, solvency margins, and more stringent product licensing and approval processes can increase the insurance sector's resilience and public trust among the population and the market (Kavubu, 2024: 31-32). At the same time, it should be said that regulations are designed to contain the risks of failure and insolvency and to protect the insured. In addition, this shapes the market structure and the level of competition by minimising competition and imposing costs (Gaganis et al., 2020: 268-270).

In the past ten years, the Georgian insurance market has increased constantly. According to official 2023 data, total written premiums surpassed 1,000,000,000 Georgian Lari GEL for the first time in the market's history, amounting to 1,064 million Georgian Lari GEL (ISSSG, 2024). After the COVID-19 pandemic, this kind of growth and the company's profitability were achieved by Georgia's insurance market without fundamental failures. The restrictions and minimum norms imposed by the Georgian insurance market regulator played an important role in maintaining this stability. In this regard, it is worth noting that during this period, the Insurance State Supervision Service of Georgia has increased capital requirements, thereby strengthening insurers' solvency positions in the market and helping the sector become more resilient to negative external factors and shocks (ISSSG, 2022).

Despite the positive effects and impacts discussed above, the impact of regulation on the Georgian insurance market and the sector in general on the financial growth of insurers has not been formally studied at the academic/analytical level. Accordingly, the research and findings on the links between the Insurance State Supervision Service of Georgia and the private sector will significantly fill the knowledge gap in this area, given current data.

This study presents one of the first comprehensive assessments of the influence of Georgia's insurance regulatory environment on insurers' performance and growth. It provides empirical evidence from 2016 to 2024 on the correlation between incremental regulatory reforms (such as increased capital and solvency requirements) and insurers' financial metrics. The research findings are distinctive and encourage further investigation into this topic among academics, government officials, business representatives, and other interested parties.

The article includes the following parts: Abstract, Introduction, Literature Review, Methodology, Results and Discussion.

2. Literature Review

By translating qualitative regulatory differences into quantitative scores, RSI allows researchers to apply statistical analysis to assess how "more stringent" vs "less stringent" regimes impact insurer behaviour and performance.

Several high-impact studies have utilised RSI or similar indices to investigate regulatory impacts:

Rate Regulation (Pricing): Using an RSI focused on rate filing stringency, Born, Bradly, and Klein (2018) concluded that stricter rate regulation in U.S. homeowners' insurance correlated with lower loss ratios (benefiting consumers through possibly lower claims costs relative to premiums) (Born et al., 2018: 10-12; Aizawa & Ko, 2023). However, they cautioned that such stringency might suppress innovation and delay necessary price adjustments. Insurers can regularly adapt to tight rate caps, but after major loss events, the inability to adjust premiums can hurt profitability (Born et al., 2018: 14).

Solvency Regulation: Pottier & Sommer's analysis (initially in 1998, revisited in later literature) of New York's life insurance rules showed that a high RSI for solvency oversight (incorporating capital floors, strict licensing, and product approval) improved solvency outcomes and policyholder trust, yet introduced higher compliance costs and possibly reduced product variety. They calculated RSI by assigning binary or scaled scores to factors like "prior approval of new products required (1/0)" and summing them with equal weights. The result underlined that excessive regulatory hurdles can constrain competition, as smaller or new insurers find it harder to enter or thrive under heavy requirements (Pottier & Sommer, 1998: 490-492).

Boyer et al. (2019) investigated the influence of investment regulations on the portfolio choices of insurers, developing an Investment Regulatory Stringency Index (IRSI) to quantify asset restrictions such as limits on stocks, real estate, mandatory diversification, and penalties for exceeding asset thresholds (Boyer et al., 2019: 22-25). Their study of U.S. property-casualty insurers revealed that those operating in jurisdictions with more stringent investment rules allocated less of their portfolios to higher-yield (taxable) assets. This outcome suggests they were compelled into more conservative investments, leading to

reduced risk-taking that, while potentially enhancing stability, also diminished investment income. Boyer et al. (2019) concluded that these regulations "undesirably" restricted investment in higher-return assets from the firms' perspective, though they likely bolstered the insurers' resilience. Their research also indicated that robust operational risk management practices could alleviate some of the negative effects of investment constraints, echoing the broader dilemma of balancing stability with profitability (Boyer et al., 2019: 32-34).

Market Exit Barriers: Another dimension is how regulation governs insurers' ability to exit the market (voluntarily or via insolvency). Kwon, Kim, and Lee (2005) performed a cross-country comparison focusing on regulatory barriers to exit, constructing an index with components such as the complexity of liquidation proceedings, obligations to settle policyholder claims before exit, and solvency thresholds that trigger intervention (Kwon et al., 2005: 269-271).

Clapham et al., through analysis, found that higher textual stringency scores are associated with increased compliance burdens for companies. Also, the approach revealed nuances. The author's study revealed that text-based RSI measures can fully capture regulatory changes and help predict industry outcomes, offering policymakers insights into how the complexity of rules might impact compliance behaviour (Clapham et al., 2022: 1475-1477).

In general, too little regulation can lead to excessive risk-taking, market failures, and loss of consumer trust. Too much stringency, however, may stifle growth, innovation, and competition (Kavubu, 2024: 37-38; Rees et al., 1999: 60-62). Several researchers emphasise proportional regulation - tailoring requirements to an insurer's size/risk profile - to avoid one-size-fits-all rules that disproportionately burden certain firms. For instance, small insurers might struggle under compliance loads that big insurers can more easily bear. The literature also underscores the evolving nature of insurance regulation: reforms such as Europe's Solvency II have markedly increased capital and reporting demands, which studies associate with enhanced stability but also high implementation costs and shifts in insurers' asset allocations (Kavubu, 2024: 33-35; Fras et al., 2024: 540-542).

Importantly, empirical research often finds that regulation can improve consumer outcomes (solvency, fair pricing), which is a primary goal of supervision. For example, a study in Kenya by Kitala and Mandago (2024) on regional insurance firms reported a strong positive correlation between government regulatory compliance and insurance company performance (Kitala & Mandago, 2024: 26-27; Kusi et al., 2019: 80). Their survey-based research in Uasin Gishu County indicated that insurers who adhered closely to regulatory standards tended to perform better, and overall, respondents believed regulation enhances good governance in the industry. Correlation analysis showed a coefficient of $r = 0.946$ ($p = 0.01$) between the stringency of regulation and firm performance in that sample (Kitala & Mandago, 2024: 28). While such a high correlation might not generalise globally, it reflects the perception (and some reality) that prudent regulation fosters stability and trust, thereby

supporting business performance. Similarly, official reports often credit regulatory measures for strengthening markets - the Insurance State Supervision Service of Georgia (ISSSG), in its 2023 report, noted that gradual increases in capital and solvency requirements have led to a steady rise in industry capitalisation, contributing to the market's resilience during the pandemic (ISSSG, 2023).

However, cautionary findings are also present. Zhang et al. (2025) provide evidence from China that regulatory penalties and strict enforcement can deter insurer growth. Studying the National Financial Regulatory Administration's actions, they found that fines and punitive measures imposed on insurers significantly negatively impacted those companies' growth rates. Interestingly, the impact varied depending on the nature of the penalty - whether it targeted individuals (management) or the company directly and the firm's specific context. This suggests that while enforcement is necessary, an overly punitive approach may unintentionally slow the market by scaring firms away from prudent risk-taking or expansion. Zhang and Cao (2023) examined regulatory policy adjustments in another Chinese context and found that tighter regulations increased insurers' absolute costs and improved cost efficiency. In their data, regulation significantly impacted operating costs - meaning costs rose - yet it forced companies to become more efficient in resource usage (Zhang & Cao, 2023: 7-9)**.** This nuanced outcome indicates that companies respond to stricter rules by streamlining operations, which can partially offset the direct cost increases.

A recent comprehensive review by Kavubu (2024) reinforces many of these points. Through a desk study of various regulatory changes (including Solvency II in Europe, consumer protection laws, data privacy (GDPR), and microinsurance regulations), the author concluded that regulatory interventions significantly influence insurers' strategic decisions and market behaviour. The review found that compliance with robust regulatory frameworks generally enhances market stability and consumer confidence - echoing the consensus that well-regulated markets tend to be more trusted and thus attract more customers. At the same time, excessive regulatory complexity was found to stifle innovation and increase compliance costs, a recurring theme in the literature. The study emphasised the importance of balancing objectives: overly strict or complex rules can discourage the development of new products or technologies (for example, if approval processes are too cumbersome). Kavubu advocates for adaptive and proportionate regulation, where rules evolve with emerging risks (such as fintech and cyber risks) and are scaled to insurer size to maintain a competitive and inclusive market (Kavubu, 2024: 35). This aligns with many regulators' direction - moving toward risk-based and principle-based regulation (rather than rigid prescriptive rules) to strike a better balance.

Kwon, Kim, and Lee (2005) presented a comparative analysis of regulatory frameworks governing insurers' exit strategies across countries (Kwon et al., 2005: 272-274). Their RSI included metrics such as regulatory barriers to liquidation, policyholder claims settlement obligations upon exit, and solvency margins. The variables used included the complexity of the liquidation process, which was scored based on the number of steps and the average time required to liquidate a company. Longer, more complex processes

received higher scores. Insurer liabilities: Measured as a percentage of claims or liabilities that an insurer must settle before exiting the market. Higher percentages equate to higher scores. Solvency margins are measured by comparing the minimum solvency capital required for insurers to operate. Scores were normalised to international benchmarks (e.g., EU Solvency II). The RSI was calculated by distributing the scores of the above variables, normalised to a scale from 0 to 1 (Kwon et al, 2005: 275-277). The study found that higher regulatory stringency protected policyholders and made it more difficult for insurers to exit the market, potentially discouraging new entrants. This study offered valuable insights into global variations in regulatory approaches and their impact on market dynamics.

The Financial Crisis of 2007-2009 has created renewed interest in systemic risk, a concept associated initially with bank runs and currency crises but which is now applied more broadly to shocks to other parts of the financial system, e.g., commercial paper, money market funds, repurchase agreements, consumer finance, and Over-The-Counter (OTC) derivatives markets. Although most regulators and policymakers believe that systemic events can be identified after the fact, a precise definition of systemic risk seems remarkably elusive (Billio et al., 2012: 535-559). Insurance companies' financial growth is driven not only by underwriting profits but also by investment performance. Premiums are invested to generate income that supports claim payouts and profit. Thus, regulations on insurers' investments can significantly influence their returns and growth capacity. Regulators typically impose rules on asset allocation to ensure that insurers invest prudently - for instance, limiting exposures to volatile equities or illiquid real estate and requiring a match between the currency/duration of assets and liabilities (Kong & Singh, 2005).

Georgia's insurance sector continues to grow steadily (ISSSG, 2024). In 2023, for the first time in history, the total premium written from insurance activity exceeded 1 billion GEL, reaching 1,064 million GEL, 17% higher than the previous year's figure. Moreover, it has almost doubled over the past five years (the written premium in 2018 was 542,2 million GEL) (Xprimm, 2025).

In Georgia, the regulator in 2020-2021 urged insurers to improve asset-liability matching (especially for life insurance linked to bank loans) (World Bank Group, 2022). As a result, life insurers have more closely matched their long-term life reserves to long-term government bonds, reducing reinvestment risk. Over time, one can expect the ISSSG to permit more foreign asset exposure once Solvency II reporting and risk management are in place - Georgian insurers could then, for example, invest a portion of their portfolio in Euro-denominated high-grade bonds or global equity funds, diversifying their income sources. This would align with how other small markets (such as the Baltics) operate post-EU harmonisation. Another regulatory aspect is asset concentration and related-party investments. Given the bank-insurer affiliations, ISSSG must ensure that insurers are not overexposed to their parent bank's securities or deposits (Xprimm, 2022).

One of the most critical regulatory levers is capital adequacy - the requirement for insurers to hold sufficient capital relative to their risk exposure. These solvency regulations

(e.g., risk-based capital ratios in the U.S., Solvency I/II directives in Europe, and similar regimes worldwide) aim to reduce insolvency risk. However, they can also constrain profitability by tying up capital that could otherwise generate returns. The literature reveals nuanced effects: A broad empirical study of European insurers found an inverted U-shaped relationship between the stringency of capital requirements and insurer profitability (Gaganis et al., 2015: 62-65; Siopi et al., 2023: 20-22). Moderate levels of capital stringency were associated with higher ROA and risk-adjusted returns, but stringent capital rules beyond a certain point dampened profitability. This suggests diminishing returns to solvency enforcement - initial increases in capital buffers improve confidence and lower financing costs. However, overly high capital mandates can inflate compliance costs or force ultra-conservative asset allocations, thereby dragging down ROA. The research observed this non-linear pattern for capital adequacy rules and related requirements on accounting disclosure and internal controls.

Individual market studies show mixed linear effects of capitalisation on profitability. Analysing Romanian insurers, researchers (BURCA & BATRINCA, 2014: 410) reported that a higher solvency margin had a significant impact on ROA. They argue that well-capitalised insurers are more financially sound and trusted, attracting more business and sustaining profits.

In the United States and many Asian markets, risk-based capital standards have long been used to tie capital requirements to the riskiness of insurers' assets and liabilities (Grace, 2025: 460). Theoretically, higher RBC ratios indicate stronger solvency and potentially lower funding costs, but some research questions whether complex RBC formulas improve on simpler measures. Eckles and Pottier (2011) famously demonstrated that a basic equity-to-assets leverage ratio could predict life insurer insolvencies as well as, or better than, the U.S. Their finding implies that increasing regulatory complexity does not always translate to better outcomes and that more straightforward capital rules might suffice in some cases (Eckles & Pottier, 2011: 24-26). If true, excessively intricate capital regulations could impose needless compliance burdens without commensurate gains in stability - effectively hurting profitability (via costs) more than they help (via risk reduction).

Moreover, regulators' willingness to relax capital rules in crisis times can affect insurer behaviour: a recent study on regulatory forbearance during the 2008-09 crisis (Ellul et al., 2022: 5496) showed that temporarily easing capital requirements on specific asset classes led insurers to retain riskier assets, potentially bolstering short-run profits at the cost of higher future risk.

Studies on this topic have yielded varied results. Furthermore, the Regulatory Stringency Index (RSI), a complex measure successfully used to connect regulatory environments with insurance outcomes, can be quantified in several ways. Higher RSI values are often associated with greater insurer stability (reduced insolvency risk and improved loss performance) and enhanced protection for policyholders.

3. Research Methodology

The study employs a deductive, quantitative approach to test its hypotheses. The core of the methodology is a multiple linear regression analysis based on a time-series dataset spanning from 2016 to 2024.

This study's theoretical foundation integrates the economic theory of regulation with the stability-profitability trade-off, a core concept in financial sector analysis. Economic theories of regulation suggest that regulatory interventions, especially in sectors like insurance that face information asymmetries and solvency risks, are essential for market stability and consumer protection (Viscusi et al., 2018: 46). Within this context, the analysis explicitly addresses the well-documented stability-profitability trade-off (Gaganis et al., 2020: 265). Prudential measures, notably stricter capital and solvency requirements, aim to bolster insurer resilience by mandating larger capital buffers and reducing leverage, thereby lowering the probability of failure. However, these stability gains often entail costs: increased capital mandates can limit the funds available for generating returns (potentially depressing Return on Equity, ROE), while compliance burdens add direct operational expenses, further pressuring profitability (Bhaskar et al., 2023: 2550). This inherent tension directly shapes the hypotheses tested in this study.

H_1 examines the expected positive impact of increased regulatory stringency (via the RSI) on financial stability (manifesting as lower leverage). Concurrently, H_2 investigates the potential 'cost' of this stability, hypothesising a negative relationship between the RSI and shareholder profitability (ROE), alongside a potential counter-effect where regulatory pressure incentivises operational improvements ('forced efficiency'), reflected in Return on Assets (ROA).

The Regulatory Stringency Index (RSI) is a well-established academic tool that quantifies the complex, often qualitative nature of government regulation for empirical analysis. As the literature demonstrates, RSIs can be constructed in several ways, including qualitative, rule-based scoring and quantitative, outcome-based scoring.

This study employs a quantitative, outcome-based approach, consistent with the methodology detailed in the author's doctoral research and applied in the article. Rather than scoring the rules themselves, the RSI measures the direct financial impact of regulatory milestones implemented in Georgia during the study period. It quantifies the tangible financial strengthening of the sector (i.e., outcomes) resulting from the new rules, creating a data-driven link between regulatory events and balance sheet resilience. This resulting index (Table 2) serves as the primary independent variable in the study's regression models.

3.1. Index Components

The index is constructed from three key financial indicators sourced from the annual reports of the Insurance State Supervision Service of Georgia (ISSSG). These three

components, reflecting the sector's financial strengthening, were given equal weighting (1/3 each):

1. Total Capital of Insurers
2. Supervisory Capital
3. Solvency Margin

The index was calculated in a two-step process:

Step 1: Normalisation

The raw data for each of the three components for the 2016-2024 period were normalised. The 2016 values were used as the minimum (X_Min), and the final 2024 values were used as the maximum (X_Max). This scales the entire dataset relative to the 2024 endpoint.

The standard min-max normalisation formula was used:

$$XNormalized = \frac{\mathrm{X}-\mathrm{XMin}(2016)}{\mathrm{XMax}(2024)-\mathrm{Xmin}(2016)} \quad (1)$$

Step 2: Final RSI Calculation

The final RSI score for each year (2016-2024) was calculated by taking the simple average of the three newly normalised components (with equal 1/3 weighting) and multiplying by 100 to present it as a percentage.

$$RSI\ Combined = \frac{Norm.Total\ Capital+Norm.Supervisory\ Capital+Norm.Solvency\ Margen}{3}\ X100 \quad (2)$$

The progressive increase in the RSI score directly corresponds to the phased-in "events" or regulatory milestones mandated by the ISSSG during the research period, specifically, increases in minimum capital requirements.

The tables below show the key regulatory events, the raw data used to calculate the index components (sourced from ISSSG Annual Reports), and the recalculated final RSI score for each year of the study. Table 1 details the specific regulatory events within the research period that drove the changes measured by the RSI.

Table: 1
Key Regulatory Milestones: Phased Increases in Minimum Capital Requirements (GEL) for Georgian Insurers, 2016-2024

Period	Regulatory Milestone Event	Life Insurance (mln GEL)	Non-Life Insurance (mln GEL)
2016	Baseline	1.5	1.0
2016-2018	Phase 1 Increase	2.2	2.0
2018-2021	Phase 2 Increase	4.2	4.2
2021-2024	Phase 3 Increase	7.2	7.2

Table: 2
Data for Regulatory Stringency Index (RSI) Calculation

Year	Total Capital (mln GEL)	Supervisory Capital (mln GEL)	Solvency Margin (mln GEL)	Final RSI Score (%)
2016	136	57	51	**0.00**
2017	154	90	65	**10.83**
2018	222	130	90	**31.67**
2019	235	144	95	**36.48**
2020	279	182	106	**49.46**
2021	324	209	121	**62.75**
2022	343	228	121	**66.93**
2023	374	258	144	**82.06**
2024	459	343	142	**100.00**

3.2. Data Collection and Sources

The data used in this analysis were gathered from official, publicly available sources to ensure objectivity and reliability.

Insurance Sector Data: Financial statement data, including assets, liabilities, equity, and net income, were sourced from the annual reports of the Insurance State Supervision Service of Georgia (ISSSG), including the comprehensive 2024 Annual Report.

Macroeconomic Data: Key control variables, including Real GDP Growth and the Consumer Price Index (Inflation), were obtained from the National Statistics Office of Georgia (Geostat). The Monetary Policy Rate was sourced from the National Bank of Georgia (NBG).

3.3. Variable Definition

Independent Variable:

Regulatory Stringency Index (RSI): This composite index, created for the study, measures the progressive tightening of regulations. It incorporates key solvency-related regulatory milestones, normalised on a scale from 0 to 100. Equal weighting was chosen for the components to maintain objectivity and avoid the subjective prioritisation of one solvency metric over another.

Dependent Variables:

Debt-to-Equity Ratio: A key indicator of financial stability and leverage.

Return on Equity (ROE): A primary measure of shareholder profitability.

Return on Assets (ROA): A measure of how efficiently a company uses its assets to generate profit.

Control Variables:

Real GDP Growth (%): Controls for the overall health and growth of the economy.

Inflation (CPI, %): Controls for the impact of price changes on claims and investment returns.

NBG Monetary Policy Rate (%): Serves as a proxy for the investment climate and the cost of capital.

3.4. Hypotheses and Model Specification

The study tests two primary hypotheses:

H_1: An increase in the RSI has a positive effect on the financial stability of insurance companies (measured by a lower Debt-to-Equity ratio).

H_2: High regulatory capital requirements, as reflected in the RSI, negatively affect the profitability (ROE) of insurance companies, while potentially improving asset efficiency (ROA).

To test these, the following regression models were specified:

Model 1 (Stability - Leverage):

$$\text{Debt-to-Equity} = \beta_0 + \beta_1 (\text{RSI}) + \beta_2 (\text{GDP Growth}) + \beta_3 (\text{Inflation}) + \beta_4 (\text{NBG Rate}) + \varepsilon$$

Model 2 (Profitability - Shareholders):

$$\text{ROE} = \beta_0 + \beta_1 (\text{RSI}) + \beta_2 (\text{ROA}) + \beta_3 (\text{NBG Rate}) + \varepsilon$$

Model 3 (Profitability - Efficiency):

$$\text{ROA} = \beta_0 + \beta_1 (\text{RSI}) + \beta_2 (\text{NBG Rate}) + \varepsilon$$

4. Results and Discussion

The descriptive statistics for the full nine-year period provide a high-level overview of the market's trajectory.

Table: 3
Descriptive Statistics of Key Variables for the Georgian Insurance Market (2016-2024)

Variable	Mean	Std. Dev.	Min	Max
RSI (%)	60.55	38.35	0.00	110.12
Debt to Equity	2.81	0.43	2.15	3.51
ROE (%)	16.1%	5.8%	11.0%	27.7%
ROA (%)	3.32%	2.21%	1.95%	8.78%
GDP Growth (%)	5.1%	5.2%	-6.8%	10.5%
Inflation (CPI, %)	5.6%	3.6%	1.8%	11.9%

The data paint a clear picture: as the RSI has consistently climbed, the industry's reliance on debt has steadily fallen. The exceptional performance in 2024, which saw both

ROA and ROE reach decade-highs, provides a critical new data point for assessing the mature impact of these reforms.

Before interpreting the regression results, the models underwent diagnostic checks. No significant heteroskedasticity was detected, ensuring the robustness of the standard errors and the associated p-values reported in the following tables (Tables 4, 5, and 6).

Hypothesis 1: The Effect of RSI on Financial Stability

Model 1: Dependent Variable = Debt-to-Equity Ratio

Table: 4
Regression Results for Model 1: The Impact of Regulatory Stringency on Financial Stability (Debt-to-Equity Ratio)

Variable	Coefficient	Std. Error	t-statistic	P-value
Intercept	4.015	0.211	19.03	<0.001
RSI (%)	-0.015	0.003	-5.00	0.004
GDP Growth (%)	0.012	0.019	0.63	0.561
Inflation (%)	-0.021	0.025	-0.84	0.443
NBG Policy Rate (%)	-0.018	0.031	-0.58	0.589
Model Fit:	**R^2 = 0.94**	**Adj. R^2 = 0.88**	**F-stat = 16.5**	**p = 0.009**

The model provides strong empirical support for **Hypothesis 1**. The coefficient for **RSI** is **-0.015** and is highly statistically significant (**p=0.004**). This result clearly indicates that as regulatory stringency has increased, insurers have reduced their reliance on debt, leading to more resilient balance sheets. For every 10-point increase in our index, the Debt-to-Equity ratio is expected to decrease by 0.15. The insignificance of the macroeconomic controls reinforces the conclusion that this deleveraging was a direct policy response rather than a byproduct of economic conditions.

Hypothesis 2: The Effect of RSI on Profitability

Model 2: Dependent Variable = Return on Equity (ROE %)

Table: 5
Regression Results for Model 2 - The Impact of Regulatory Stringency on Shareholder Profitability (Return on Equity)

Variable	Coefficient	Std. Error	t-statistic	P-value
Intercept	20.15	6.89	2.92	0.043
RSI (%)	-0.121	0.052	-2.33	0.081
ROA (%)	3.011	0.540	5.58	0.005
NBG Policy Rate (%)	-1.580	0.612	-2.58	0.061
Model Fit:	**R^2 = 0.91**	**Adj. R^2 = 0.84**	**F-stat = 12.1**	**p = 0.015**

The results for this model clearly illustrate the anticipated trade-off. The coefficient for **RSI** is **-0.121** and is significant at the 10% level (**p=0.081**), demonstrating that stricter regulation is associated with a modest reduction in shareholder returns. This is the expected cost of stability, as higher capital buffers reduce the leverage available to generate profit.

Model 3: Dependent Variable = Return on Assets (ROA %)

Table: 6
Regression Results for Model 3 - The Impact of Regulatory Stringency on Asset Efficiency (Return on Assets)

Variable	Coefficient	Std. Error	t-statistic	P-value
Intercept	-2.15	2.51	-0.86	0.435
RSI (%)	0.045	0.019	2.37	0.077
NBG Policy Rate (%)	0.552	0.251	2.20	0.093
Model Fit:	**R^2 = 0.68**	**Adj. R^2 = 0.58**	**F-stat = 6.45**	**p = 0.041**

An intriguing and positive finding emerges from this model. The **RSI** has a positive and significant effect on **ROA** (**p=0.077**). This suggests that the pressures of a stricter regulatory environment have incentivised insurers to become more efficient in their operations and asset management. To protect their margins amid higher capital costs, companies appear to have strengthened underwriting discipline and optimised investment strategies. This finding aligns with international evidence. For instance, a study of Canadian life insurers also concluded that operational efficiency is a critical determinant of profitability (Wise, 2023: 125).

5. Conclusions and Recommendations

The key finding of this study is that regulatory reform in Georgia's insurance sector achieved its primary goal of enhancing financial stability while also spurring an important, and perhaps unintended, improvement in operational efficiency. The analysis provides strong evidence that stricter regulation, as measured by the RSI, directly led to lower leverage across the sector, confirming the success of the solvency-focused reforms.

More revealingly, the study highlights a nuanced trade-off. While the reforms had the expected modest negative impact on shareholder returns (ROE) due to higher capital requirements, they also had a significant positive effect on asset management efficiency (ROA). This suggests that in response to regulatory pressure, insurers were not merely passive absorbers of new costs; they actively improved their core operations to protect margins. This "forced efficiency" is the study's most significant conclusion, demonstrating that well-designed regulation can catalyse a more mature and resilient market.

The Georgian experience demonstrates that a well-calibrated, phased-in regulatory reform agenda can strengthen a developing insurance market without sacrificing its growth or overall profitability.

Regarding policy recommendations, the study suggests continuing on a path of strong, risk-based regulation, with ongoing evaluation to ensure it remains proportionate. Regulators should remain vigilant about unintended consequences (like reduced competition or innovation) and be ready to fine-tune rules as needed - for example, easing procedural requirements if they become too burdensome or introducing sandbox environments for innovative products under regulatory oversight.

6. Research Limitations

The results of the study are robust, but it is important to acknowledge its limitations, which in turn suggest insights for future research. Sample Size: The analysis is based on a 9-year time series (2016-2024). In statistical terms, this is a relatively small sample, which reduces the power of the regression models and may explain the insignificance of some macroeconomic variables. Future research should aim to extend this time series as more annual data become available to confirm and strengthen the findings. Aggregate Data: The study uses aggregate, market-level data. This approach is effective for understanding the overall sectoral response to regulation but masks firm-level heterogeneity. The impact of regulatory changes was likely not uniform across all companies, with smaller, less capitalised insurers potentially facing greater challenges than their larger counterparts. A future study using company-level panel data would provide more granular insights into these differential effects. Proxy Variables: In the absence of a consistent historical dataset for long-term government bond yields, the NBG Monetary Policy Rate was used as a proxy for the investment climate. While this is a suitable and academically accepted alternative, it is not a perfect measure of the returns available on the long-term assets that insurers hold. Future analysis could be enhanced by incorporating a more direct measure of long-term yields.

References

Aizawa, N. & A. Ko (2023), "Dynamic Pricing Regulation and Welfare in Insurance Markets", National Bureau of Economic Research *Working Paper* Series, No. 30952.

Bhaskar, D. et al. (2023), "Regulation Design in Insurance Markets", *American Economic Review*, 113(10), 2546-2580.

Billio, M. et al. (2012), "Econometric measures of connectedness and systemic risk in the finance and insurance sectors", *Journal of Financial Economics*, 104(3), 535-559.

Born, P. et al. (2018), "Does State Rate Regulation Matter? An Assessment of the Effects of More Stringent Regulation on Insurers' Performance in Homeowners Insurance", *SSRN Electronic Journal*, https://ssrn.com/abstract=3288760 or http://dx.doi.org/10.2139/ssrn.3288760

Boyer, M.M. et al. (2019), "Operational risk management and regulatory investment constraints on portfolio allocation: evidence from property and casualty insurers", *Journal of Regulatory Economics*, 57(1), 20-52.

Burca, A.-M. & G. Batrinca (2014), "The Determinants of Financial Performance in the Romanian Insurance Market", *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4(1), 407-421.

Clapham, B. et al. (2022), "Policy making in the financial industry: A framework for regulatory impact analysis using textual analysis", *Journal of Business Economics*, 93(9), 1463-1514.

Eckles, D.L. & S.W. Pottier (2011), "Is Efficiency an Important Determinant of A.M. Best Property-Liability Insurer Financial Strength Ratings?", *Journal of Insurance Issues*, 34(1), 18-33.

Ellul, A. et al. (2022), "Insurers as Asset Managers and Systemic Risk", *The Review of Financial Studies*, 35(12), 5483-5534.

Fras, M. et al. (2024), "Determinants of the Behaviour of Entities on the Insurance Market in the Light of Changes Introduced by the IDD Directive", *Journal of Consumer Policy*, 47(4), 533-566.

Gaganis, C. et al. (2015), "Regulations, profitability, and risk-adjusted returns of European insurers: An empirical investigation", *Journal of Financial Stability*, 18, 55-77.

Gaganis, C. et al. (2020), "Cross-country evidence on the relationship between regulations and the development of the life insurance sector", *Economic Modelling*, 89, 256-272.

Grace, M.F. (2025), "Regulation of Insurance Markets in the USA", in: *Handbook of Insurance* (457-482), Springer Nature Switzerland.

ISSSG (2022), *Insurance State Supervision Service of Georgia Annual Report 2022*, <www.insurance.gov.ge: https://insurance.gov.ge/Files/ShowFiles?id=5ac10016-cabd-4c16-b925-bb775f183e5e>, 11.06.2025.

ISSSG (2023), *Insurance State Supervision Service of Georgia Annual Report 2023*, <https://www.insurance.gov.ge/Files/ShowFiles?id=b91208a4-f6f9-46b5-955e-04ae81bb86ce> , 17.07.2025.

ISSSG (2024), *Insurance State Supervision Service of Georgia User Guide - Consumer rights in insurance relations and current news*, <https://insurance.gov.ge/Files/ShowFiles?id=bb98ac4a-020a-4d20-b217-6efc0ecd626b>, 21.04.2025.

Kavubu, A. (2024), "Regulatory Changes and Their Impact on Insurance Market Dynamics", *Journal of Actuarial Research*, 2(1), 29-40.

Kitala, J.C. & R. Mandago (2024), "Effects of Government Regulation on the Performance of Insurance Firms in Uasin Gishu County - Kenya", *International Journals of Academics & Research*, 6(3), 25-30.

Klein, R.W. & H. Skipper (1999), "Insurance Regulation in the Public Interest: The Path towards Solvent, Competitive Markets", *The Geneva Papers*, 25(4), 482-504.

Kong, J. & M. Singh (2005), "Insurance Companies in Emerging Market", *IMF Working Paper*, International Capital Markets Department, International Monetary Fund.

Kusi, B.A. et al. (2019), "Insurance regulations, risk and performance in Ghana", *Journal of Financial Regulation and Compliance*, 28(1), 74-96.

Kwon, W.J. et al. (2005), "Can Insurance Firms Easily Exit from the Market? A Global Comparative Analysis of Regulatory Structures", *The Geneva Papers on Risk and Insurance - Issues and Practice*, 30, 268-284.

Pottier, S. & D. Sommer (1998), "Regulatory Stringency and New York Licensed Life Insurers", *The Journal of Risk and Insurance*, 65(3), 485-502.

Ranade, A. & R. Ahuja (2000), "Issues in Regulation of Insurance", *Economic and Political Weekly*, 35(5), 331-338.

Rees, R. et al. (1999), "Regulation of Insurance Markets", *The Geneva Papers on Risk and Insurance Theory*, 24(1), 55-68.

Siopi, E. et al. (2023), "Can Regulation Affect the Solvency of Insurers? New Evidence from European Insurers", *International Advances in Economic Research*, 29(1-2), 15-30.

Viscusi, W.K. et al. (2018), *Economics of Regulation and Antitrust* (5th ed.), Cambridge, MA: MIT Press.

Xprimm (2022), *GEORGIA: profit of insurance companies affiliated with banks is significantly higher than that of independent market participants*, Xprimm Publications.

Xprimm (2025), *Insurance Profile Georgia Market Overview Full Year 2024*, Xprimm Publications.

Wise, W. (2023), "The importance of efficiency for life insurer profit regarding Canadian life insurers", *Pressacademia*, 10(3), 121-136.

World Bank Group (2022), *Georgia - Financial Sector Assessment*, <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/224301643135539486/georgia-financial-sector-assessment>, 25.05.2025.

Zhang, T. & J. Cao (2023), "Impact of regulatory policy adjustments on insurance company costs and cost efficiency", *Finance Research Letters*, 58(Part D), 104611.

Sosyoekonomi

2026, Vol. 34(70), 27-50

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.02
Date Submitted: 16.07.2025
Date Revised: 02.11.2025
Date Accepted: 28.07.2026

The Role of Financial Inclusion in Firms' Performance: A Multidimensional Analysis in Developing Countries[1]

Hilal OK-ERGÜN *(https://orcid.org/0000-0002-1454-3677), Muğla Sıtkı Koçman University, Türkiye; hilalokergun@mu.edu.tr*

Ahmet KURTARAN *(https://orcid.org/0000-0003-1780-2491), Karadeniz Technical University, Türkiye; kurtaran@ktu.edu.tr*

Firma Performansında Finansal Erişimin Rolü: Gelişmekte Olan Ülkeler Üzerine Çok Boyutlu Bir Analiz[2]

Abstract

This study analyses the role of financial inclusion (FI) in firms' performance (FP). The study analysed 23 sectors and 42,744 companies in 82 developing countries using multidimensional panel data models. Analysis revealed that firms with access to financial products and services achieve higher sales than those without such access. Furthermore, firms that define access to finance as a barrier achieve lower sales than those that do not. Additionally, exports, age, foreign partnerships, and company size were found to have a positive impact on their performance. Consequently, the study determined that FI has a positive impact on FP.

Keywords : Financial Inclusion, Firm Performance, Developing Countries, Panel Data Analysis.

JEL Classification Codes : G20, G30.

Öz

Bu çalışma, finansal kapsayıcılığın firmaların performansındaki rolünü analiz etmektedir. 82 gelişmekte olan ülkede 23 sektör ve 42.744 firma çok boyutlu panel veri modelleri kullanılarak analiz edilmiştir. Analiz, finansal ürün ve hizmetlere erişimi olan şirketlerin bu hizmetlere erişimi olmayan şirketlere göre daha yüksek satışlar elde ettiğini ortaya koymuştur. Ayrıca, finansmana erişimi bir engel olarak tanımlayan şirketler, bunu yapmayan şirketlere göre daha düşük satışlar elde etmektedir. Ek olarak, ihracatın, yaşın, yabancı ortaklıkların ve şirket büyüklüğünün performans üzerinde olumlu yönde etkili olduğu bulunmuştur. Sonuç olarak, çalışmada finansal kapsayıcılığın firmaların performansı üzerinde olumlu bir etkiye sahip olduğu saptanmıştır.

Anahtar Sözcükler : Finansal Kapsayıcılık, Firma Performansı, Gelişmekte Olan Ülkeler, Panel Veri Analizi.

---

[1] *This study is derived from the doctoral dissertation titled "The Role of Financial Inclusion in Firm Performance: A Multidimensional Analysis on Developing Countries" conducted by Hilal Ok-Ergün at the Karadeniz Technical University Institute of Social Sciences under the supervision of Prof.Dr. Ahmet Kurtaran. We want to thank the Business Analysis Unit of the Development Economics Global Indicators Department at the World Bank Group for providing the data.*

[2] *Bu çalışma Hilal Ok-Ergün tarafından Karadeniz Teknik Üniversitesi Sosyal Bilimler Enstitüsü'nde, Prof.Dr. Ahmet Kurtaran'ın danışmanlığında yürütülen "Firma Performansında Finansal Erişimin Rolü: Gelişmekte Olan Ülkeler Üzerine Çok Boyutlu Bir Analiz" başlıklı doktora tezinden türetilmiştir. Verileri sağlayan Dünya Bankası Grubu Kalkınma Ekonomisi Küresel Göstergeler Departmanı İş Analizi Birimi'ne teşekkür ederiz.*

1. Introduction

The most basic function of financial systems is to provide the necessary funds on reasonable terms and to utilise these funds efficiently and effectively. The effective use of funds received by firms through financial institutions is a crucial tool for achieving their objectives, enhancing their performance, and ensuring their long-term sustainability. In this context, obstacles faced by firms in accessing the goods and services offered by financial organisations can lead to their failure and negatively influence the improvement of the special sector. Credit provided by financial institutions is considered a critical service for firm success and the improvement of the special sector. Financial inclusion or access to finance, which has the potential to contribute to the growth of the real sector and, consequently, to economic growth, remains a topic of interest, particularly in developing countries. According to Claessens & Tzioumi (2006), access to finance refers to the widespread availability of high-quality financial services at a reasonable cost. Rojas & Gonzales (2010) define access to financial services in general as "the proportion of society and businesses that can use financial services if they wish to do so". According to Damodaran (2013), the basis of financial inclusion (FI) is to ensure that a wide range of financial services suitable for each individual is available and that they can understand and use these services. Korkmaz (2016) defines FI as "the ability of individuals and firms within an economy to access and utilise financial services." Abdmoulah and Jelili (2013) define FI as "the ability of individuals or businesses to gain access to financial services, including loans, deposits, payments, insurance, and other risk management services." According to Abdmoulah and Jelili (2013), the concept of access should be distinguished from the real utilisation of financial services, as non-use of financial resources can be voluntary or involuntary. Those who do not utilise financial services voluntarily choose not to use them even though they have access, either because they do not need these services or because they choose not to for cultural, religious, or other reasons. Beck (2016) noted that access to financial services can be described along different dimensions, including "geographic access (i.e., proximity to a financial service provider) and socioeconomic access (i.e., the absence of prohibitive fees and documentation requirements)." In international literature, the terms "access to financial services", "financial access", and "financial inclusion" are often used interchangeably. However, due to the widespread use of the term "financial inclusion", it was favoured in this study.

According to Kabakova and Plaksenkov (2018), FI has several characteristics. These are: (i) equal presence of financial services, (ii) regular use, (iii) high-quality financial services, and (iv) the possibility of increasing welfare. According to Damodaran (2013), FI is a long-term, strategic process. To achieve these goals, the following points must therefore be taken into account: "(i) Supply access to fundamental financial services such as banking, (ii) the utilisation of financial services must meet the requirements of the needy, (iii) financial products must be affordable, and (iv) the quality of goods and services must be improved." Many firms worldwide, especially small and medium-sized enterprises (SMEs), lack access to the goods and services provided by the financial system, particularly credit, due to various reasons. FI is particularly crucial for firms when it comes to obtaining credit.

Restricted access to credit in developing countries is seen as a significant barrier to FP. Therefore, the purpose of the study is to analyse whether FI affects firm performance in developing countries. To this end, data from 42,744 firms operating in 23 different sectors in 82 developing countries were analysed using panel data analysis. Panel data analysis was chosen because it enables the construction and estimation of comprehensive models that incorporate time and cross-sectional variation. The variables were selected from the existing literature and models developed within it. Therefore, the most significant contribution of this study to the literature is its multidimensional examination and analysis of financial inclusion across countries, sectors, firms, and years. Furthermore, it distinguishes itself from other studies by analysing the impact of financial inclusion on firm performance not only in terms of access to credit but also in the financing of working capital through banks and the availability of open credit. In other words, examining firms' use of financial products and services from a multidimensional perspective, using the variables in the models, enhances the study's originality.

The study is divided into four sections: Introduction, Literature Review, Implementation, Conclusion, and Recommendations. The introduction defines FI and emphasises its importance. The literature section examines studies that address FI from a firm's perspective. The implementation section includes data, methodology, and findings. The final section consists of the conclusions and recommendations derived from the findings.

2. Literature

Most studies in the literature on FI focus on individuals and households. However, FI for firms remains a subject of interest to researchers. In this part of the study, studies addressing the FI-FP relationship at global and regional levels are examined under two separate headings to allow for detailed discussion, including digital finance and digital financial inclusion items.

2.1. The FI-FP Relationship on a Global Scale

The FI-FP relationship has been examined in the international literature using large country samples. For instance, Rajan & Zingales (1996) analysed the effect of improving the financial system on industrial growth. The authors concluded that real sectors that depend heavily on external finance flourish in countries with strong financial markets.

Demirgüç-Kunt & Maksimovic (1998) also analysed the effect of differences in financial systems and organisations on firms' debt and growth in 30 developing countries. They found that both a live stock market and a well-advanced legal system are crucial for promoting firms' growth. They found that firms in countries with live stock markets and a high degree of legal congruence are more likely to raise external finance, thereby having the opportunity to grow faster. They also concluded that reported returns on capital are lower in countries with live stock markets and well-functioning legal systems.

Demirgüç-Kunt et al. (2004) utilised firm-level data from the WB's Enterprise Surveys (ES), conducted in 1999 among more than 4,000 firms in 52 countries, to investigate the effect of a country's institutions, work environment, and organisational structure on access to finance and company growth. Beck et al. (2004) empirically analysed the impact of the banking system, particularly banking competition, on firms' access to credit in 74 industrialised and developing countries, utilising a probit regression model. The authors found that banking competition increased the financial constraints on SMEs more than on large companies. Generally, they concluded that increased bank competitiveness leads to greater financial constraints for firms.

In a study covering 44 countries and 36 sectors, Beck et al. (2005) found that financial development had a greater effect on the growth of sectors that are technologically more conditional on small firms than on large companies. From this, the authors concluded that financial development accelerated economic growth by removing restrictions to growth for SMEs. Claessens & Laeven (2005), who analysed the role of competition within the banking system for sectoral growth in 16 countries, found that sectors with greater external financial dependence showed faster growth performance in more competitive banking systems and that the degree of competition within banks is a vital factor in the functioning of the financial system. Access to finance is one of the most significant obstacles, particularly for SMEs (Beck & Demirgüç-Kunt, 2006). Improving financial organisations has a significant effect on firms' access to finance, particularly for SMEs.

Ayyagari et al. (2008) examined the role of the working environment in corporate growth across 79 countries. Their analysis revealed that the most important obstacles directly hindering firms' growth are financing, crime, and political instability. The authors emphasised that financial sector reforms to reduce financing restrictions could be one of the most effective ways to promote firms' growth. With respect to Atieno et al. (2009), access to finance has a higher positive effect on the growth of small, medium, and large enterprises, especially in economies with developed financial systems or a rule of law. Atieno (2009) analysed the impact of linkages between micro and small firms and financial institutions on access to financial services and FP. The authors found that linkages between firms and financial organisations positively affect access to financial services. They also found that membership in alliance networks between micro and small firms is vital for easy access to financial services. Rahaman (2011) empirically investigated the effect of firms' access to financial resources on firm growth, using dynamic panel modelling for both listed and unlisted firms. The author found that access to internal financing has a significant influence on firm growth. However, the author found that the influence of internal financing on company growth decreases as access to bank loans increases. This situation, which, according to the author, is particularly pronounced in small and unlisted firms, shows how a firm's financial structure affects growth due to external financing constraints. Beck et al. (2013) empirically analysed the nexus between financial structure and firms' access to finance in 54 developing countries using a probit model. The authors examined three types of financial organisations: low-quality financial institutions, specialised lenders, and banks. Firstly, they found a correlation between the supremacy of banks in the financial system and

the low utilisation of financial services by companies. Furthermore, they found no evidence that smaller companies have better access to finance. Finally, they emphasised the suitability of low-quality financial organisations and specialised lenders to facilitate access to finance in low-income countries. This concept, which is considered one of the biggest operational problems of informal enterprises, was analysed by Farazi (2014). Farazi (2014) examined the factors of the utilisation of financial services by informal enterprises and found that the utilisation of loans and bank accounts for commercial purposes is low in informal enterprises and that a notable majority of enterprises finance their daily operations and investments from resources other than financial organisations (internal funds, family and friends). He found that business size, the owner's level of education, and the owner's affiliation to the formal sector are notably related to access to financial services in informal businesses. A comparative analysis with formal firms revealed that formal firms use loans and bank accounts more frequently. Accordingly, registered firms are 54% more likely to have a bank account and 32% more likely to have a loan. Overall, registered firms are less likely to rely on internal sources, family, friends, and loan sharks to fund their working capital and more likely to use bank financing than unregistered businesses. The study found that the results are also valid across firms' sizes and countries.

Table 1 presents additional studies examining the FI-FP relationship at the global level.

Table: 1
FI-FP Relationship on a Global Scale

Author	Year	Scope	Findings
Love & Peria	2014	53 countries	In their study, the authors used a panel data analysis to examine the impact of banking competition on the access to finance of 68,353 firms between 2002 and 2010. Their results suggest that a high level of competition within the banking system enhances firms' access to finance. Therefore, they emphasise how important and beneficial it is to promote competition between banks to facilitate companies' access to finance.
Ayyagari et al.	2016	70 countries	The authors analysed the effects of access to finance on employment growth utilising a panel data analysis of 50,000 firms. They found a statistically significant and affirmative nexus between firms' access to finance and employment growth. They found that improved access to credit increases employment, especially for micro, small, and medium-sized firms.
Knack & Xu	2017	119 countries	In their study, the authors analysed the impact of financial development on firms' access to external sources of finance using the least squares method for 60,000 companies. They found that micro-enterprises have poorer access than SMEs. They also analysed the effect of contracting institutions on firms' access to external finance. They found that the firm's ownership rights, rather than contracting institutions, have a positive effect on access to external finance. Based on the study's results, the authors emphasise that special attention needs to be paid to the situation of micro-enterprises that have difficulties accessing external finance from official sources.
Güney	2019	16 countries	The author investigated the determinants of debt financing use and its effect on FP, based on the characteristics of firms of different sizes, between 2009 and 2014, using logistic regression and generalised partial linear modelling. The author found that in developing countries, firm characteristics influence the utilisation of debt financing. In particular, the author found that firms' access to external financing from banks, in other words, access to bank loans, has a positive influence on FP.
Lee et al.	2020	47 countries	The authors analysed the role of FI on FP during and after crises in both Asian and non-Asian regions, across manufacturing and non-manufacturing sectors, and in small, medium, and large firms. The authors found that FI improved FP in non-crisis periods and countries outside Asia. They also analysed the effect of financial innovation on firms' sales performance through access to financial services. They concluded that financial innovation combined with FI indicators had a negative impact on business performance.
Charfeddine & Zaouali	2022	43 countries	They investigated the effects of FI and organisational environment on entrepreneurship using a panel vector autoregression (PVAR) model. They emphasised that FI and institutional factors have a significant impact on entrepreneurship, with access to fundamental financial services encouraging the creation of new firms and access to credit supporting the growth and sustainability of existing firms.

2.2. FI-FP Relationship at Regional Level

In addition to global studies, different findings have been reported in studies on the FI-FP relationship by country and region. For instance, Sleuwaegen & Goedhuys (2002) analysed the nexus between the size structure of manufacturing companies in African countries and their growth processes, finding that firm size and age are critical factors in specifying a company's growth potential.

According to Gatti & Love (2006), while the relation between financial improvement and growth is widely recognised, there is little proof that credit affects growth at the micro level. In this context, Gatti & Love (2006) analysed the effect of access to credit on the productivity of companies in Bulgaria. They found that credit has a statistically significant and positive impact on total factor productivity. Amha et al (2013) empirically analysed the effect of access to finance on the growth of grain traders and millers in Ethiopia using survey data. Their study found that commercial banks or microfinance institutions had no impact on the growth of traders and millers in Ethiopia. The study concluded that access to credit is primarily utilised to meet short-term cash needs, and that access to informal credit is also limited. In addition, the authors found that loans granted by commercial banks are mostly given to large enterprises, while medium-sized enterprises have restricted access to finance. In examining the components that impact FP, Harrison et al. (2014) found that access to finance is one of the components that negatively affect the performance of manufacturing firms in the African region at the firm level.

Table 2 presents additional studies examining the FI-FP relationship at the regional level.

Table: 2
FI-FP Relationship at Regional Level

Author	Year	Scope	Findings
Efobi et al.	2016	Nigeria	The authors analysed the effect of access to banking services on the performance of manufacturing firms in the study. They used a multidimensional approach to access to financial services and used lagged total annual turnover as an indicator of FP. They found that firms with access to banking services performed better and that the dimension of this access varied depending on the type of access.
Fowowe	2017	African region countries	In this study, the author analysed employee growth as a proxy for firm growth and the presence or absence of credit constraints as an indicator of access to finance. Using a cross-sectional regression, the author conducted an empirical study with data from 10,888 companies, showing that restrictions on access to finance have a negative impact on company growth. However, he found that companies without credit restrictions have a faster growth potential than those with credit restrictions.
Kumarasamy & Singh	2018	Asia-Pacific countries	The authors analysed the effect of access to finance and financial development on a firm's ability to enter export markets using a probit regression model. Using the WB's ES database, they found that access to finance plays a crucial role in enhancing firms' ability to export goods and services. They also found that firms with access to finance are more likely to enter the export market, and that firms' size, age, foreign ownership status, and productivity affect their ability to do so. Overall, the study's results indicate that firms with access to bank finance are more likely to enter the export market. The authors therefore conclude that the development of the financial system and access to finance facilitate firms' entry into the export market.
Fombang & Adjasi	2018	African region countries	Using firm-level data from the WB's ES database for selected African countries, the authors analysed the effect of access to finance on business innovation. In their study, they found that overdraft facilities stimulated innovation in all selected African countries. Similarly, they found that trade credit stimulated innovation in firms in Nigeria, South Africa, and Cameroon, while asset finance stimulated innovation in firms across Cameroon, Nigeria, and South Africa. Consequently, the authors found that different forms of financing construction (overdraft facilities, asset finance, and trade credit) influence firm innovation in selected African countries.
Hussain et al.	2018	England	In this study, the authors analysed the nexus between financial knowledge, access to finance, and growth in SMEs operating for more than five years using data collected through surveys and interviews. The authors found that financial knowledge improves access to finance, thereby enhancing the growth potential of SMEs. They also found that financial knowledge mediates the relationship between access to finance and the growth performance of SMEs.
Koomson & Ibrahim	2018	Ghana	In this study, the authors analysed the effect of FI on the growth of non-agricultural businesses by creating a multidimensional index of FI. The authors found that improved FI for non-agricultural enterprises increases their growth by approximately 43%. Furthermore, they found that improved FI for non-agricultural enterprises has a greater growth-enhancing effect in urban areas than in rural areas.
Mwangi & Cheluget	2018	Kenya	In their study, the authors analysed the factors that influence SMEs' access to credit using a multiple regression model. The authors found that financial knowledge, financial innovation, and FI accounted for 79% of the variation in SMEs' access to credit.
Ghassibe et al.	2019	Middle East and Central Asia regions	In their study, the authors utilised panel data to analyse the contribution of improved FI for SMEs to economic growth and employment. Firstly, the authors found that SMEs with high levels of FI were able to transmit monetary policy effectively and collect taxes. Secondly, they found that FI increased employment and labour productivity in SMEs. Ultimately, the study concluded that FI had a positive effect on economic growth and employment in the regions covered, compared to other regions.
Lakuma et al.	2019	Uganda	The author investigated the determinants of debt financing use and its impact on FP, examining the characteristics of firms of different sizes between 2009 and 2014, using logistic regression and generalised partial linear modelling. The author found that in developing countries, firm characteristics influence the use of debt financing. In particular, the author found that firms' access to external financing from banks, in other words, access to bank loans, has a positive influence on FP.
Zhu	2023	China	The study investigated the impact of digital financial inclusion on labour income in publicly traded companies. Analysing data from 2011 to 2021, the study found that digital financial inclusion was more significant for small and medium-sized companies and that its effect was more substantial in the western region of China.

Khémiri et al.	2024	MENA region	The mediating role of FI on FP was investigated using the regulatory effect model with System GMM in a sample of 465 firms. In the study covering the period from 2007 to 2020, the regulatory effect of FP on sustainable firm growth through investment was identified.
Munir et al.	2024	SAARC Region	In the study, the authors investigated the impact of FIs on bank performance. Covering the years 2010-2021, the study concluded that FIs can have a significant and positive effect on bank performance. Furthermore, ownership concentration and board independence were found to have a significant mediating effect on the relationship between FI and FP.
Sun & Zhang	2024	China	In a study of micro, small, and medium-sized enterprises, the findings confirmed the positive impact of digital financial inclusion on the technological innovation of these enterprises.
Tameta	2024	Cameroon	The study examined the impact of FI on FP in deposit-taking institutions as of 2022. Overall, it found that FI is necessary for the performance of financial institutions and makes a positive contribution.
Bhatter	2025	India	The study, which covered the period 2014-2023, examined the role of the FI in the banking sector's financial performance. It revealed a U-shaped relationship and concluded that the FI became the driving force behind financial performance after a critical threshold was reached.
Ayele et al.	2025	Ethiopia	In a study of 16 banks using the two-stage Generalised Method of Moments (GMM) system, the authors concluded that FI has a positive effect on the FP of commercial banks.
Mahato & Kanth	2025	India	In the study examining digital financial inclusion, the authors investigated its impact on financial performance in family firms. Based on findings from 312 women entrepreneurs, the study revealed that digital financial inclusion positively contributes to business performance.
Manasseh et al.	2025	54 countries in the African region	The study examined the period from 2000 to 2020, and the findings indicate a long-term cointegration relationship between financial inclusion, financial performance, and economic welfare in the relevant countries.
Peter et al.	2025	India	Using data from 216 women entrepreneurs, the study examined the impact of traditional and digital FI on FP. The results showed that both traditional and digital FI positively affect FP.
Vu et al.	2025	Vietnam	The study empirically investigated the impact of financial inclusion (FI) on return on assets (ROA) through corporate borrowing, using a financial inclusion index from 2008 to 2018. Conducted on firms in the information and communication technology sector, the study found that FI negatively affected ROA both directly and through corporate borrowing.

2.3. Literature Review and Original Value

Most studies addressing access to financial services in the national and international literature have focused on credit access. The results of studies in the literature indicate that access to financial services is a significant problem for the growth and development of firms, especially SMEs. In this regard, most research focuses on SMEs. Empirical studies demonstrate that access to credit is a significant factor in access to financial products and services.

Studies on FI, especially in the national literature, are limited. This highlights the importance of examining firms' access to the products and services they need and use, particularly in the context of banking products and services. Therefore, this study differs from other studies in that it examines the impact of FI on FP, in addition to the dimensions of access to credit, bank working capital financing, and the availability of open credit. The study also differs from other studies in the literature in terms of the years analysed, the countries studied within the sample, and the number of firms. In addition, the use of multidimensional panel data models in examining the role of FI on FP contributes to the originality of the study, especially in the national finance literature. In this respect, the study and its findings are likely to make an important contribution to closing the gap in the literature. Most research on the impact of FI on firms appears to be in the international literature. Therefore, it is expected that this study will contribute to filling a significant gap, especially in the national literature.

3. Implementation

3.1. Data & Methodology

In developing countries, firms' limited access to financial goods and services is viewed as a significant barrier to FP. FI on FP in developing countries. Furthermore, the study specifically analyses the effect of firm characteristics on FP. To this end, the study refers to companies that participated in the WB's ES, which was conducted in 82 developing

countries between 2010 and 2018. The results of the study, therefore, include data from 42,744 companies in the countries covered by the study. The countries, sectors, and company numbers included in the study are listed in Appendix 1-A and Appendix 2-A.

To investigate the effect of FI on FP, studies in the literature were followed, and details regarding the variables used are offered in Table 3.

Table: 3
Details of Variables

Variable	Types of Variables	Symbol	References
Total Sales	Dependent	lnsales	Beck et al. (2004), Gatti & Love (2006), Rahaman (2011), Harrison et al. (2014), Efobi et al. (2016), Güney (2019), Lu et al. (2020), Nizam et al. (2021)
Credit Debt and/or Credit Limit	Independent	credit	Gatti & Love (2006), Atieno (2009), Beck et al. (2013), Farazi (2014), Love & Peria (2014), Ayyagari et al. (2016), Efobi et al. (2016), Chauvet & Jacolin (2017), Fowowe (2017), Fombang & Adjasi (2018), Güney (2019), Ratnawati (2020), Özşuca (2020), Lee et al. (2020), Nizam et al. (2021)
Working capital is financed through banks	Independent	workcap	Aterido et al. (2009), Farazi (2014), Efobi et al. (2016), Knack & Xu (2017), Chauvet & Jacolin (2017), Güney (2019), Ratnawati (2020)
Open a credit facility	Independent	opencredit	Gatti & Love (2006), Beck et al. (2013), Love & Peria (2014), Efobi et al. (2016), Chauvet & Jacolin (2017), Fowowe (2017), Fombang & Adjasi (2018), Güney (2019), Özşuca (2020)
The firm's identification of access to financing as a significant obstacle to its current operations	Independent	obstec	Demirgüç (2004), Knack & Xu (2017), Güney (2019), Özşuca (2020)
Firm Age	Control	lnfirmage	Sleuwaegen & Goedhuys (2002), Demirguc-Kunt et al. (2004), Gatti & Love (2006), Karagöz & Demirgil (2009), Rahaman (2011), Beck et al. (2013), Farazi (2014), Love & Peria (2014), Harrison et al. (2014), Ayyagari et al. (2016), Efobi et al. (2016), Knack & Xu (2017), Bose et al. (2017), Fombang & Adjasi (2018), Kumarasamy & Singh (2018), Güney (2019), Lu et al. (2020)
Export	Control	export	Beck et al. (2004), Demirgüç-Kunt et al. (2004), Beck et al. (2005), Karagöz & Demirgil (2009), Aterido et al. (2009), Harrison et al. (2014), Love &Peria (2014), Ayyagari et al. (2016), Knack & Xu (2017), Chauvet & Jacolin (2017), Fombang & Adjasi (2018), Lakuma (2019), Güney (2019), Özşuca (2020), Lee et al. (2020), Nizam et al. (2021)
Foreign	Control	foreign	Clarke et al. (2001), Beck et al. (2004), Demirgüç-Kunt et al. (2004), Beck et al. (2005), Gatti & Love (2006) Aterido et al. (2009), Beck et al. (2013), Love & Peria (2014), Harrison et al. (2014), Ayyagari et al. (2016), Knack & Xu (2017), Chauvet & Jacolin (2017), Bose et al. (2017), Kumarasamy &Singh (2018), Lakuma (2019), Lee et al. (2020), Özşuca (2020), Nizam et al. (2021)
Firm Size (small if the number of employees is less than 100, large if the number of employees is more than 100)	Control	size	Beck et al. (2004), Kunt et al. (2004), Beck et al. (2005), Aterido et al. (2009), Karagöz & Demirgil (2009), Love & Peria (2014), Knack & Xu (2017), Demirgüç-Fombang & Adjasi (2018), Kumarasamy & Singh (2018), Güney (2019), Lakuma (2019) Lee et al. (2020), Nizam et al. (2021)

Table 3 displays the type, symbol, and references of the variables used in the study models. Accordingly, a firm's total revenue was used as the dependent variable to represent FP. To include a wide range of country and company data in the analysis, consistent with the data set and scope of the study, total sales data were used as the dependent variable. A review of the literature shows that financial ratios are preferred for analysing FP. These include liquidity, financial structure, activity, and profitability ratios. Among the profitability ratios, return on assets (ROA) and return on equity (ROE) are among the most favoured ratios (Veeravel et al., 2025; Tahtamoni et al., 2025). However, it can also be observed that activity ratios related to sales and variables related to the sales growth rate were also used (Beck et al., 2004; Gatti & Love, 2006; Rahaman, 2011; Harrison et al., 2014; Efobi et al., 2016; Güney, 2019; Lu et al., 2020; Nizam et al., 2021). As shown in Table 2, studies using sales amounts were also found. In this context, annual sales amounts for firms with available data for the year, country, and sector covered in the study were used to examine firm performance. In the Enterprise Surveys, sales amounts were reported in each country's local currency. Accordingly, total sales data for the firms were obtained. Thus, total sales were deflated using the GDP deflator, calculated using the expenditure approach, with 2010 as the base year. The data for the study come from the WB's ES dataset (WB, <http://www.enterprisesurveys.org>). Also, Enterprise Surveys stratify and categorise firms

by size based on the number of employees. In the surveys, small firms were defined as those with 5 to 19 employees, medium firms as those with 20 to 99 employees, and large firms as those with 100 or more employees.

According to the WB's ES dataset, sectors were determined using the United Nations' "International Standard Industrial Classification of All Economic Activities" (ISIC Rev. 3.1). Studies on the importance of FI for firms are based on the view that FI contributes to firm growth. Studies in the literature indicate that FI, particularly as a key factor in accessing credit, enhances firms' sales growth. Chauvet & Jacolin (2017) and Lee et al. (2020) concluded in their studies that FI has a positive effect on firms' growth in developing countries. Ratnawati (2020) found that a high level of FI in Indonesian microenterprises and SMEs has a positive influence on their performance. Based on these findings, the research hypothesis developed in the study is as follows:

H_1 = FI has a positive impact on FP in developing countries.

The sub-research hypotheses are as follows:

H_{1a} = In developing countries, having a loan and/or line of credit with a financial organisation has a positive impact on FP.

H_{1b} = In developing countries, utilising banks to finance working capital has a positive effect on FP.

H_{1c} = In developing countries, firms' access to open credit has a positive effect on FP.

H_{1d} = In developing countries, firms' definition of access to finance as an obstacle has a negative impact on FP.

Panel data enables the construction of comprehensive and complex models that span multiple units and time dimensions, as well as the prediction and testing of these models. A multidimensional panel data model comprises a unit or time dimension in a two-dimensional panel data model that has a unit and a time extension (Bölükbaş, 2018: 52). In other words, multidimensional panel data models are panel data models that incorporate multiple time or unit dimensions. Models in which multiple units or time dimensions are nested are referred to as "nested multidimensional panel data models." In contrast, models in which units or time dimensions are not nested are referred to as "non-nested multidimensional panel data models." A three-dimensional panel data model that includes two units and one time dimension is generally expressed as follows (Yerdelen-Tatoğlu, 2020: 351-352):

$$Y_{ijt} = \alpha + \beta X_{ijt} + \mu_i + \gamma_j + \lambda_t + u_{ijt} \, (i=1,\ldots..N;\ j=1,\ldots..M \text{ and } t=1,\ldots\ldots T) \qquad (1.1)$$

The terms i and j in the model represent the unit dimensions of the model, and t represents the time dimension. In addition, μ_i and γ_j stand for the unit effects and λ_t for the time effect. This model has the specified dimension and three effects. In this model, X_{ijt} are covariates, and the error terms are unrelated (Balázsi et al., 2017: 6). The dimensions in the model provide information about the dimensions contained in the data that are related to the

variables. The presence of more than two dimensions in the model indicates that the data related to the variables contain information on more than two dimensions (unit or time). The effects in the model refer to the examination of unobserved unit and time effects, which provide information about the direction of the model. Depending on whether the unit and time effects in the model are significant, three-dimensional two-way or three-dimensional one-way models can be developed:

$$Y_{ijt} = \alpha + \beta X_{ijt} + \mu_i + \gamma_j + u_{ijt} \, (i=1,\ldots\ldots N; j=1,\ldots\ldots M \text{ and } t=1,\ldots\ldots T) \quad (2.1)$$

$$Y_{ijt} = \alpha + \beta X_{ijt} + \mu_i + \lambda_t + u_{ijt} \, (i=1,\ldots\ldots N; j=1,\ldots\ldots M \text{ and } t=1,\ldots\ldots T) \quad (3.1)$$

$$Y_{ijt} = \alpha + \beta X_{ijt} + \gamma_j + \lambda_t + u_{ijt} \, (i=1,\ldots\ldots N; j=1,\ldots\ldots M \text{ and } t=1,\ldots\ldots T) \quad (4.1)$$

$$Y_{ijt} = \alpha + \beta X_{ijt} + \mu_i + u_{ijt} \, (i=1,\ldots\ldots N; j=1,\ldots\ldots M \text{ and } t=1,\ldots\ldots T) \quad (5.1)$$

$$Y_{ijt} = \alpha + \beta X_{ijt} + \gamma_j + u_{ijt} \, (i=1,\ldots\ldots N; j=1,\ldots\ldots M \text{ and } t=1,\ldots\ldots T) \quad (6.1)$$

$$Y_{ijt} = \alpha + \beta X_{ijt} + \lambda_t + u_{ijt} \, (i=1,\ldots\ldots N; j=1,\ldots\ldots M \text{ and } t=1,\ldots\ldots T) \quad (7.1)$$

Models (2.1), (3.1), and (4.1) are three-dimensional and bidirectional, while models (5.1), (6.1), and (7.1) are three-dimensional and one-dimensional. Multidimensional panel datasets are used to study phenomena such as international trade and/or capital flows between countries and regions, trade volumes between different products and businesses, and airline passenger numbers between multiple companies (Matyas & Balázsi, 2012: 1). Multidimensional panel data is also frequently used in social network analysis, which examines the relationships between social entities (such as individuals, firms, groups) (Bun et al., 2017:109).

Multidimensional panel datasets have some common characteristics. These can be listed as follows (Matyas, 2017):

- These data sets are often deficient and unbalanced, often intentionally, with a high rate of missing or incomplete observations.
- The number of observations can be very big in some dimensions, in the tens of millions, while it is quite restricted in other dimensions.
- A right-sided index gap, which is derived from economic theory, is often present in models. For instance, if the dependent variable is three-dimensional, there are often only two explanatory variables, etc.
- Theoretically, the number of available models can be quite large, even when taking into account possible effect specifications and interaction effects.

Multidimensional panels can generally also be modelled with missing data. Missing data or units can cause this, as it may drop out of the sample; i.e., if i = j in the model, $y_i\, j_t$ may not be present. These missing data imply that for each pair of persons (ij), $t \in Ti\, j$, where the index set Ti j is a subvariety of the general index set {1, ..., T} of periods covered by the data. We also assume that for each t, there is at least one pair (i, j); for each i, there is at least one pair (j, t); and for each j, there is at least one pair (o). This supposition is

considered unrealistic, as it essentially necessitates removing individuals or periods from the dataset without observations (Balázsi et al., 2017: 12). Therefore, this study uses an unbalanced panel dataset. The observation counts for countries and sectors are shown in Appendix 1-A and Appendix 2-A.

To enable a detailed analysis of the effect of FI on FP, this study examines four different models. These models analyse the impact of FI on FP, together with firm characteristics. In this context, the following multidimensional models were developed based on Chauvet and Jacolin (2017) and Lee et al. (2020):

$$Insales_{i,j,k,t}=\beta_0 + \beta_1 \text{credit}_{i,k,j,t} + \beta_2 \text{lnfirmage}_{i,k,j,t} + \beta_3 \text{export}_{i,k,j,t} + \beta_4 \text{foreign}_{i,k,j,t} + \beta_5 \text{size}_{i,k,j,t} + \mu_j + \lambda_k + \gamma_t + u_{i,k,j,t} \quad (1)$$

$$Insales_{i,j,k,t}=\beta_0 + \beta_1 \text{workcap}_{i,k,j,t} + \beta_2 \text{lnfirmage}_{i,k,j,t} + \beta_3 \text{export}_{i,k,j,t} + \beta_4 \text{foreign}_{i,k,j,t} + \beta_5 \text{size}_{i,k,j,t} + \mu_j + \lambda_k + \gamma_t + u_{i,k,j,t} \quad (2)$$

$$Insales_{i,j,k,t}=\beta_0 + \beta_1 \text{opencredit}_{i,k,j,t} + \beta_2 \text{lnfirmage}_{i,k,j,t} + \beta_3 \text{export}_{i,k,j,t} + \beta_4 \text{foreign}_{i,k,j,t} + \beta_5 \text{size}_{i,k,j,t} + \mu_j + \lambda_k + \gamma_t + u_{i,k,j,t} \quad (3)$$

$$Insales_{i,j,k,t}=\beta_0 + \beta_1 \text{obstec}_{i,k,j,t} + \beta_2 \text{lnfirmage}_{i,k,j,t} + \beta_3 \text{export}_{i,k,j,t} + \beta_4 \text{foreign}_{i,k,j,t} + \beta_5 \text{size}_{i,k,j,t} + \mu_j + \lambda_k + \gamma_t + u_{i,k,j,t} \quad (4)$$

In the models developed in this study, the index i represents firms, the index j represents countries, the index k represents sectors, and the index t represents years. Accordingly, the models include the dimensions country, sector, firm, and year. Firms are in the lowest dimension, sectors are in the next higher category, and countries are in the next higher category of sectors. The data were created in this framework and treated as nested multidimensional models. However, unobserved country, sector, and year effects were included in the models; μ_j stands for the country effect, γ_k for the sector effect, and λ_t for the year effect. Accordingly, the models developed in this study are four-dimensional and triply nested panel data models with three time dimensions. Therefore, the study models are four-dimensional nested panel data models with company, country, sector, and year dimensions, and are three-way models that analyse the effects of country, sector, and year. According to Balázsi et al. (2018), the use of multidimensional data has increased as they have become more widely available. Multidimensional models can be more computationally challenging than two-dimensional models. These data models can produce biased and inconsistent results for internal estimation tests in dynamic models.

3.2. Findings

In this section, the analysis findings are presented. During the analysis, the Likelihood Ratio (LR) test was first used to assess the significance of the unit and time effects in the models. Six different tests were conducted for each model, individually, in pairs, and in triplicate, to test for the presence of unobserved country, sector, and time effects in the models. Based on the unobserved effects identified in the models, the appropriate

model structure was determined, and the model estimation process began. The maximum likelihood method, using the random effects approach, and the within-group estimation method, using the fixed effects approach, were employed for model estimation. The decision between the fixed effects estimator and the random effects estimator was made based on the results and sample selection. First, the descriptive statistics for the variables in the models developed in the study are presented in Table 4.

Table: 4
Descriptive Statistics

Variable	Observ.	Mean	Standard Dev.	Min. Value	Max. Value
lnsales	42.744	12.87	2.53	2.66	26.74
credit	42.744	0.34	0.47	0	1
workcap	42.744	0.31	0.46	0	1
opencredit	42.744	0.36	0.48	0	1
obstec	42.744	0.15	0.36	0	1
lnfirmage	42.744	2.69	0.70	0	5.35
foreign	42.744	0.10	0.30	0	1
export	42.744	0.23	0.42	0	1
size	42.744	0.80	0.40	0	1

In the study, *lnsales* was used as an indicator of FP*,* and *lnfirmage* was used as an indicator of firm characteristics and was also included in the analysis by taking its natural logarithm due to differences in scale. The variables *credit, workcap, opencredit*, and *obstec* were used as indicators of FI and are dummy variables. Therefore, the variables take values between 0 and 1 as shown in Table 3. Accordingly, between 2010 and 2018, the average of firms with credit debt and/or credit limits in the countries concerned was calculated at 0.34, the average of firms that finance working capital through banks at 0.31, the average of firms with open credit at 0.36 and the average of firms that consider access to finance as obstec at 0.15. It is worth noting that the average values of the firms included in the study were comparatively close to each other in terms of credit utilisation, bank financing of working capital, and the ability to use open credit.

Additionally, the variables *foreign, export*, and *size* were used as indicators of firm characteristics and are represented as dummy variables. Therefore, the variables assume values of 0 or 1. Accordingly, between 2010 and 2018, the average export rate of firms across the countries included in the study was calculated to be 0.23, the average export rate of companies with foreign partnerships was 0.10, and the average export rate of small companies with fewer than 100 employees was 0.80. It can be concluded that the vast majority of firms included in the study were small firms with fewer than 100 employees, and that the probability of exporting and forming foreign partnerships was relatively low.

Multidimensional models with multiple unit or time effects can also be estimated using fixed and random effects; however, the significance of all effects in the model must be tested first. The model should be estimated by selecting appropriate specifications based on the significant unit and/or time effect (Yerdelen-Tatoğlu & İçen, 2019: 30). In multidimensional random effects models, the significance of unobserved unit and time effects is also tested utilising the Likelihood Ratio (LR) test. The significance of unit and/or

time effects in the models, in other words, whether it is a classical or multidimensional model, is determined by the LR test. Based on the LR test, the appropriate model structure is determined, and the model estimation process begins (Bölükbaş, 2018: 99).

In this study, the validity of the country, industry, and year effects estimated in the model was tested using the LR test, and the outcomes are shown in Table 5.

Table: 5
Likelihood Ratio (LR) Test Results

No	Hypothesis	Model (1)	Model (2)	Model (3)	Model (4)
1	H_0:$\sigma_\mu = \sigma_\gamma = \sigma_\lambda = 0$	14629.70*	14917.79*	14800.39*	15342.40*
2	$H_0 = \sigma_\mu = \sigma_\lambda = 0$	12513.59*	13751.63*	13672.75*	14085.83*
3	$H_0 = \sigma_\mu = \sigma_\gamma = 0$	12513.59*	12780.79*	12678.74*	13204.97*
4	$H_0 = \sigma_\gamma = \sigma_\lambda = 0$	5963.23*	6098.42*	6160.74*	6219.64*
5	$H_0 = \sigma_\mu = 0$	11444.29*	11698.64*	11635.63*	12036.60*
6	$H_0 = \sigma_\gamma = 0$	1454.66*	1481.16*	1432.90*	1536.67*
7	$H_0 = \sigma_\lambda = 0$	4653.28*	4756.45*	4880.60*	4808.24*

*Note: * indicates significance at the 1% level.*

Since the LR test is a combined test, its alternative hypothesis is that the standard error of at least one effect is different from zero. Accordingly, the country, sector, and year effects were initially tested together in the model. In the test in which the standard error of these three effects is zero, H_0 was rejected. In the second, third, and fourth tests, the unobserved country, sector, and year effects were examined for country-year, country-sector, and sector-year interactions, respectively. As a result of these tests, H_0 was rejected, and at least one of the two effects was found to be statistically significant. In the fifth, sixth, and seventh tests, the country, sector, and year effects were examined separately for each factor. Therefore, the presence of all three effects was established in the first model. It was concluded that the country, sector, and year effects were significant in the first research models of the study. This led to the conclusion that the models were triple, four-dimensional panel data models with two unit effects and a time effect.

All models in the study were estimated using fixed- and random-effects approaches, with the results presented in Tables 6 and 7. Tests for heteroskedasticity and autocorrelation assumptions were conducted for the models estimated with the fixed-effects approach, and the findings are presented in the paragraph below.

Table 6 presents the assumptions tested during the model estimation process. Accordingly, the Breusch-Pagan/Cook-Weiseberg and White tests were used to test for heteroscedasticity. These tests identified the presence of a heteroscedasticity problem in all models. In addition, the Wooldridge test, used to detect autocorrelation, also indicated a problem with autocorrelation in the model. Therefore, all models were estimated with the standard error estimators of Arellano, Froot and Rogers, which are resistant to heteroscedasticity and autocorrelation.

Table: 6
Within-Group Estimator Results

Model 1					Model 2				
Variable	**Coef.**	**Stand. Dev**	**Robust1**	**Robust2**	**Variable**	**Coef.**	**Stand. Dev**	**Robust1**	**Robust2**
credit	0,663*	0,021 *(-31,44)*	0,053 *(-12,50)*	0,036 *(-18,17)*	**workcap**	0,552*	0,021 *(25,61)*	0,048 *(11,33)*	0,042 *(12,90)*
lnfirmage	0,238*	0,014 *(16,90)*	0,050 *(4,70)*	0,028 *(8,40)*	**lnfirmage**	0,244*	0,014 *(17,26)*	0,051 *(4,73)*	0,02 *(8,27)*
export	0,603*	0,024 *(24,38)*	0,080 *(7,51)*	0,061 *(9,79)*	**export**	0,612*	0,024 *(24,64)*	0,081 *(7,48)*	0,061 *(9,88)*
foreign	0,782*	0,033 *(23,61)*	0,100 *(7,78)*	0,045 *(16,68)*	**foreign**	0,776*	0,033 *(23,33)*	0,101 *(7,65)*	0,0459 *(16,90)*
size	-2,218*	0,025 *(-88,56)*	0,162 *(-13,63)*	0,063 *(-35,00)*	**size**	-2,256*	0,025 *(90,02)*	0,166 (-13,57)	0,062 *(-35,83)*
R^2	0,264	**Obser. Num.**	**42,744**		**R^2**	0,259	**Obser. Num.**	**42,744**	
F statistic		307,43*	183,22*	1973,11*	**F statistic**		2989,97*	149,73*	1481,15*
Breusch-Pagan/	70,63*	**Wooldridge test:**	1353,417*		**Breusch-Pagan/**	72,27*	**Wooldridge test:**	738,249*	
Cook Weiseberg	280,04*	**White test:**	721,682*		**Cook Weiseberg**	290,5*	**White test:**	1360,407*	
Model 3					**Model 4**				
Variable	**Coef.**	**Stand. Dev**	**Robust1**	**Robust2**	**Variable**	**Coef.**	**Stand. Dev**	**Robust1**	**Robust2**
opencredit	0,777*	0,021 *(35,53)*	0,0643 *(12,09)*	0,023 *(32,43)*	**obstec**	-0,323*	0,026 *(-12,07)*	0,104 *(-3,10)*	0,046 *(-6,95)*
lnfirmage	0,215*	0,01 *(15,28)*	0,0505 *(4,27)*	0,027 *(7,73)*	**lnfirmage**	0,254*	0,014 *(17,90)*	0,051 *(4,91)*	0,030 *(8,44)*
export	0,614*	0,024 *(24,94)*	0,0768 *(7,99)*	0,061 *(9,92)*	**export**	0,664*	0,024 *(26,67)*	0,084 *(7,87)*	0,063 *(10,48)*
foreign	0,735*	0,033 *(22,26)*	0,0969 *(7,59)*	0,043 *(16,93)*	**foreign**	0,742*	0,033 *(22,17)*	0,096 *(7,73)*	0,044 *(16,54)*
size	-2,210*	0,024 *(-88,57)*	0,1599 *(-13,82)*	0,055 *(-39,74)*	**size**	-2,304*	*0,025* *(-91,68)*	0,165 *(13,91)*	0,059 *(-38,81)*
R^2	0,269	**Obser. Num.**	**42,744**		**R^2**	0,237	**Obser. Num.**	**42,744**	
F statistic		3151,24*	151,11*	1276,42*	**F statistic**		2854,39*	177,33*	1097,33*
Breusch-Pagan/	73,56	**Wooldridge test:**	1335,719*		**Breusch-Pagan/**	77,65	**Wooldridge test:**	1306,289*	
Cook Weiseberg	317,25	**White test:**	701,2369*		**Cook Weiseberg**	320,07	**White test:**	1021,985	

Note: The variance increase factor values for the variables were calculated to be below 5.
Robust1: Results obtained using Arellano and Froot Rogers' robust standard errors at the country level.
Robust2: Results obtained using Arellano and Froot Rogers' robust standard errors at the sector level.

In the robust estimator of Arellano, Froot, and Rogers, only the values of the F-statistic, standard deviation, and t-statistic differ from those of the within-group estimator. The R^2 values, coefficients, and significance levels of the variables remain unchanged compared to the within-group estimator. Therefore, the results of the within-group estimation method and the robust estimation for country and sector are presented in a single table. Next, the models were estimated with the maximum likelihood method using a random effects approach, and the outcomes are offered in Table 7.

Table 7 shows the results of the maximum likelihood method for all models. First, the Wald test results show that all models are generally significant. According to the Z-statistic, all variables are significant at the 1% level. Accordingly, the variables *credit, workcap, opencredit, lnfirmage, export*, and *foreign* have a statistically significant effect on lnsales, while the variables obstec and size have a statistically significant effect on *lnsales.* The country, year, and sector effects in Model 1 account for 117%, 54%, and 33% of the total variance. The country, year, and sector effects in Model 2 account for 119%, 54% and 33% of the total variance, respectively. In Model 3, the country, year, and sector effects account for 116%, 52% and 32% of the total variance, respectively. In Model 4, the shares of country, year, and industry effects in the total variance are 120%, 53% and 34%, respectively. According to Models 1 and 2, a 1% increase in firm age outcomes results in a

0.32% increase in firm sales, while Model 3 indicates a 0.31% increase and Model 4 indicates a 0.33% increase. The estimation results reveal that firms' access to external finance, including bank loans, credit lines, and open credit facilities, positively contributes to their sales performance. However, having an open credit facility can provide the greatest impact. Conversely, financial constraints are shown to hinder firms' operational efficiency and reduce sales. Additionally, engagement in exports and partnerships with foreign firms enhances sales outcomes, while smaller firms with fewer than 100 employees tend to experience lower sales levels.

Table: 7
Maximum Likelihood (ML) Estimator Results

Model/Variables	(1)	(2)	(3)	(4)
credit	0,6119* [0,020]			
workcap		0,5277* [0,020]		
opencredit			0,7932* [0,021]	
obstec				-0,2957* [0,025]
lnfirmage	0,324* [0,013]	0,326* [0,013]	0,307* [0,013]	0,336* [0,013]
export	0,605* [0,0236]	0,611 [0,023]	0,605* [0,023]	0,660* [0,023]
foreign	0,923* [0,0315]	0,918 [0,031]	0,882* [0,031]	0,884* [0,031]
size	-2,061 [0,023]	-2,090* [0,023]	-2,031* [0,023]	-2,136* [0,024]
Fixed Term	12,863 [0,237]	12,93* [0,237]	12,795 [0,232]	13,164* [0,239]
Wald chi2(3)	14629,70*	15476,87*	16465,30*	14772,05*
R.country(p_{μ})	1,1723	1,195147	1,1619	1,2088
R.year ($p_{\gamma t}$)	0,5423	0,5371	0,5205	0,5358
R.sector (p_{λ})	0,3286	0,3313	0,3214	0,3431
Observation Number	42,744	42,744	42,744	42,744

*Note: * Indicates a significance level of 1%. Standard deviation values are shown in square brackets. Probability value findings for the z statistic in the maximum likelihood method are included.*

3.3. Decision Between the Estimators

The four different multidimensional panel models developed in this study were estimated using the maximum likelihood method with a random effects approach and the within-group estimator method with a fixed effects approach. The findings of this model specification favour the random effects estimator. Moreover, the random effects estimators are more effective than the fixed effects estimators when N (the number of units) is greater than T (the number of years) and the assumptions regarding random effects are valid (Gujarati, 2016: 419). Baltagi et al. (2001) found that the maximum likelihood estimator is one of the most powerful estimators in unbalanced panel data when estimating the standard errors and variance components of regression coefficients in nested panel data models, and they recommended its use. According to Baltagi (2005), the fixed-effects approach is appropriate when random selection from the population is involved, as it can lead to a loss of degrees of freedom when the number of units in a model is significant. Accordingly, for the outcomes and sample selection, the maximum likelihood estimator with the random effects approach was considered in the models.

4. Conclusion and Recommendations

Financial inclusion, considered a key tool for individuals and firms to achieve their goals and objectives and enhance their welfare, is viewed as a significant challenge in developing countries. The study aimed to research the role of FI on FP. To this end, multidimensional panel data models were developed and estimated using panel data analysis using data from 42,744 firms across 23 different sectors in 82 developing countries between 2010 and 2018.

This study examined the effect of FI on FP, considering indicators of access to and utilisation of financial services within firms. Four multidimensional panel models were developed for this study. As the effect of FI on FP needs to be analysed in detail, each indicator of FI was examined in these models, together with the characteristics of the firms.

In all the models developed in this study, firms' annual sales were used as the dependent variable, while FI indicators served as the independent variables. Variables related to the firms' characteristics were utilised as control variables. In a first step to predict the models, the estimated unit and time effects were tested. Country and sector were considered as unobserved unit effects, while year was treated as a time effect. The four different models developed in the study were tested for country, sector, and time impacts utilising the LR test. The LR tests revealed that country, sector, and year effects were present in all models. The models developed for this purpose were determined as four-dimensional (country, sector, company, and year) and triple multidimensional panel models with country, sector, and year effects. After the LR tests, the models were estimated using the random effects approach and the maximum likelihood method. The random effects approach was deemed convenient for the study based on the results obtained during model estimation and the sample selection.

The findings of the model estimation reveal that firms with loans and/or credit lines from financial institutions have higher sales than firms without loans and/or credit lines from financial organisations; firms that finance their working capital through banks have higher sales than firms that do not finance their working capital through banks; and firms with open access to credit have lower sales than firms that do not. Additionally, firms that identified access to finance as a barrier tend to have lower sales than those that do not. Therefore, the use of credit lines, along with open credit and bank financing of working capital, which serve as indicators of access to finance, was found to have a positive impact on FP. In addition, exports, large companies, foreign partnerships, and older age were found to have a positive impact on FP.

According to the estimation outcomes of the four different research models of the study, the primary hypothesis (H_1) and the sub-hypotheses (H_{1a}, H_{1b}, H_{1c}, H_{1d}) could not be rejected. The results are consistent with those in the present literature.

The results indicate that improved FI within firms increases their sales and, therefore, has a positive effect on their success. It was also found that the FI indicator with the most significant impact on increasing company sales is access to open credit. This illustrates the importance of access to financial services in developing countries for FP.

In these conditions, it is crucial to determine the grade of FI in countries. Given the importance of a country's financial structure, it is crucial to establish standardised measurement criteria for determining FI in future policies and strategies. In addition, studies aimed at determining the level of FI in companies should be strengthened and promoted.

Banks, the cornerstone of the financial system, are the leading providers of financial services. Removing obstacles that prevent businesses from raising money through banks, instead of borrowing informally to carry out their investments or daily activities, is crucial for the smooth operation of the financial system. Therefore, improvements in bureaucratic procedures and collateralisation by banks will help solve the problems faced by businesses, especially in accessing credit. Additionally, diversifying products and services for companies of different sizes will facilitate access to these offerings. However, banks must also take necessary legal measures to minimise risks, such as loan defaults. In addition, strengthening banks' technological infrastructure and offering simple and cost-effective digital banking services will accelerate and facilitate companies' access to these products and services. By providing businesses with easy access to the financial system's products and services, in other words, by obtaining official financing, investing their savings, and conducting transactions, they will be able to achieve their goals and facilitate faster growth.

Countries' financial strategies and policies also have a critical role in firms' access to financial goods and services. When setting economic policies, it is crucial to take measures that ensure banks and other official financial institutions can easily finance companies' investments. By removing barriers to investment financing, such as access to credit, increased investment can lead to larger businesses, more employment, and ultimately, economic growth. Therefore, the necessary measures should be taken to remove the barriers that prevent companies from accessing the goods and services provided by the financial system, and strategies should be developed to address this problem. To address this problem, technological advances can be considered as incentives for better access to financial services. In addition, cooperation between policymakers and the real sector, as well as credit institutions, can help facilitate business access to financial products and services, which is vital for accelerating countries' economic growth objectives. In this context, policymakers need to propose supportive policies. At this point, the level of development of the financial system comes to the fore. Increasing financial inclusion can contribute to the depth and development of the financial system. Therefore, it is crucial to improve the financial literacy of companies, especially their owners and managers. In this context, it is recommended that companies receive regular financial literacy training at both regional and national levels.

Furthermore, implementing business processes in finance departments and incorporating digital processes can enable companies to use financial services at lower costs.

Integrating fintech applications into business processes and developing innovative financial tools can improve companies' access to and use of financial products and services. Additionally, considering environmental policies in the use and delivery of financial products and services to promote sustainability can also support this goal.

The study can be extended to include comparisons between countries, sectors, regions, or years. Models can also be developed using different practices and variables (especially about fintech or digital finance) related to the financial goods and services used by companies. In particular, future studies can investigate the impact of firms' access to and utilisation of digitalised banking goods and services on FP. In addition, the findings of the study support those of Chauvet and Jacolin (2017) and Lee et al. (2020).

References

Abdmoulah, W. & R.B. Jelili (2013), "Access to Finance Thresholds and the Finance-Growth Nexus", *Economic Papers*, 32(4), 522-534.

Amha, W. (2013), "The Impact of Financial Access on Firm Growth: Evidence from Ethiopian Grain Traders and Millers", *Ethiopian Journal of Economics*, 22(1), 139-171.

Aterido, R. (2009), "Big Constraints To Small Firms' Growth? Business Environment And Employment Growth Across Firms", Policy Research *Working Paper*, 5032.

Atieno, R. (2009), "Linkages, Access to Finance and the Performance of Small-Scale Enterprises in Kenya", World Institute for Development Economics *Research Paper*, 6.

Ayele, A.B. et al. (2025), "Financial inclusion and bank performance: Evidence from the banking sector in Ethiopia", *Journal of Corporate Finance Research*, 19(1), 54-69.

Ayyagari, M. (2016), "Access to Finance and Job Growth: Firm-Level Evidence Across Developing Countries", Policy Research *Working Paper*, 6704.

Ayyagari, M. et al. (2008), "How Important Are Financing Constraints? The Role of Finance in the Business Environment", *The World Bank Economic Review*, 22(3), 483-516.

Balázsi, L. (2017b), "Random Effects Models", in: L. Matyas (ed.), *Advanced Studies in Theoretical and Applied Econometrics Vol. 50* (35-69), Springer Nature, Switzerland.

Balázsi, L. et al. (2018), "The estimation of multidimensional fixed effects panel data models", *Econometric Reviews*, 37(3), 212-227.

Balázsi, L.et al. (2017a), "Fixed Effects Models", in: L. Matyas (ed.), *Advanced Studies in Theoretical and Applied Econometrics Vol. 50* (1-34), Springer Nature, Switzerland.

Baltagi, B.H. (2005), *Econometric Analysis of Panel Data, 2nd ed.*, John Wiley & Sons Ltd., England.

Baltagi, B.H. et al. (2001), "The Unbalanced Nested Error Component Regression Model", *Journal of Econometrics*, 101(2), 357-381.

Beck, T. & A. Demirgüç-Kunt (2006), "Small And Medium-Size Enterprises: Access to Finance As A Growth Constraint", *Journal of Banking & Finance*, 30, 2931-2943.

Beck, T. (2016), *Financial Inclusion - Measuring Progress and Progress in Measuring*, IMF, Lifting The Small Boats: Statistics For Inclusive Growth, Washington D.C.

Beck, T. et al. (2004), "Bank Competition and Access to Finance: International Evidence", *Journal of Money, Credit, and Banking*, 36(3), 627-648.

Beck, T. et al. (2005a), "Reaching Out: Access to and Use of Banking Services Across Countries", World Bank Policy Research *Working Paper*, 3754.

Beck, T. et al. (2005b), "Finance, Firm Size, and Growth", World Bank Policy Research *Working Paper*, 3485.

Beck, T. et al. (2005c), "Financial and Legal Constraints to Growth: Does Firm Size Matter?", *The Journal of Finance*, 60 (1), 137-177.

Beck, T. et al. (2006), "Banking Services for Everyone? Barriers to Bank Access and Use Around the World", Policy Research *Working Paper*, 4079.

Beck, T. et al. (2013), "Is Small Beautiful? Financial Structure, Size and Access to Finance", *World Development*, 52, 19-33.

Bhatter, H.K. et al. (2025), "Unveiling the Curvilinear Dynamics: Financial Inclusion and Bank Performance in India", *Managerial Finance*, 51(11), 1742-1757.

Bose, S. et al. (2017), "Non-Financial Disclosure and Market-Based Firm Performance: The Initiation of Financial Inclusion", *Journal of Contemporary Accounting & Economics*, 13, 263-281.

Bölükbaş, Ö.F. (2018), "Çok Boyutlu Panel Veri Modelleri: Firma Karakteristiklerinin Sermaye Yapısı Üzerindeki Etkilerinin İncelenmesi", *Doctoral Dissertation*, Marmara Üniversitesi, Sosyal Bilimler Enstitüsü.

Bun, M.J.G. et al. (2017), "Dynamic Models and Reciprocity", in: L. Matyas (ed.), *Advanced Studies in Theoretical and Applied Econometrics Vol. 50* (101-123), Springer Nature, Switzerland.

Charfeddine, L. & S. Zaouali (2022), "The effects of financial inclusion and the business environment in spurring the creation of early-stage firms and supporting established firms", *Journal of Business Research*, 143, 1-15.

Chauvet, L. & L. Jacolin (2017), "Financial Inclusion, Bank Concentration and Firm Performance", *World Development*, 97, 1-13.

Claessens, S. & K. Tzioumi (2006), "Measuring Firms' Access to Finance", in: *Access to Finance: Building Inclusive Financial Systems* (1-25), Brookings Institution and the World Bank, Washington, D.C.

Claessens, S. & L. Laeven (2005), "Financial Dependence, Banking Sector Competition, and Economic Growth", *Journal of the European Economic Association*, 3(1),179-207.

Clarke, G.R.G. et al. (2001), "Does Foreign Bank Penetration Reduce Access to Credit in Developing Countries? Evidence from Asking Borrowers", Policy Research *Working Paper*; No. 2716.

Damodaran, A. (2013), "Financial Inclusion: Issues and Challenges", *AKGEC Journal of Technology*, 4(2), 54-59.

Demirgüç-Kunt, A. & L. Klapper (2012), "Measuring Financial Inclusion: The Global Findex Database", Policy Research *Working Paper*, 6025.

Demirgüç-Kunt, A. & V. Maksimovic (1998), "Law, Finance, and Firm Growth", *The Journal of Finance*, 3(6), 2107-2137.

Demirgüç-Kunt, A. et al. (2004), "Business Environment and the Incorporation Decision?", World Bank Policy Research *Working Paper*, 3317.

Efobi, U. et al.(2016), "Exploring Multidimensional Financial Inclusion and Manufacturing Firms Performance in a Developing Country: The Case of Nigeria", AGDI *Working Paper*, No. WP/16/043, African Governance and Development Institute (AGDI), Yaoundé.

Farazi, S. (2014), "Informal Firms and Financial Inclusion: Status and Determinants", World Bank Policy Research *Working Paper*, No. 6778.

Fombang, M.S. & C.K. Adjasi (2018), "Access to Finance and Firm Innovation", *Journal of Financial Economic Policy*, 10(1), 73-94.

Fowowe, B. (2017), "Access to Finance and Firm Performance: Evidence From African Countries", *Review of Development Finance*, 7, 6-17.

Gatti, R. & I. Love (2006), "Does Access to Credit Improve Productivity? Evidence From Bulgarian Firms", World Bank Policy Research *Working Paper*, 3921.

Ghassibe, M. et al. (2019), *SME Financial Inclusion for Sustained Growth in the Middle East and Central Asia*, International Monetary Fund, 19, 209.

Gujarati, D. (2016), *Örneklerle Ekonometri* (Trans. N. Bolatoğlu), 1. Baskı, BB101 Yayınları, Ankara.

Güney, E. (2019), "Finansal Erişim, Gelişmekte Olan Finansal Piyasalar Örneği", *Doctoral Dissertation*, Trakya Üniversitesi, Sosyal Bilimler Enstitüsü.

Harrison, A.E. et al. (2014), "Explaining Africa's (Dis)advantage", *World Development*, 63, 59-77.

Hussain, J. et al. (2018), "Is Knowledge That Powerful? Financial Literacy and Access to Finance: An Analysis of Enterprises in the UK", *Journal of Small Business and Enterprise Development*, 25(6), 985-1003.

International Monetary Fund (N/A), *World Economic Outlook*, <https://www.imf.org/en/Publications/WEO/Issues/2021/01/26/2021-world-economic-outlook-update>, 02.04.2021.

Kabakova, O. & E. Plaksenkov (2018), "Analysis of Factors Affecting Financial Inclusion: Ecosystem View", *Journal of Business Research*, 89, 198-205.

Karagöz, M. & H. Demirgil (2009), "Firma Büyüme Performansını Etkileyen Faktörler", *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 14(2), 47-68.

Khémiri, K. et al. (2024), "Sustainability, Fintech Development And Environmental Performance in MENA Countries", *Sustainability*, 16(3), 2573.

Knack, S. & L.C. Xu (2017), "Unbundling Institutions For External Finance: Worldwide Firm-Level Evidence", *Journal of Corporate Finance*, 44, 215-232.

Koomson, I. & M. Ibrahim (2018), "Financial Inclusion and Growth of Non-Farm Enterprises in Ghana", in: U. Efobi & S. Asongu (eds.), *Financing Sustainable Development in Africa* (369-396), Palgrave Macmillan, Cham.

Korkmaz, Ş. (2016), "Finansal İçerme: Türkiye'de Finansal Erişim Üzerine Bir Model Uygulaması", *Doctoral Dissertation*, İstanbul Üniversitesi, Sosyal Bilimler Enstitüsü.

Kumarasamy, D. & P. Singh (2018), "Access to Finance, Financial Development and Firm Ability to Export: Experience from Asia-Pacific Countries", *Asian Economic Journal*, 32(1), 15-38.

Lakuma, C.P. et al. (2019), "Financial Inclusion and Micro, Small, and Medium Enterprises Growth in Uganda", *Journal of Innovation and Entrepreneurship*, 8, 15.

Lee, C.C. et al. (2020), "Financial Inclusion, Financial Innovation, and Firms' Sales Growth", *International Review of Economics & Finance*, 66, 189-205.

Love, I. & M.S.M. Peria (2014), "How Bank Competition Affects Firms' Access to Finance", *The World Bank Economic Review*, 29(3), 413-448.

Mahato, J. & D. Kanth (2025), "Investigating the Influence of Digital Financial Inclusion on the Performance of Family Firms in India: Does Financial Well-Being Mediate?", *Global Knowledge, Memory and Communication*, https://doi.org/10.1108/GKMC-08-2024-0515.

Manasseh, C.O. et al. (2025), "Examining Financial Inclusion, Performance Management and Economic Prosperity in Africa", *Journal of Management World*, 3(4), 218-232.

Matyas, L. & L. Balázsi (2012), "The Estimation of Multidimensional Fixed Effects", Central European University Department of Economics *Working Papers*.

Matyas, L. (ed.) (2017), *Advanced Studies in Theoretical and Applied Econometrics, Vol. 50*, Springer Nature, Switzerland.

Munir, S. et al. (2024), "Impact of Financial Inclusion on Firm Performance With Moderating Role of Ownership Concentration and Board Independence", *Journal of Law & Social Studies*, 6(3), 258-273.

Mwangi, W.P. & J. Cheluget (2018), "Role of Financial Literacy, Financial Innovation, Financial Inclusion on SME Access to Credit in Kenya: A Case of Kumisa SACCO", *Journal of Finance and Accounting*, 2(2), 1-18.

Nizam, R. et al. (2021), "Financial Inclusion and Firm Growth in Asean-5 Countries: A New Evidence Using Threshold Regression", *Finance Research Letters*, 41, 101861.

Özşuca E.A. (2020), *Türkiye'de Finansal İçerme, Herkes İçin Finansman*, Ankara: Gazi Kitabevi.

Peter, G. et al. (2025), "Unveiling the Nexus: Financial Inclusion, Financial Literacy, and Financial Performance As Catalyst For Women-Owned Enterprises in India", *Journal of Sustainable Finance & Investment*, 6(4), 721-751.

Rahaman, M.M. (2011), "Access To Financing and Firm Growth", *Journal of Banking & Finance*, 35, 709-723.

Rajan, R.G. & L. Zingales (1996), "Financial Dependence and Growth", National Bureau of Economic Research *Working Paper*, 5758.

Ratnawati, K. (2020), "The Influence of Financial Inclusion on MSMEs' Performance Through Financial Intermediation and Access to Capital", *Journal of Asian Finance, Economics and Business*, 7(11), 205-218.

Rojas-Suarez, L. & V. Gonzales (2010), *Access to Financial Services in Emerging Powers: Facts, Obstacles and Policy Implications*, OECD Development Center.

Sleuwaegen, L. & M. Goedhuys (2002), "Growth of Firms in Developing Countries, Evidence From Côte d'Ivoire", *Journal of Development Economics*, 68, 117-135.

Sun, J. & J. Zhang (2024), "Digital financial inclusion and innovation of MSMEs", *Sustainability*, 16(4), 1404.

Tahtamoni, T. et al. (2025), "Impact of ESG practices and economic volatility on firm performance in the US IT sector: Evidence from 2010-2022", *Journal of Environmental Management*, 393, 127048.

Tameta, S. (2024), "The effects of financial inclusion on financial performance of financial institutions in Cameroon", *International Journal of Economic Policy*, 4(3), 12-30.

United Nations (N/A), <https://unstats.un.org/unsd/classifications/Econ/ISIC.cshtml>, 14.11.2021.

Veeravel, V. et al. (2025), "Does internal carbon pricing improve firm performance? Evidence from Indian listed companies", *Finance Research Letters*, 86, 108780.

Vu, M. et al. (2025), "The mediating role of corporate borrowings in the nexus between financial inclusion and performance of ICT firms: New insights from Vietnam", *Applied Economics*, 57(30), 4379-4393.

World Bank (N/A), *Enterprise Survey*, <http://www.enterprisesurveys.org>, 12.12.2020.

Yerdelen-Tatoğlu, F. & H. İçen (2019), "Çevresel Kuznets Eğrisinin Çok Boyutlu Panel Veri Modelleri ile Analizi", *Anadolu İktisat ve İşletme Dergisi*, 3(1), 26-38.

Yerdelen-Tatoğlu, F. (2020), *Panel Veri Ekonometrisi, 5. Baskı*, İstanbul: Beta Yayınları.

Zhu, W. (2023), "Digital Financial Inclusion and The Share of Labor Income: Firm-Level Evidence", *Finance Research Letters*, 56, 104160.

APPENDICES

Appendix 1-A: Number of Observations by Country and Year

Country/Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Albania		98							288	**386**
Argentina							54	225		**729**
Armenia		175								**175**
Azerbaijan		90							49	**139**
Bangladesh			1275							**1275**
Belarus		190						256	183	**629**
Bosnia and Herzegovina		259							222	**481**
Benin						133				**133**
Bhutan					195					**195**
Bolivia							226			**226**
Bulgaria		196							484	**680**
Burundi				133						**133**
Cambodia						282				**282**
Cameroon						255				**255**
Central African Republic	106									**106**
Chad								135		**135**
China		2220								**2220**
Colombia							651	198		**849**
Democratic Republic of the Congo			349							**349**
Côte d'Ivoire						235				**235**
Dominican Republic						162				**162**
Ecuador							345			**345**
Egypt						1074	229		2855	**4158**
El Salvador						502				**502**
Eswatini						77				**77**
Gambia								127		**127**
Ethiopia	99				625					**924**
Georgia		161							299	**460**
Ghana			443							**443**
Guatemala							243			**243**
Guinea						39				**39**
Honduras						194				**194**
Indonesia						735				**735**
Jordan			309						240	**549**
Kyrgyz Republic		169							263	**432**
Kenya			566					578	210	**1354**
Kazakhstan		233							720	**953**
Laos Democratic People's Republic						344		230		**574**
Lebanon			365						480	**845**
Kingdom of Lesotho						110				**110**
Liberia							142			**142**
Madagascar			226							**226**
Malawi				276						**276**
Malaysia					304					**304**
Mali						122				**122**
Mauritania				84						**84**
Moldova		228							302	**530**
Mongolia		260							344	**604**
Montenegro		62								**62**
Morocco			254						531	**785**
Mozambique								409	97	**506**
Myanmar			367			156	312			**835**
Namibia				135						**135**
Nepal			447							**447**
Nicaragua							269			**269**
North Macedonia		262							219	**481**
Niger							72			**72**
Nigeria				353						**353**
Papua New Guinea					44					**44**
Paraguay							274			**274**
Peru							747			**747**
Philippines					733					**733**
Russia	2168								858	**3026**
Senegal				311						**311**

Serbia		259							230	**489**
Sierra Leona							128			**128**
Solomon Islands					73					**73**
South Sudan				360						**360**
Sudan				181						**181**
Suriname								154		**154**
Sri Lanka	452									**452**
Tajikistan		141							127	**268**
Tanzania			247							**247**
Thailand					55	555				**610**
Togo						110				**110**
Tunisia			322							**322**
Türkiye		545						263	893	**1701**
Uganda			317							**317**
Ukraine		271							848	**1119**
Uzbekistan									452	**452**
Vietnam					545					**545**
Zambia		516							495	**1010**

Appendix 2-A: Number of Observations by Sector

Sectors	**Observations**	**Sectors**	**Observations**
Retail	7740	Textiles	1371
Food, Beverages, and Tobacco	5054	Machinery and Equipment	1367
Wholesale Trade	3963	Furniture	1258
Ready-to-Wear	2702	Press, Publishing, Media	917
Construction	2577	Motor Vehicles, Trailers and Semi-Trailers, and Other Transportation Equipment	862
Hotels and Restaurants	2427	Forest Products	759
Fabricated Metal Products	1876	Electronics	715
Transportation	1685	Computer and Related Activities	704
Non-Metallic Mineral Products	1685	Leather	606
Pharmaceuticals and Chemical Products	1566	Other Commercial Activities	541
Rubber and Plastics	1489	Basic Metals	492
		Paper and Paper Products	387

Sosyoekonomi

2026, Vol. 34(70), 51-73

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.03
Date Submitted: 16.07.2025
Date Revised: 01.03.2026
Date Accepted: 26.07.2026

Perceived Corruption, Public Trust, and Socioeconomic Inequalities: The Roles of Income and Education in Türkiye

Müslüm KAYACI *(https://orcid.org/0000-0002-6055-2734), Dicle University, Türkiye; muslumkayaci@gmail.com*

Algılanan Yolsuzluk, Kamuya Güven ve Sosyoekonomik Eşitsizlikler: Türkiye'de Gelir ve Eğitimin Rolü

Abstract

This study examines the impact of perceived corruption on public trust in government and public administration in Türkiye, using data from the World Values Survey Wave 7. It explores how socioeconomic factors, specifically income and education levels, moderate this relationship. Findings indicate that higher perceptions of corruption are associated with lower trust in institutions. However, neither income nor education consistently moderate this effect. Interestingly, widespread perceived corruption does not always reduce trust, suggesting a possible normalisation of corruption. The study highlights the complex interaction between corruption perception, trust, and socioeconomic status in shaping citizens' attitudes toward public institutions in Türkiye.

Keywords : Perceived Corruption, Public Trust, Income and Education Effects, Public Administration.

JEL Classification Codes : H83, D73.

Öz

Bu çalışma, Dünya Değerler Araştırması 7. Dalga verilerini kullanarak Türkiye'de algılanan yolsuzluğun hükümete ve kamu yönetimine duyulan güven üzerindeki etkisini incelemektedir. Sosyoekonomik faktörlerin, özellikle gelir ve eğitim düzeylerinin bu ilişkiyi nasıl yumuşattığını araştırmaktadır. Bulgular, daha yüksek yolsuzluk algılarının kurumlara duyulan daha düşük güvenle ilişkili olduğunu göstermektedir. Ancak ne gelir ne de eğitim bu etkiyi tutarlı bir şekilde yumuşatmaktadır. İlginç bir şekilde, yaygın olarak algılanan yolsuzluk her zaman güveni azaltmaz; bu da yolsuzluğun olası bir normalleşmesini düşündürmektedir. Çalışma, Türkiye'de vatandaşların kamu kurumlarına yönelik tutumlarını şekillendirmede yolsuzluk algısı, güven ve sosyoekonomik durum arasındaki karmaşık etkileşimi vurgulamaktadır.

Anahtar Sözcükler : Algılanan Yolsuzluk, Kamu Güveni, Gelir ve Eğitim Etkisi, Kamu Yönetimi.

1. Introduction

In the field of public administration, perceptions of corruption are considered fundamental elements that profoundly shape the relationship between the state and its citizens. The phenomenon of corruption is not confined solely to specific illegal or unethical acts; it also encompasses a perceptual dimension that significantly influences public trust in governmental institutions and political authority. It has been argued that corruption diminishes trust in government and public institutions (Rothstein & Uslaner, 2005; Gebrihet, 2024), undermines the legitimacy of the political system and institutions (Philp, 2001: 358), erodes the fabric of society by fostering environments conducive to human rights violations (Transparency International, 2018), and, if left unchecked, may result in broader societal consequences concerning democracy, legitimacy, and citizenship (Villoria et al., 2013: 86). Therefore, the individual and societal effects of corruption and the way these effects manifest in public trust have become a crucial area of inquiry within public administration research.

On the other hand, it is essential to distinguish between actual corruption and the perception of corruption. Actual corruption refers to concrete and verifiable acts of malfeasance carried out by actors within institutional or governmental structures in violation of legal and ethical norms. These acts typically include legally defined and sanctionable behaviours such as bribery, embezzlement, and nepotism. However, due to its inherently covert and illegal nature, corruption is often difficult to observe and document directly. This clandestine quality can lead to effects that may be "more destructive than corruption itself" (Melgar et al., 2010: 120). The perception of corruption can undermine the psychological and social contract between citizens and the state, thereby cultivating a pervasive sense of scepticism toward governmental actions (Rothstein & Uslaner, 2005). Particularly in contexts where transparency and accountability mechanisms are weak or insufficient, allegations or perceptions of corruption may contribute to a broader climate of collective distrust (Grimmelikhuijsen & Meijer, 2014). Consequently, governments' capacity to manage perceptions, alongside their anti-corruption strategies, plays a decisive role in building public trust (Warren, 2004). Hence, the distinction between actual corruption and its perception is critical, as the covert nature of corruption and the difficulties associated with its documentation may enable perceptions to spread independently of factual realities.

The relationship between the perception of corruption and trust in government and public administration is shaped by a complex interplay of social and economic dynamics. In this context, citizens' income level is a key determinant in the dynamics of this relationship (Rothstein & Uslaner, 2005; Schoon & Cheng, 2011). Income level strongly affects how individuals perceive corruption and how these perceptions influence their trust in government and administrative bodies. Individuals with higher income levels may be less directly affected by corruption, and thus systemic perceptions of corruption may have a more limited impact on their levels of trust. Conversely, individuals in lower income groups are more likely to experience the tangible consequences of corruption in their daily lives, which may lead to a greater erosion of trust in public institutions. Similarly, education plays a crucial role in mediating the relationship between perceptions of corruption and trust

(Hooghe et al., 2012; Hakhverdian & Mayne, 2012). More educated individuals, possessing greater informational resources and critical thinking skills, are often more inclined to evaluate corruption incidents analytically. On the other hand, individuals with lower levels of education may face limitations in accessing or interpreting information related to corruption, which may render their trust in government more vulnerable. Therefore, both income and education levels are key socioeconomic variables in understanding how perceptions of corruption are formed at the individual and societal levels, and how these perceptions shape the dynamics of public trust.

This study contributes to the field of public administration by developing an integrative framework that consolidates key determinants of public trust and advances three core propositions in the context of Türkiye. It argues, first, that heightened perceptions of corruption among citizens are linked to diminished trust in government and public administration. Second, it proposes that income level moderates this relationship by mitigating the adverse effect of perceived corruption on trust. Third, it suggests that education level operates as an amplifying moderator, strengthening the negative association between corruption perception and public trust. Beyond formulating these propositions, the study offers a concise conceptual discussion of corruption, corruption perception, and public trust, and situates the hypotheses within the existing scholarly literature. It then presents methodological procedures and empirical findings, concluding with a synthesis of results. By bridging conceptual clarification with empirical examination, the study provides both theoretical insight and practical relevance for understanding the dynamics of governance and citizen trust in public administration.

2. Literature Review And Hypotheses

2.1. Corruption and the Perception of Corruption

The concepts of corruption and the perception of corruption represent foundational topics frequently examined within the fields of social sciences and public administration. Corruption cannot be easily defined, and comprehensive efforts to delineate its boundaries often fall short due to the inherently fluid and context-dependent nature of the term. In a broad sense, corruption encompasses a wide range of behaviours such as bribery, extortion, favouritism, abuse of information, and misuse of discretionary authority. These actions may occur in connection with activities including personnel recruitment, procurement of services, issuance of licenses and permits, and the execution of construction projects (Graycar, 2015: 89). In general terms, corruption can be defined as "the misuse of public power for private gain" (Rose-Ackerman, 1999: 91; Treisman, 2000: 399). Another widely cited definition of corruption is offered by Transparency International (2018), defining it as "the abuse of entrusted power for private gain". It typically arises when public officials seek personal gain through practices such as bribery, embezzlement, gift-taking, or nepotism (Rose-Ackerman, 1999). One of the most established and widely cited definitions refers to "duty-based" corruption, wherein public corruption is understood as the misuse of official responsibilities, resulting in direct or indirect benefit for an individual or group through access to public

office (Villoria et al., 2013: 86). The main point in this definition is the abuse of power entrusted to public officials for private advantage or gain.

Corruption also encompasses sociocultural dimensions. It is shaped by historical, cultural, and institutional factors, which contribute to significant variations in its manifestation across countries (Treisman, 2000: 400). For instance, while corruption is generally less prevalent in societies with strong democratic institutions, it tends to become more systematic under authoritarian regimes (Rothstein & Uslaner, 2005). Moreover, the structural and functional characteristics of public administration within a given societal context are critical determinants of both the likelihood and extent of corrupt practices (Melgar et al., 2010). Specifically, bureaucratic norms surrounding transparency, accountability, and ethical standards - as well as societal perceptions of public service -can shape the propensity for corruption among public officials.

On the other hand, the perception of corruption represents a distinct construct. As discussed above, actual corruption refers to the misuse of authority by public officials or private actors for personal gain and is measurable through concrete evidence. Such acts include bribery, embezzlement, nepotism, and the improper allocation of public resources (Svensson, 2005: 20). Actual corruption is typically identified through objective indicators such as judicial records, official investigations, audit reports, and publicly documented cases. These tangible sources of evidence help delineate the scope and nature of unlawful behaviour at both individual and institutional levels. However, perceptions of corruption reflect the subjective evaluations of individuals or communities regarding the unethical use of authority by public officials or institutions for personal gain. These perceptions may exert more detrimental effects than corruption itself (Melgar et al., 2010: 120). Perceived corruption also constitutes a critical indicator of public trust in institutions and officials (Anderson & Tverdova, 2003). In most societies, perceived corruption diminishes institutional trust, specifically regarding public entities such as the government, the judiciary, and law enforcement (Gebrihet, 2024; Mizrahi & Krup, 2025). This perception is informed not only by actual corruption incidents but also by broader assessments of transparency, accountability, and the quality of governance. Furthermore, corruption perception is influenced by subjective elements such as media representations, cultural norms, and individual experiences (Mizrahi & Krup, 2025; Svensson, 2005).

A higher perception of corruption can erode citizens' trust in the state, thereby undermining democratic legitimacy and the efficacy of public policy (Rothstein & Uslaner, 2005). Accordingly, it may be argued that the perception of corruption - much like actual corruption - plays a pivotal role in shaping social, economic, and political dynamics. Given that it is based on subjective evaluations of unethical institutional behaviour, the perception of corruption emerges not only as a phenomenon independent of objective corruption levels but also as an interactive factor that influences institutional trust, democratic legitimacy, and policy effectiveness. In this regard, the perception of corruption may be seen as a mechanism that guides individual behaviour, economic decision-making, and attitudes toward the state - possessing a level of significance that is equivalent to, or in certain contexts even greater

than, the tangible effects of corruption itself. Therefore, it can be concluded that anti-corruption strategies should not be confined solely to addressing actual incidents of corruption. They must also account for the subjective elements and societal perception dynamics that shape public attitudes and trust.

2.2. Trust in Government and Public Administration

The literature on trust is extensive and emphasises its role as a normative concept underpinning social relations. Trust emerges when individuals develop positive expectations regarding the intentions, behaviours, or functioning of others or of a system under conditions of uncertainty. While various definitions of trust have been proposed across disciplines, it is generally asserted that there are no major interdisciplinary discrepancies in these conceptualisations (Rousseau et al., 1998: 394). In a broad framework, trust is defined as "a psychological state comprising the intention to accept vulnerability based on positive expectations of the intentions or behaviour of another" (Rousseau et al., 1998: 395). It can also be described as the extent to which one individual places confidence in another's words, actions, and decisions, and the willingness to act based on that confidence (McAllister, 1995: 25).

Trust in government refers to citizens' belief in the government and its affiliated institutions' capacity to act competently, honestly, and in the public interest to ensure societal welfare (Nannestad, 2008). Moreover, trust in government describes citizens' expectations regarding the nature, functioning, and engagement of government with the public, as well as the conduct of political leaders, civil servants, and citizens themselves (Beshi & Kaur, 2020). This trust is shaped by perceptions of the government's legitimacy, accountability, and responsiveness to citizens' expectations (Miller, 1974; Hetherington, 1998). Trust in government is inherently a political and multidimensional concept. It encompasses general and systemic factors such as perceived legitimacy of the politico-administrative system, as well as citizens' specific experiences with the government and its services, and the interaction between the two (Bouckaert & Van de Walle, 2001). However, trust in government often refers to a belief in an abstract and ambiguously defined institutional structure (Fisher et al., 2010). Therefore, to grasp the concept of trust in a more detailed and concrete manner, attention must also be directed toward trust in specific public services or institutions (Van de Walle et al., 2005).

Accordingly, a nuanced and contextual understanding of trust requires examining not only trust in government, but also trust in public administration and its actors. Trust in public administration is defined as a relational construct reflecting citizens' belief that public officials will prioritise societal needs over personal interests and adhere to ethical principles (Bouckaert, 2012). This form of trust entails citizens' willingness to permit public officials to act on their behalf, and their belief that those officials will make effective decisions and act in the public interest (Houston & Harding, 2013: 55). Public administration, as the technical and bureaucratic apparatus that implements government policies, bears direct responsibility for delivering services to citizens. Hence, trust in public administration is

closely associated with the effectiveness, impartiality, transparency, and equitable accessibility of public services. Unlike trust in government, which has a more political character, trust in public administration is rooted in administrative capacity, the professionalism of public officials, and the perceived fairness of institutional operations. Public perceptions regarding the reliability of public administration are shaped not only by the government's ability to produce tangible outcomes, but also by the manner in which administrative processes are conducted, adopting fair practices, avoiding favouritism, and limiting corruption (Van Ryzin, 2011: 755). In this context, trust in public administration can be understood as being shaped by the quality of day-to-day interactions that citizens have with public institutions and is directly linked to administrative performance. Accordingly, it is argued that the construction of an effective and legitimate governance structure requires the integrated and holistic development of trust in both government and public administration (Kim, 2005).

In this study, the concepts of trust in government and trust in public administration are addressed jointly. Based on data derived from the World Values Survey, survey items about both types of trust are analysed within this framework.

2.3. The Relationship Between Perceived Corruption and Trust in Government and Public Administration

A global decline in public trust toward institutions has become a well-documented phenomenon and a focal point of scholarly inquiry (Bannister & Connolly, 2011; Gracia & Ariño, 2015). The underlying causes of this erosion of trust are multifaceted and have attracted increasing attention in the fields of public administration and political science. Among these factors, perceptions of corruption emerge as a central determinant of the general decline in trust toward government and public administration, occupying a prominent place in academic and policy debates (Anderson & Tverdova, 2003; Torcal & Christmann, 2021; Van de Walle & Migchelbrink, 2022). Since corruption typically falls outside the boundaries of legitimate behaviour, is ethically contentious, and often illegal, its prevalence is difficult to ascertain directly. Therefore, subjective perceptions have come to be regarded as among the most appropriate and meaningful means of assessing the scope and impact of corruption (Morris, 2008: 390). Furthermore, trust in government and the political system is not independent of societal political polarisation. Although some countries may experience high levels of corruption, citizens' perceptions can be shaped by their political ideologies (Lawlor & Stephenson, 2025). For example, during the COVID-19 crisis in the United States, public trust in government public health policies was strongly influenced by political orientation, particularly among Republican citizens (Goldstein & Wiedemann, 2022). Therefore, the relationship between perceived corruption and trust in public administration should be examined by taking different contextual mechanisms into account.

Comparative corruption indices, such as those published by Transparency International, collect data based on perception-based assessments from experts, civil society

representatives, and public officials. Additionally, surveys conducted by academic studies and independent research organisations serve as important data sources in this area. International datasets like the World Values Survey (WVS) and the European Social Survey (ESS) offer valuable insights into citizens' perceptions of corruption across different countries and communities, thereby facilitating comparative cross-national analyses (Mizrahi & Krup, 2025: 5). In this study, the data concerning Türkiye have been derived from the WVS dataset, which is widely used in academic research and is methodologically robust. The WVS, with its comprehensive sampling framework and systematic data collection procedures, possesses a strong capacity to represent individuals' value judgments and social perceptions. For this reason, WVS data are considered particularly reliable for analysing citizens' perceptions of sensitive issues such as corruption.

Empirical findings suggest that perceptions of corruption are generally negatively related to trust in government and public administration (Anderson & Tverdova, 2003; Morris & Klesner, 2010; Kubbe, 2013). One of the primary expectations citizens hold toward public administration is that public services be delivered fairly and transparently, with public resources used efficiently, effectively, and appropriately. However, dishonest behaviour by government officials and public servants undermines public confidence in the state's fairness and impartiality (Rothstein & Uslaner, 2005). It can be argued that such perceptions constitute one of the principal causes of declining trust in government and public administration. In countries where corruption is perceived to be high, citizens tend to assess the performance of the political system more negatively and exhibit lower levels of trust toward civil servants (Anderson & Tverdova, 2003). Thus, perceived corruption significantly influences citizens' trust in government, both in terms of the outcomes of public services and the processes by which these services are delivered. In particular, transparency and the absence of corruption in public processes are identified as the strongest institutional predictors of public trust (Van de Walle & Migchelbrink, 2022).

Recent public opinion surveys and international indices indicate a notable increase in citizens' perceptions of corruption in Türkiye. For instance, Transparency International's Corruption Perceptions Index (CPI) shows a marked downward trend in Türkiye's performance since 2013[1]. In 2013, Türkiye achieved its highest ranking of the past decade, scoring 50 points and placing 53rd among 175 countries. However, subsequent years have seen a clear decline both in score and rank. By 2017, Türkiye's score had dropped to 40, and its ranking had fallen to 81st. This downward trajectory continued into 2020, with the score remaining at 40 but the ranking slipping further to 86th. The most striking deterioration has occurred in recent years: in 2023, Türkiye scored 34 and ranked 115th; in 2024, the same score placed it at 107th. Thus, over the past decade, Türkiye has lost a total of 16 points and dropped 54 positions in the global rankings. This trend indicates a structural deterioration in perceptions of corruption in Türkiye and a corresponding decline in citizens' views regarding the integrity and accountability of public institutions. Furthermore, a recent study

[1] *<https://www.transparency.org/en/cpi/2024/index/tur>, 25.05.2025.*

suggests that even public officials recognise that public trust declines as perceptions of corruption increase in Türkiye (Kan, 2025). When government processes are more open and transparent, citizens' trust in public administration also increases (Demirel-Değirmenci & Ural-Uslan, 2023). For these reasons, this study examines the impact of perceived corruption on trust in government and public administration in Türkiye. Focusing on Türkiye as a single-country case is necessary given the limited research examining the relationship between these concepts in this specific context.

Moreover, the European Commission's 2024 Türkiye Progress Report raises serious concerns about anti-corruption efforts in the country, noting a lack of significant progress in this area. The report emphasises that corruption remains a widespread and systemic issue in Türkiye and that deficiencies in accountability and transparency within public institutions need to be addressed. Particularly, the absence of a comprehensive national anti-corruption strategy and action plan is seen as indicative of a lack of political will. The report also underlines the need to strengthen the existing legal and institutional frameworks to prevent political interference in the prosecution and adjudication of corruption cases, thereby safeguarding the rule of law (European Commission, 2024). The concerns regarding increased corruption by supranational organisations are not unreasonable. Increased corruption deteriorates the quality of public service (Nguyen et al., 2017), decreases economic growth (Obayelu, 2007) and increases socioeconomic and market-related costs (Coetze, 2014) in a country. As a mid-range economic actor in the World economy, Türkiye should be more careful about corrupt practices in public administration and in other organisations. Harmful practices in the administrative realm should not slow down the country's economic and social development in the future.

Based on these considerations, the following hypothesis is proposed with reference to the case of Türkiye:

> ***H*$_1$***: As citizens' perceptions of corruption increase in Türkiye, their trust in government and public administration decreases.*

2.4. The Role of Income Level

Income level appears to play a significant role in shaping the negative relationship between citizens' perceptions of corruption and their trust in government and public administration. Empirical studies suggest that higher income levels are associated with increased trust in public institutions among individuals (Schoon & Cheng, 2011: 643-644; Medve-Balint & Boda, 2014: 438). This indicates that individuals' socioeconomic conditions influence the degree of institutional trust. This relationship can be explained through several mechanisms. First, individuals with higher income levels are typically assumed to have better educational backgrounds and greater economic resources. These factors may reduce uncertainties in their lives and contribute to higher levels of general trust. Second, wealthier individuals tend to have lower dependency on public services and greater access to private alternatives. As a result, they are less likely to be directly exposed to corrupt practices within

the public sector, which may positively influence their perception of government trustworthiness (Uslaner, 2008).

On the other hand, individuals in lower-income groups often rely more heavily on public services and interact more frequently with public officials, which increases their exposure to various forms of corruption, such as bribery (Rose-Ackerman, 1999). Such direct experiences may lead to heightened perceptions of corruption and increased institutional distrust. In other words, corruption is more likely to be perceived by lower-income individuals as a personal and tangible threat. Issues commonly associated with corruption, such as limited access to public services, inefficiency, and biased service delivery, carry greater weight for these segments of the population (You & Khagram, 2005). Furthermore, in highly corrupt environments, there is a widespread belief that poor citizens are treated unfairly by government institutions (Uslaner, 2005: 56). Accordingly, the negative impact of corruption perception on trust in government and public administration is felt more acutely among lower-income individuals. Conversely, for those in higher income brackets, their relatively limited dependence on public services due to access to private options for healthcare, education, and security can buffer them from direct exposure to inefficiencies or corrupt demands. Even if corruption is perceived to exist within the public sector, the absence of firsthand negative experiences may mitigate its impact on institutional trust.

Therefore, the negative relationship between corruption perception and institutional trust appears to be weaker and more indirect for individuals with higher incomes. Based on this reasoning, income can be proposed as a moderating variable in the relationship between perceived corruption and trust in government and public administration. Türkiye offers a highly relevant context for examining this moderating effect. For this reason, the following hypothesis may be proposed:

> ***H*$_2$***: In Türkiye, income level positively moderates the negative relationship between citizens' perception of corruption and their trust in government and public administration.*

2.5. The Role of Education Level

Education serves as a fundamental mechanism for systematically enhancing individuals' access to information and their ability to evaluate it critically. This process not only fosters cognitive competencies but also strengthens critical thinking and analytical skills (Gelder, 2005: 41). As the level of education increases, individuals' responses to complex information become more conscious and selective, and their capacity for critical evaluation expands. Critical thinking enables individuals to approach complex problems with a questioning mindset rather than accepting information passively (Paul & Elder, 2006: 34). Consequently, education not only influences the capacity to acquire knowledge but also shapes the way individuals engage with different types of information. In this context, educated individuals' responses to political, social, and economic information may vary significantly depending on their level of education.

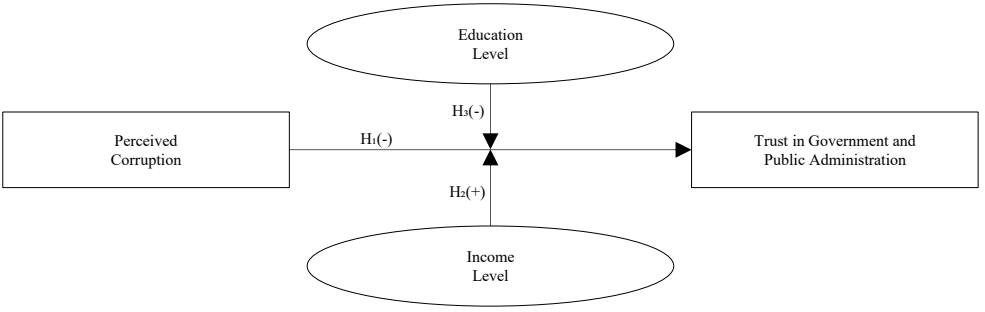
Educational attainment is one of the key determinants of political attitudes and behaviours. Its influence is particularly evident in domains such as perceptions of corruption and trust in government and public institutions. A strong and positive relation between education and institutional trust is widely recognised in the literature (Charron & Rothstein, 2016; Hooghe et al., 2012: 609). Individuals with higher education levels are better equipped to assess information critically and to understand complex social phenomena. In this context, in societies where corruption is perceived to be widespread, more educated individuals are likely to detect and interpret corrupt practices more accurately, which may result in a sharper decline in their trust in government and public administration. Indeed, studies have shown that individuals with lower levels of education tend to be less responsive to the effects of corruption, whereas among more educated citizens, perceptions of corruption exert a stronger negative influence on trust in government (Hakhverdian & Mayne, 2012: 740). Moreover, individuals with higher education are more likely to report misconduct to public authorities, which can help improve public service delivery and reduce corruption, thus ultimately contributing to greater public trust (Botero et al., 2013).

Research also shows that in countries with high levels of corruption, education tends to reduce institutional trust, whereas in countries with lower levels of corruption, it enhances trust in institutions (Hakhverdian & Mayne, 2012: 739). Similarly, in highly corrupt societies, higher levels of education are often associated with lower institutional trust, as education increases individuals' awareness of and sensitivity to the corrosive effects of corruption (Ugur-Çınar et al., 2020). In summary, the relationship between corruption perception and trust in government and public administration varies significantly depending on individuals' level of education. Higher educational attainment enhances political awareness and critical assessment skills, which in turn may lead to a more critical stance toward government in contexts of pervasive corruption and result in lower levels of institutional trust. Based on these observations, it may be argued that education acts as a negative moderator in the Turkish context, amplifying the adverse effect of corruption perception on institutional trust. Accordingly, the following hypothesis may be tested:

> ***H*$_3$***: In Türkiye, educational attainment negatively moderates the negative relationship between citizens' perception of corruption and their trust in government and public administration.*

Based on these research hypotheses, the study's research model is shown in Figure 1 below.

Figure: 1
Proposed Research Model



3. Data & Methodology

3.1. Data

This study utilises data from the World Values Survey (WVS) Wave 7 for Türkiye to examine the relationships between perceived corruption, trust in government and public administration, and the income and education levels of Turkish citizens. The WVS collects comprehensive information on societal values, social life, and public perceptions of government and public institutions. Wave 7 of the WVS includes detailed data from 66 countries collected between 2018 and 2022. Its broad geographic scope and representative sampling make it a reliable and widely used resource among scholars and comparativists. This study does not require ethical approval, as it relies on secondary data for hypothesis testing. The World Values Survey (WVS) dataset is publicly available and can be freely used for various types of research.

For decades, WVS data have been employed in diverse academic fields including political science, sociology, economics, and psychology owing to its reputation as a high-quality, cross-national survey instrument (Minkov & Hofstede, 2012; Uddin, 2024; Haerpfer et al., 2022). In Türkiye, data for Wave 7 were collected in 2018. The sample consists of 2,415 adults aged 18 and above, drawn from all geographic regions of the country. The application of a probability sampling method across participating countries ensures the sample's high level of representativeness (Uddin, 2024: 4). WVS researchers collaborated with the Turkish Statistical Institute to define the geographic distribution of the sample within Türkiye accurately. Survey questions were administered in the respondents' native language and are publicly accessible on the WVS website for each participating country. The organisation responsible for data collection in Türkiye emphasised efforts to minimise non-response rates during fieldwork. Respondents completed the survey either face-to-face or via telephone.

According to the Turkish Statistical Institute (TÜİK), Türkiye's total population in 2018 was 82,003,882 (Turkish Statistical Institute, 2019). Consequently, the sample is

considered representative and capable of yielding meaningful insights for this study (Shieh, 2009: 521). Table 1 summarises the sample distribution. Male respondents comprise 50.02% of the sample. The distribution of education levels is as follows: 12% reported having no formal education, 36.41% dropped out of primary school, 11% completed primary school, 24.31% dropped out of middle school, and 17% completed high school. These figures indicate that the sample's overall education level is relatively low, with approximately half of respondents not completing primary education. Additionally, a majority of respondents (62.06%) reported being married. Furthermore, TÜİK (2019) total population results have similar findings about the education level of the general population. 3% of the population is illiterate. 11% are literate but have not completed any formal level of schooling. The largest proportion, 25%, consists of primary school graduates. Individuals who completed middle school or an equivalent vocational school account for 13%, while 12% are classified as primary education graduates. Those who graduated from high school or an equivalent vocational school constitute 20% of the population. Higher education graduates (college or faculty level) represent 13%. The proportion of individuals holding a master's degree or higher is 2%. Finally, 1% of the population falls into the category of unknown educational attainment.

Overall, the distribution indicates that the population is largely concentrated at the primary and secondary education levels, whereas the proportion of individuals with postgraduate education remains relatively low. Although the distribution of education levels in the sample is not entirely homogeneous, the survey findings closely reflect those of the general population. Therefore, any potential bias related to education level is likely to mirror the actual structure of the population rather than result from sampling distortion.

Table: 1
Frequencies

Sex	**Freq.**	**%**	**Marital Status**	**Freq.**	**%**
Male	1207	49.98	Married	1497	62.06
Female	1208	50.02	Living together as if married	6	0.25
Total	2415	100.00	Divorced	62	3
Education Level	**Freq.**	**%**	Married but living separately from his wife	4	0.17
I never went to school	277	12	Widow	60	2
I dropped out of primary school	876	36.41	Single	783	32.46
Primary school	256	11	Total	2412	100.00
I dropped out of middle school	585	24.31			
High school	412	17			
Total	2406	100.00			

3.2. Measurement

All variables in this study are derived from relevant questions included in the World Values Survey (WVS) Wave 7 Türkiye questionnaire. The complete questionnaire and sample design documentation are publicly accessible via the WVS website[2]. Detailed descriptions of the variables used in this study are summarised in Table 2.

[2] *<https://www.worldvaluessurvey.org/WVSDocumentationWV7.jsp>, 25.05.2025.*

The dependent variable is trust in government and public administration, measured using a survey question that assesses respondents' confidence in a list of institutions. In line with previous scholarly studies (Uddin, 2024; Lee & Schachter, 2019), this study focuses on a subset of those institutions: *the police, courts, national government, parliament, and civil service*. These institutions collectively represent both the political and administrative spheres of governance, thereby providing a comprehensive measure of institutional trust. Respondents rated their level of confidence in each institution on a four-point scale, ranging from 1 (a great deal) to 4 (none at all). Responses coded as -2 (no answer) and -1 (don't know) were treated as missing data and excluded from statistical analysis to ensure the validity of the results. The reliability of the five-item trust scale was evaluated using Cronbach's alpha. The results indicated strong internal consistency (α =0 .8575). Item-rest correlations ranged from 0.625 to 0.721, and the removal of any individual item did not substantially improve the alpha coefficient, confirming the coherence of the construct. The dependent variable, trust in government and public administration, was operationalised as the mean value of the respondents' ratings across the five selected institutions.

Table: 2
Variable Descriptions

Variables	Survey Item	Recoded Range
Trust in government and public administration	How much do you trust each of the institutions I will list below? Again, answer like "1-I trust completely", "2-I trust a little", "3-I don't trust much", "4-I don't trust at all"	1-I don't trust at all 2-I don't trust much 3-I trust a little 4-I trust completely
Perceived corruption	Now I want to ask you about your thoughts on corruption. That is, people giving bribes, gifts, etc. to others to get the jobs or services they need done... Could you please indicate your views on corruption in our country on the 10-point scale below? A score of 1 on our scale indicates that you think there is no corruption in our country, while a score of 10 indicates that there is widespread corruption. Or if your thoughts on this issue are in the middle, you can choose a score accordingly.	1-There is no corruption in our country 10-There is widespread corruption in our country
Perceived corruption density	How widespread do you think corruption is in our country? Among the groups I will list below, in your opinion, are those involved in corruption: Are they very few? Less than half? The majority? Almost all?	1-Very few 2-Less than half 3-Majority 4-Almost all
Income level	If we were to place people living in Türkiye on a 10-point scale in terms of income, where would you find yourself on this scale? On the scale, "1" represents the lowest income group, and "10" represents the highest income group.	1-The bottom 10-The top
Education level	What is your educational status? Which school was the last one you finished or dropped out of? (Categorical Variable)	0-I never went to school 1-I dropped out of primary school 2-I am a primary school graduate 3-I dropped out of middle school 6-I am a high school graduate
Sex	Please code the respondent's sex without asking	1-Male 2-Female
Marital Status	Which of the following is your current marital status?	1-Married 2-Living together as if married 3-Divorced 4-Married but living separately from spouse 5-Widowed 6-Single
Age	So how old are you?	Log (Age)

The independent variable in this study is measured using two constructs from the WVS data. The first construct captures respondents' perceived level of corruption, while the

second reflects perceived corruption intensity within specific groups. Three groups were selected for this purpose: *elected officials, local government officials, and civil servants*, as these are highly relevant to the functioning of government and public institutions. Respondents' perceived level of corruption is measured on a scale from 1 to 10, whereas perceived corruption density for specific groups is assessed on a scale from 1 to 4.

The first moderating variable is income level, based on respondents' subjective income perception, since the dataset does not include precise measures of actual income. Respondents rated their income position on a scale from 1 (lowest) to 10 (highest). The second moderating variable is education level, measured as a categorical variable. Although the original survey offers more detailed options, only five education categories are represented in the Türkiye sample.

Additionally, the study includes sex, marital status, and age as control variables, as these demographic factors are commonly recognised as relevant determinants in the analysis of socioeconomic issues within a society.

4. Results

Table 3 presents the descriptive statistics for the continuous variables used in this study. The mean value of the trust in government and public administration variable is 2.856, indicating a relatively high level of trust among respondents toward government and public institutions. In contrast, the variables for perceived corruption (6.572) and perceived corruption density (2.835) exhibit high mean values, which appear to contradict the reported trust levels. The perceived income level of respondents has a mean of 5.343, reflecting a moderate self-assessed income position within the sample. The average age of respondents is 38.83 years.

Table: 3
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Trust in government and public administration	2296	2.856	.656	1	4
Perceived corruption	2336	6.572	2.222	1	10
Perceived corruption density	2121	2.835	.829	1	4
Income level	2329	5.343	1.722	1	10
Age	2414	38.83	12.67	18	95

Table 4 presents the pairwise correlation statistics for all variables included in the study. Significant relationships were found between trust in government and public administration and the following variables: perceived corruption ($r = -0.217$, $p < 0.05$), perceived corruption density ($r = 0.324$, $p < 0.05$), education level ($r = -0.062$, $p < 0.05$), and marital status ($r = -0.045$, $p < 0.05$). In contrast, income level, sex, and age did not show statistically significant correlations with the dependent variable. The strongest correlation was observed between marital status and age ($r = -0.594$, $p < 0.05$), which reflects a moderate level of association. To assess potential multicollinearity among the independent variables, variance inflation factor (VIF) values were examined. All VIF scores were below the

commonly accepted threshold of 10, indicating that multicollinearity is not a concern in this analysis.

Table: 4
Pairwise Correlation Statistics

Variables	1	2	3	4	5	6	7	8
(1) Trust in government and public administration	1.000							
(2) Perceived corruption	-0.217*	1.000						
	(0.000)							
(3) Perceived corruption density	0.324*	-0.371*	1.000					
	(0.000)	(0.000)						
(4) Income level	-0.004	0.050*	0.011	1.000				
	(0.861)	(0.017)	(0.616)					
(5) Education level	-0.062*	0.021	0.014	0.297*	1.000			
	(0.003)	(0.309)	(0.516)	(0.000)				
(6) Sex	0.003	0.018	0.023	-0.002	-0.093*	1.000		
	(0.884)	(0.386)	(0.288)	(0.907)	(0.000)			
(7) Marital Status	-0.045*	0.026	-0.013	0.051*	0.199*	-0.105*	1.000	
	(0.031)	(0.215)	(0.564)	(0.014)	(0.000)	(0.000)		
(8) Age(log)	0.022	-0.016	-0.005	-0.071*	-0.280*	0.058*	-0.594*	1.000
	(0.302)	(0.447)	(0.824)	(0.001)	(0.000)	(0.004)	(0.000)	
** Shows significance at p<0.05*								

Table 5 reports the results of the OLS regressions used to test our hypotheses. Model 1 evaluates H_1, which posits a negative relationship between citizens' perceptions of corruption and their trust in government and public administration in Türkiye. The coefficient for perceived corruption is negative and statistically significant ($\beta = -0.04$, $p < 0.01$), thereby partially supporting H_1. In contrast, perceived corruption density exhibits a positive and marginally significant effect ($\beta = 0.22$, $p < 0.10$). These opposing but significant relationships persist across all specified models (Models 1-5): higher corruption perceptions reduce trust, whereas greater perceived corruption density increases trust.

The moderating role of income level is assessed in Models 2 and 3. In Model 2, the interaction between perceived corruption and income is not significant ($\beta = 0.01$, $p > 0.10$), indicating no moderation of the corruption-trust link. However, Model 3 reveals a significant negative interaction between perceived corruption density and income ($\beta = -0.05$, $p < 0.01$). This result shows that the positive effect of corruption density on trust weakens as income increases. Since H_2 hypothesised that higher income would attenuate the negative relationship between corruption perception and trust, and our findings indicate the opposite for the density construct, H_2 is not supported. As illustrated in Figure 2, the slope of the relationship between perceived corruption density and trust flattens for respondents at moderate and high income levels.

Table: 5
Regression Results of Hypotheses Testing

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Sex (Female)	-0.01	-0.01	-0.01	-0.02	-0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Marital Status (Living together as if married)	**-0.45***	**-0.46***	**-0.45***	**-0.51****	**-0.52****
	(0.25)	(0.25)	(0.25)	(0.25)	(0.25)
Marital Status (Divorced)	-0.01	0.00	0.00	0.01	0.01
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Marital Status (Married but living separately from)	-0.35	-0.34	-0.30	-0.37	-0.35
	(0.35)	(0.35)	(0.35)	(0.43)	(0.43)
Marital Status (Widowed)	0.10	0.10	0.09	0.10	0.09
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Marital Status (Single)	-0.06	-0.06	-0.06*	-0.06	-0.05
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Age (Log)	-0.04	-0.04	-0.04	-0.09*	-0.09
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Perceived Corruption	**-0.04*****	**-0.07*****	**-0.04*****	**-0.06*****	**-0.03*****
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)
Perceived Corruption Density	**0.22*****	**0.21*****	**0.46*****	**0.22*****	**0.25*****
	(0.02)	(0.02)	(0.05)	(0.02)	(0.05)
Income level		-0.04	**0.13*****		
		(0.03)	(0.03)		
Income level∗Perceived corruption		0.01			
		(0.00)			
Income level∗Perceived corruption density			**-0.05*****		
			(0.01)		
Education Level (I dropped out of primary school)				**-0.25***	0.03
				(0.14)	(0.16)
Education Level (I am a primary school graduate)				-0.22	0.14
				(0.17)	(0.20)
Education Level (I dropped out of middle school)				**-0.40*****	-0.07
				(0.15)	(0.17)
Education Level (I am a high school graduate)				**-0.35****	-0.10
				(0.16)	(0.18)
I dropped out of primary school∗Perceived corruption				**0.03***	
				(0.02)	
I am a primary school graduate∗Perceived corruption				0.02	
				(0.03)	
I dropped out of middle school∗Perceived corruption				**0.04***	
				(0.02)	
I am a high school graduate∗Perceived corruption				0.03	
				(0.02)	
I dropped out of primary school∗Perceived corruption density					-0.02
					(0.06)
I am a primary school graduate∗Perceived corruption density					-0.08
					(0.07)
I dropped out of middle school∗Perceived corruption density					-0.02
					(0.06)
I am a high school graduate∗Perceived corruption density					-0.02
					(0.06)
Constant	2.63***	2.82***	1.93***	3.08***	2.80***
	(0.22)	(0.26)	(0.26)	(0.26)	(0.26)
R-squared	0.12	0.12	0.13	0.13	0.13
Number of observations	2038	2014	2014	2033	2033
F-statistic	31.11***	25.26***	27.42***	17.89***	17.72***
Adj R-squared	0.117	0.117	0.126	0.124	0.123
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1					

The moderating effect of education level, as posited in H_3, is examined in Models 4 and 5. Neither model provides support for H_3. The interaction terms for respondents who left primary school ($\beta = 0.03$, $p < 0.10$) and those who left middle school ($\beta = 0.04$, $p < 0.10$) are positive and marginally significant. Although these coefficients are small, their sign indicates that the negative association between perceived corruption and trust in government

and public administration becomes weaker at higher education levels. Figure 3 illustrates this moderation: the lines representing "primary school dropout" and "middle school dropout" display a less steep negative slope compared to the reference category, confirming a modest buffering effect of education.

Figure: 2
Moderating Impact of Income Level

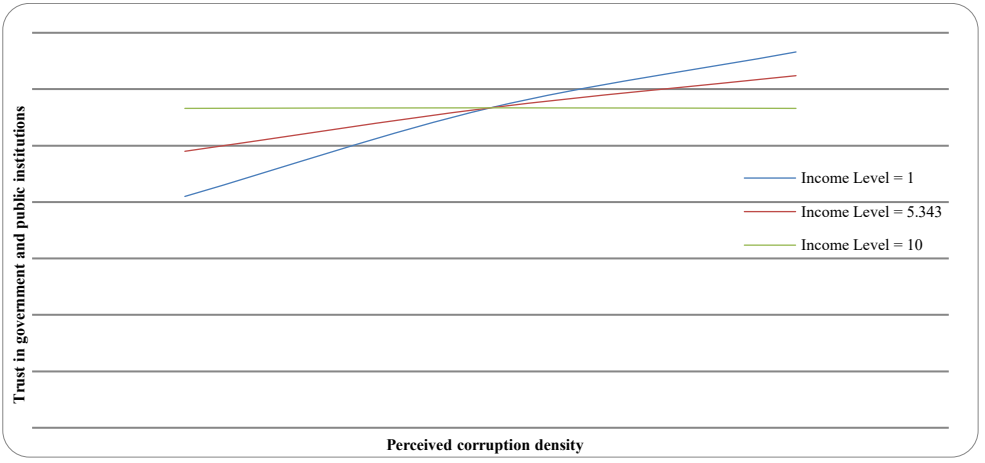
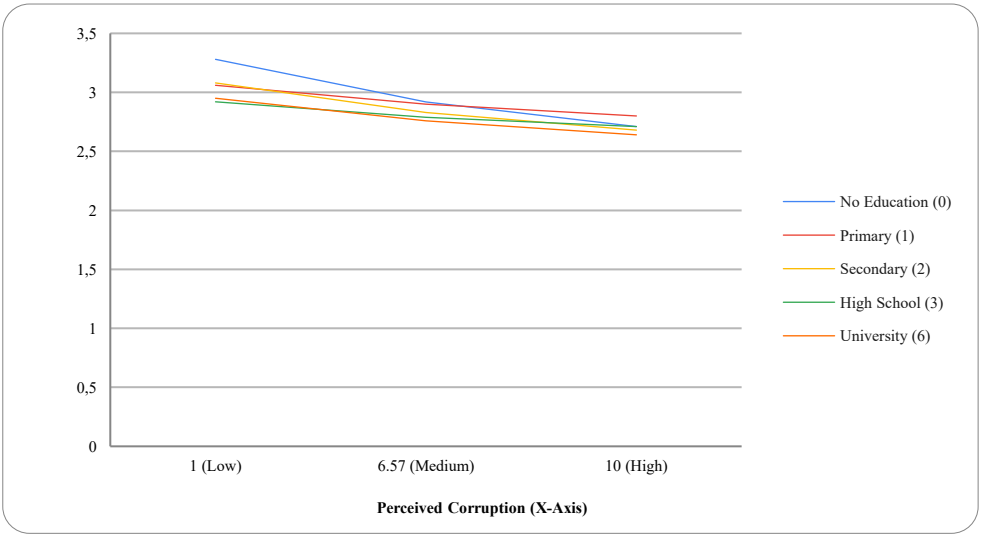


Figure: 3
Moderating Impact of Education Level



5. Discussion

Corruption has been widely recognised as a factor that undermines public trust in governmental bodies and institutions (Rothstein & Uslaner, 2005). It is also considered a threat to the legitimacy of political systems and governance structures (Philp, 2001: 358). Moreover, corruption contributes to societal deterioration by creating conditions conducive to human rights violations (Transparency International, 2018). When left unchecked, these dynamics can escalate into broader challenges concerning democracy, legitimacy, and civic engagement (Villoria et al., 2013: 86). As a result, understanding both the individual- and societal-level consequences of corruption, particularly its impact on public trust, has become a central focus within the field of public administration. Accordingly, this study aims to examine the impact of citizens' perceptions of corruption on their trust in government and public administration in Türkiye. In addition, the study explores whether income and education levels significantly moderate this relationship.

This study partially supports the hypothesis that perceived corruption negatively affects trust in government and public administration. This finding aligns with previous research emphasising the detrimental effects of corruption on trust in political and administrative institutions (Anderson & Tverdova, 2003; Morris & Klesner, 2010; Kubbe, 2013). It also holds particular relevance for the context of Türkiye, where corruption rankings have deteriorated in recent years. The result is consistent with European Union reports and Transparency International's Corruption Perceptions Index (CPI).

However, the study also uncovers an unexpected result. Perceived corruption density is positively related to trust in government and public administration. In other words, even though citizens believe corruption is widespread within public institutions, they still report relatively high levels of trust in them. Several factors may help explain this pattern. One possible explanation is that citizens may be willing to overlook the extent of corruption if public services are delivered effectively and meet their expectations. This interpretation aligns with Peerthum and Luckho (2021), who show that although perceptions of corruption tend to reduce institutional trust, satisfactory public service delivery can soften or mediate this negative effect. Another possible explanation is that citizens may have become habituated to corruption practices in Türkiye. Despite perceiving corruption as widespread, citizens may still express trust in public institutions. As Persson, Rothstein, and Teorell (2013) proposed in their seminal paper, systemic corruption leads both citizens and bureaucrats to accept and survive within the system. The principal-agent theory in developed and modern countries collapses in developing countries where corruption is widespread. Furthermore, this paradox may reflect the influence of Türkiye's political climate over the past decade, where increased polarisation has led to politically motivated justifications of corruption. As proposed by Brown, Touchton and Whitford (2011), higher levels of political polarisation have more impact on perceived corruption. Furthermore, partisanship may cause people to perceive less corruption in the government or accept a high level of corruption due to social belonging (Blais et al., 2017). Future studies should examine how

political polarisation in Türkiye influences perceptions of corruption and trust in public administration, particularly in relation to universal governance values.

The study does not find consistent evidence for moderating effects of income and education on the relationship between perceived corruption and trust in government and public administration. However, results indicate that higher income levels weaken the positive association between perceived corruption density and trust. Although this does not directly support the study's second hypothesis, it offers an important insight: higher-income individuals may be less tolerant of corruption, which in turn reduces their trust in government institutions. This challenges the common assumption that individuals with higher incomes are less sensitive to corruption. Future research should further explore how socioeconomic class differences shape perceptions of public administration in Türkiye. Moreover, findings suggest that the negative relationship between corruption perception and trust is less pronounced among more educated individuals. This may relate to income level, and future research could investigate the combined effect of income and education. While education is often associated with lower levels of trust in government, this relationship should be examined alongside income brackets. Over the past two decades, Türkiye has undergone significant sociopolitical transformation, including the emergence of a new middle class with a distinct sociological profile. Political polarisation has further complicated citizens' attitudes toward corruption and institutional trust, making this an important area for further investigation.

The findings of this study carry important implications for the public administration and governance literature. Previous research shows that transparency and accountability mechanisms such as open budgeting practices and independent auditing institutions play a central role in building citizens' trust in public administration and reducing the damaging effects of corruption on institutional legitimacy (Yıldız & Eroğlu, 2025; Şamdan, 2023). These insights suggest that tackling corruption is not only about identifying and punishing misconduct, but also about creating governance structures that make decision-making processes more transparent and accountable. For policymakers and public officials, this means approaching policy design and implementation as interconnected processes, where anti-corruption measures are embedded throughout. Strengthening these institutional safeguards can help reduce corruption density while reinforcing public trust in government and public institutions.

This study has several limitations. First, the WVS survey data used were collected in 2018, and no more recent wave is currently available for Türkiye. Given the political, social, and administrative changes since 2018, citizens' perceptions and attitudes may have shifted significantly. In addition, the global COVID-19 pandemic has introduced widespread disruptions that may have influenced trust in public institutions. Future studies should aim to use more current data, ideally collected after major national and global events. Finally, qualitative or mixed-method approaches could yield more nuanced insights into how citizens perceive corruption and how these perceptions shape their trust in government and public administration.

References

Anderson, C.J. & Y.V. Tverdova (2003), "Corruption, Political Allegiances, And Attitudes toward Government in Contemporary Democracies", *American Journal of Political Science*, 47(1), 91-109.

Avrupa Komisyonu (2024), *2024 Türkiye Raporu*, <https://www.ab.gov.tr/siteimages/birimler/kpb/2024_trkiye_report_tr.pdf>, 11.02.2025.

Bannister, F. & R. Connolly (2011), "Trust and Transformational Government: A Proposed Framework for Research", *Government Information Quarterly*, 28(2), 137-147.

Beshi, T.D. & R. Kaur (2020), "Public trust in local government: Explaining the role of good governance practices", *Public Organization Review*, 20(2), 337-350.

Blais, A. et al. (2017), "Partisanship, information, and perceptions of government corruption", *International Journal of Public Opinion Research*, 29(1), 95-110.

Botero, J. et al. (2013), "Education, Complaints and Accountability", *The Journal of Law and Economics*, 56(4), 959-996.

Bouckaert, G. & S. Van de Walle (2001), *Government Performance and Trust in Government*, <https://www.researchgate.net/profile/Steven-Van-De-Walle/publication/228767477_Government_Performance_and_Trust_in_Government/links/02e7e521e026c60989000000/Government-Performance-and-Trust-in-Government.pdf>, 20.03.2025.

Bouckaert, G. (2012), "Trust and Public Administration", *Administration*, 60(1), 91-115.

Brown, D.S. et al. (2011), "Political polarization as a constraint on corruption: A cross-national comparison", *World Development*, 39(9), 1516-1529.

Charron, N. & B. Rothstein (2016), "Does education lead to higher generalized trust? The importance of quality of government", *International Journal of Educational Development*, 50, 59-73.

Coetzee, J. (2014), "The impact of corruption on development", *Journal of Public Administration*, 49(3), 821-835.

Demirel-Değirmenci, S. & Y. Ural-Uslan (2023), "The Role of Open Government in Maintaining Trust in Public Administration", *OPUS Journal of Society Research*, 20(56), 1163-1180.

Fisher, J. et al. (2010), "Does One Trust Judgement Fit All? Linking Theory And Empirics", *The British Journal of Politics and International Relations*, 12(2), 161-188.

Gebrihet, H.G. (2024), "The effects of the perception of corruption on public trust in government in Africa: A comparative analysis", *Politikon*, 51(1-2), 18-39.

Gelder, T.V. (2005), "Teaching Critical Thinking: Some Lessons from Cognitive Science", *College Teaching*, 53(1), 41-48.

Goldstein, D.A. & J. Wiedemann (2022), "Who do you trust? The consequences of partisanship and trust for public responsiveness to COVID-19 orders", *Perspectives on Politics*, 20(2), 412-438.

Gracia, D.B. & L.C. Ariño (2015), "Rebuilding Public Trust in Government Administrations Through E-Government Actions", *Revista Española de Investigación de Marketing ESIC*, 19(1), 1-11.

Graycar, A. (2015), "Corruption: Classification And Analysis", *Policy and Society*, 34(2), 87-96.

Grimmelikhuijsen, S.G. & A.J. Meijer (2014), "Effects of Transparency on The Perceived Trustworthiness of A Government Organization: Evidence from An Online Experiment", *Journal of Public Administration Research and Theory*, 24(1), 137-157.

Haerpfer, C. et al. (eds.), (2022), *World Values Survey: Round Seven - Country-Pooled Datafile Version 5.0.*, Madrid, Spain & Vienna, Austria: JD Systems Institute & WVSA Secretariat.

Hakhverdian, A. & Q. Mayne (2012), "Institutional Trust, Education And Corruption: A Micro-Macro Interactive Approach", *The Journal of Politics*, 74(3), 739-750.

Hetherington, M.J. (1998), "The Political Relevance of Political Trust", *American Political Science Review*, 92(4), 791-808.

Hooghe, M. et al. (2012), "The Cognitive Basis of Trust. The Relation between Education, Cognitive Ability, And Generalized And Political Trust", *Intelligence*, 40(6), 604-613.

Houston, D.J. & L.H. Harding (2013), "Public Trust in Government Administrators: Explaining Citizen Perceptions of Trustworthiness And Competence", *Public Integrity*, 16(1), 53-76.

Kan, M.E. (2025), "Türk Kamu Personeli Gözünden Yolsuzluk: Nedenleri, Etkileri, Sonuçları ve Alınabilecek Tedbirler Üzerine Nitel Bir Araştırma", *Uluslararası İktisadi ve İdari İncelemeler Dergisi*, 47, 187-214.

Kim, S.E. (2005), "The Role of Trust in The Modern Administrative State: An Integrative Model", *Administration & Society*, 37(5), 611-635.

Kubbe, I. (2013), "Corruption and Trust: A Model Design", Zeitschrift für vergleichende Politikwissenschaft, 7(1), 117-135.

Lawlor, A. & L.B. Stephenson (2025), "Affective polarization and institutional confidence in Canada", *International Political Science Review*, (Online First), https://doi.org/10.1177/01925121251388296.

Lee, Y. & H.L. Schachter (2019), "Exploring The Relationship between Trust in Government And Citizen Participation", *International Journal of Public Administration*, 42(5), 405-416.

McAllister, D.J. (1995), "Affect-And Cognition-Based Trust As Foundations for Interpersonal Cooperation in Organizations", *Academy of Management Journal*, 38(1), 24-59.

Medve-Balint, G. & Z. Boda (2014), "The Poorer You Are, The More You Trust? The Effect of Inequality And Income on Institutional Trust in East-Central Europe", *Sociologicky Casopis*, 50(3), 419-453.

Melgar, N. et al. (2010), "The Perception of Corruption", *International Journal of Public Opinion Research*, 22(1), 120-131.

Miller, A.H. (1974), "Political Issues And Trust in Government: 1964-1970", *American Political Science Review*, 68(3), 951-972.

Minkov, M. & G. Hofstede (2012), "Hofstede's Fifth Dimension: New Evidence from The World Values Survey", *Journal of Cross-Cultural Psychology*, 43(1), 3-14.

Mizrahi, S. & D.N. Krup (2025), "Institutional Trust, Corruption, And Democracy: Relationships Based on People's Perceptions Worldwide", *Political Studies*, 74(1), 165-186.

Morris, S.D. & J.L. Klesner (2010), "Corruption And Trust: Theoretical Considerations And Evidence from Mexico", *Comparative Political Studies*, 43(10), 1258-1285.

Morris, S.D. (2008), "Disaggregating Corruption: A Comparison of Participation And Perceptions in Latin America with A Focus on Mexico", *Bulletin of Latin American Research*, 27(3), 388-409.

Nannestad, P. (2008), "What Have We Learned about Generalized Trust, If Anything?", *Annual Review of Political Science*, 11, 413-436.

Nguyen, T.V. et al. (2017), "Local governance, corruption, and public service quality: evidence from a national survey in Vietnam", *International Journal of Public Sector Management*, 30(2), 137-153.

Obayelu, A.E. (2007), "Effects of corruption and economic reforms on economic growth and development: lessons from Nigeria", in: *2007 African Economic Conference*, <https://www.afdb.org/fileadmin/uploads/afdb/Documents/Knowledge/25068317-EN-OBAYELUS-PAPER-ON-CORRUPTION-MODIFIED-VERSION.PDF>, 25.05.2025.

Paul, R. & L. Elder (2006), "Critical Thinking: The Nature of Critical And Creative Thought", *Journal of Developmental Education*, 30(2), 34-45.

Peerthum, S. & T. Luckho (2021), "Exploring the linkage between public corruption and political trust in Mauritius: a PLS-SEM approach", *Public Organization Review*, 21(2), 317-335.

Persson, A. et al. (2013), "Why anticorruption reforms fail: systemic corruption as a collective action problem", *Governance*, 26(3), 449-471.

Philp, M. (2001), "Access, Accountability And Authority: Corruption And The Democratic Process", *Crime, Law and Social Change*, 36, 357-377.

Rose-Ackerman, S. (1999), *Corruption And Government: Causes, Consequences, And Reform*, Cambridge: Cambridge University Press.

Rothstein, B. & E.M. Uslaner (2005), "All for All: Equality, Corruption, And Social Trust", *World Politics*, 58(1), 41-72.

Rousseau, D.M. et al. (1998), "Not So Different After All: A Cross-Discipline View of Trust", *Academy of Management Review*, 23(3), 393-404.

Schoon, I. & H. Cheng (2011), "Determinants of Political Trust: A Lifetime Learning Model", *Developmental Psychology*, 47(3), 619-631.

Shieh, G. (2009), "Detecting Interaction Effects in Moderated Multiple Regression with Continuous Variables Power And Sample Size Considerations", *Organizational Research Methods*, 12(3), 510-528.

Svensson, J. (2005), "Eight Questions about Corruption", *Journal of Economic Perspectives*, 19(3), 19-42.

Şamdan, Y. (2023), "Türk Kamu Yönetiminde Şeffaflık ve Hesap Verebilirlik", *Uluslararası Yönetim Akademisi Dergisi*, 6(3), 926-942.

Torcal, M. & P. Christmann (2021), "Responsiveness, Performance And Corruption: Reasons for The Decline of Political Trust", *Frontiers in Political Science*, 3, 676672.

Transparency International (2018), <https://www.transparency.org/en/what-is-corruption>, 12.03.2025.

Treisman, D. (2000), "The Causes of Corruption: A Cross-National Study", *Journal of Public Economics*, 76(3), 399-457.

Turkish Statistical Institute (2019), *Address Based Population Registration System Results, 2018*, <https://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayali-Nufus-Kayit-Sistemi-Sonuclari-2018-30709>, 25.05.2025.

Uddin, N. (2024), "Impact of Crime and Insecurity on Citizen Trust in Public Institutions: Evidence from Bangladesh", *International Journal of Public Administration*, 48(4), 238-249.

Ugur-Cinar, M. et al. (2020), "How Does Education Affect Political Trust?: An Analysis of Moderating Factors", *Social Indicators Research*, 152(2), 779-808.

Uslaner, E.M. (2008), *Corruption, Inequality, And The Rule of Law*, Cambridge: Cambridge University Press.

Van de Walle, S. & K. Migchelbrink (2022), "Institutional Quality, Corruption, And Impartiality: The Role of Process And Outcome for Citizen Trust in Public Administration in 173 European Regions", *Journal of Economic Policy Reform*, 25(1), 9-27.

Van Ryzin, G.G. (2011), "Outcomes, Process, And Trust of Civil Servants", *Journal of Public Administration Research and Theory*, 21(4), 745-760.

Villoria, M. et al. (2013), "Social And Political Consequences of Administrative Corruption: A Study of Public Perceptions in Spain", *Public Administration Review*, 73(1), 85-94.

Walle, S.V.D. et al. (2005), "Deep Impact for High-Impact Agencies?: Assessing The Role of Bureaucratic Encounters in Evaluations of Government", *Public Performance & Management Review*, 28(4), 532-549.

Warren, M. (2004), "What Does Corruption Mean in A Democracy?", *American Journal of Political Science*, 48(2), 328-343.

Yıldız, H.D. & E. Eroğlu (2025), "Budget Transparency and Corruption: Empirical Evidence from a Cross-National Governance Framework", *Sayıştay Dergisi*, 36(138), 517-543.

You J. & S. Khagram (2005), "A Comparative Study of Inequality And Corruption", *American Sociological Review*, 70(1), 136-157.

Kayacı, M. (2026), “Perceived Corruption, Public Trust, and Socioeconomic Inequalities: The Roles of Income and Education in Türkiye”, *Sosyoekonomi*, 34(70), 51-73.

Sosyoekonomi

2026, Vol. 34(70), 75-100

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.04
Date Submitted: 17.07.2025
Date Revised: 11.10.2025
Date Accepted: 04.08.2026

The Effect of Good Governance Indicators on Productive Capacity Index in G20 Countries

Yusuf KAHREMAN *(https://orcid.org/0000-0001-5968-5081), Sivas Cumhuriyet University, Türkiye; ykahreman@cumhuriyet.edu.tr*

Merve EKİCİ *(https://orcid.org/0000-0002-0974-3498), Çukurova University, Türkiye; mekici@cu.edu.tr*

G20 Ülkelerinde İyi Yönetişim Göstergelerinin Üretken Kapasite Endeksi Üzerindeki Etkisi

Abstract

This study aims to analyse the relationship between the productive capacity index (PCI) and the main dimensions of good governance indicators (GGI): voice and accountability (VA), political stability and absence of violence/terrorism (PSA), government effectiveness (GE), regulatory quality (RQ), rule of law (RL) and control of corruption (CC). For this purpose, the study considers data from G20 countries for the period 2002-2022 and applies the panel CCEMG test and a causality test to analyse the relationship between the variables. The analysis for each country shows that PCI and GGI have different effects.

Keywords : Good Governance, Productive Capacity, G20 Countries, Panel Data Analysis.

JEL Classification Codes : C01, C33, D24.

Öz

Bu çalışma, üretken kapasite endeksi (PCI) ile iyi yönetişim göstergelerinin (GGI) temel boyutları olan ifade özgürlüğü ve hesap verebilirlik (VA), siyasi istikrar ve şiddet/terörizmin yokluğu (PSA), hükümetin etkinliği (GE), düzenleyici kalite (RQ), hukukun üstünlüğü (RL) ve yolsuzluğun kontrolü (CC) arasındaki ilişkiyi analiz etmeyi amaçlamaktadır. Bu amaçla çalışma, 2002-2022 döneminde G20 ülkelerinin verilerini dikkate almakta ve değişkenler arasındaki ilişkiyi analiz etmek için panel CCEMG testi ile nedensellik testi uygulamaktadır. Her bir ülke için yapılan analiz, PCI ve yönetişim göstergeleri arasında farklı etkiler olduğunu göstermektedir.

Anahtar Sözcükler : İyi Yönetişim, Üretken Kapasite, G20 Ülkeleri, Panel Veri Analizi.

1. Introduction

It is common for countries to adopt a long-term, stable approach when setting economic growth targets. A review of growth theories indicates that numerous theories exist. However, since the 1990s, it has been recognised that conventional indicators are insufficient for explaining growth. Consequently, the significance of productive capacity in economic growth assessments has gained more attention in recent years (Gnangnon, 2021). The PCI, initially released by the United Nations Conference on Trade and Development (UNCTAD) in 2021, includes data from 199 nations spanning 2000 to 2018, with the most recent edition extending through 2022. This index consists of eight dimensions, each calculated as a distinct index. These eight dimensions are derived from 42 sub-dimensions (Hall & Jones, 1996; UNCTAD, 2023).

PCI reflects a country's economic structure by measuring the level of utilisation of its production capacity. High PCI values indicate economic growth potential and attract foreign investors. Investment opportunities and employment opportunities are directly related to economic expansion (UNCTAD, 2023). GGI affect critical factors such as accountability, transparency, political stability, security, public efficiency, and economic regulations. Countries with strong governance are considered more likely to increase investor confidence, attract foreign direct investment, and enable effective resource utilisation. In this context, increasing productive capacity largely depends on good governance, as transparency and accountability positively affect economic outputs and indirectly improve the PCI. Furthermore, good governance supports sectoral development, ensures efficient resource use, and strengthens economic growth. A low PCI leads to economic stagnation, while a high PCI increases economic resilience. Therefore, strengthening GGI enables countries to achieve their economic goals more effectively and sustainably through the PCI.

In this regard, determining whether the PCI and good governance metrics are correlated is essential, as it will guide economic assessments of nations. This study will clarify the relationship between economic growth and good governance indices. Furthermore, understanding the relationship between the PCI and good governance metrics is essential for ensuring social welfare and sustainability. The findings of the analysis can inform policymakers' decisions on identifying areas for improvement and developing more effective economic policies. The information provided is expected to inform the development of country strategies during global or national crises. The fact that direct macro indicators have been examined thus far sets this study apart from the literature, particularly in the context of economic studies on GGI. This study investigates the relationship between GGI and the sources of economic progress rather than focusing solely on economic indicators. The goal is to examine the relationship between the PCI and good governance practices in the G20 nations from 2002 to 2022, which together account for around 70% of the world economy, with the study's main contributions in mind. To achieve this, an empirical investigation will determine whether the PCI and the World Bank's good governance metrics are related. The following sections of the study will commence with an introduction to the variables under consideration, presented in a theoretical context. A

thorough literature review will then be conducted, and related research will be assessed. The third section of the study will present detailed information on the methodology employed. The final section will present the findings and develop policy recommendations in line with them.

2. Theoretical Framework

This section describes the dependent and independent variables considered in this study, along with an analysis of how these indicators have changed over time across the G20 nations.

2.1. Productive Capacity Index

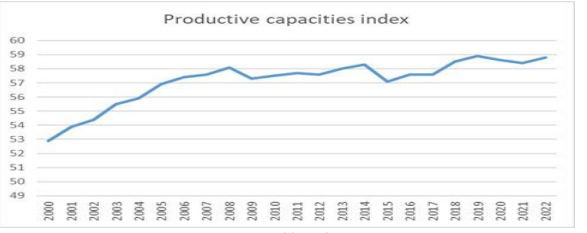
UNCTAD's analysis finds eight major kinds of productive capacity. The aforementioned productive capacity components are further classified into the following categories: human capital index, natural capital index, energy index, transport index, information and communication technologies index, institutions index, private sector index, and structural change index (UNCTAD, 2020).

The concept of human capital encompasses a range of factors, including individuals' levels of education, skills, and health. Furthermore, it emphasises society's integration into research and development processes, as evidenced by the number of researchers and the financial resources allocated to research. The concept of natural capital encompasses a range of factors, including the financial returns from the utilisation of natural resources, the estimation of prospective mining and agricultural resources, and the costs associated with their extraction. The energy component assesses the availability, efficiency, and sustainability of energy resources by considering variables such as energy distribution, consumption, and losses from renewable energy sources. Furthermore, GDP per unit of oil is considered an indicator of energy utilisation efficiency. The transport component assesses the capability of transport systems to move people and goods from one location to another. It encompasses infrastructure for road, rail, and air transportation. The ICT component assesses the extent to which the population has access to and is integrated with information and communication technologies.

In this context, factors include the number of fixed-line and mobile phone users, the extent of internet access, and the security of the servers that provide this access. The institutional component assesses the quality and effectiveness of institutions and their success in combating crime, corruption, and terrorism. This is achieved by evaluating factors such as political stability and citizens' freedom of expression. The private-sector component employs a multifaceted approach to assess the time and costs associated with cross-border trade processes, the provision of credit support to enterprises, the execution of contracts, and the procedures for establishing enterprises. The movement of labour and other productive resources from low-productivity economic sectors to high-productivity ones is a component

of structural change. This is measured using fixed capital intensity, the GDP contribution of industry and services, and the complexity and variety of exports (UNCTAD, 2023).

Figure: 1
PCI for G20 Countries



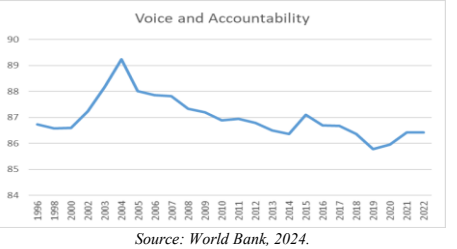
Source: World Bank, 2024.

The PCI index of G20 nations from 2000 to 2022 is shown in Figure 1. The index, which had previously shown a rising trend, experienced a period of stability after 2000. However, after 2017, it resumed its upward trend. This suggests that nations have increased their production capacity and that the ability to produce commodities and services has become more important. In particular, the economic measures and fiscal incentives adopted following the 2008 global financial crisis helped preserve and restore production capacity. In addition, the increase in exports of the service sector and high-tech products in the 2010s enabled more efficient use of production capacities. In recent years, investments in digital infrastructure and the widespread use of renewable energy have both increased production efficiency and strengthened the economic resilience of G20 countries.

2.2. Voice and Accountability

The concept of VA, a key sub-dimension of GGI, enhances democratic processes and shapes good governance policies. It emphasises freedom of expression, transparency, and managerial accountability to stakeholders, including responding to criticisms and assuming responsibility for outcomes (Sharma, 2008). According to Goetz and Jenkins (2002), this concept ensures that people can freely express their choices and that justice is upheld.

Figure: 2
VA Index for G20 Countries



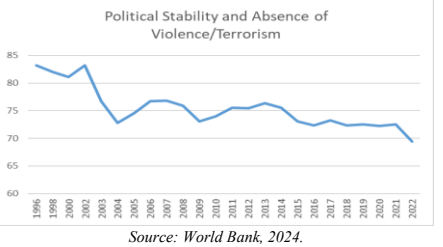
Source: World Bank, 2024.

Figure 2 illustrates the VA indicator data obtained from the World Bank. Despite the absence of a notable discrepancy between the highest and lowest VA values among G20 countries from 1996 to 2022, cyclical fluctuations were discernible. During this period, the highest value was recorded at 89.23 in 2004, while the lowest was 85.78 in 2019. These fluctuations demonstrate that even minor changes in governance quality can affect investor confidence and economic decision-making processes. The decline in 2019, in particular, can be attributed to global economic uncertainties and political instability in some countries. Overall, high and stable VA values support the economic performance of G20 countries, contributing to sustainable growth and efficient resource use.

2.3. Political Stability and Absence of Violence/Terrorism

This indicator measures a country's perceived political stability risk through terrorism, conflict, and ethnic tensions. Political stability is generally assessed by the absence of civil wars, coups, political terrorism, and corruption (Posner, 1997). High stability manifests as the effective, uninterrupted functioning of political processes (Kaufmann et al., 2011).

Figure: 3
PSA for G20 Countries



Source: World Bank, 2024.

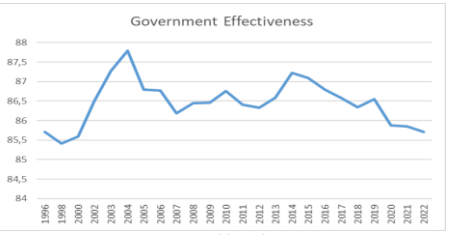
The resulting graph, created using data from the World Bank, illustrates the correlation between PSA. This is presented in Figure 3. The index, which was 83.19 in 1996, declined notably through 2022, reaching 69.44. This decline in perceptions of instability and violence over time, coupled with a decline in political stability for G20 countries, is evident from the data. This decline may undermine investor confidence and economic decision-making; increased political instability may make it difficult to attract foreign direct investment and put pressure on economic growth. Therefore, declines in the PSA index have significant effects on the macroeconomic performance and sustainable development goals of G20 countries.

2.4. Government Effectiveness

GE, one of the World Bank's WGI indicators, measures policy formulation and implementation capacity, public sector independence, and service quality (Kaufmann et al., 2009; Cooray & Young, 2024). High-scoring countries implement long-term policies

independently of pressure from special interest groups; low-scoring countries are more susceptible to special interest influence. GE is also an important indicator of investor attractiveness; higher index values are associated with greater investment (Dong et al., 2024).

Figure: 4
GE for G20 Countries



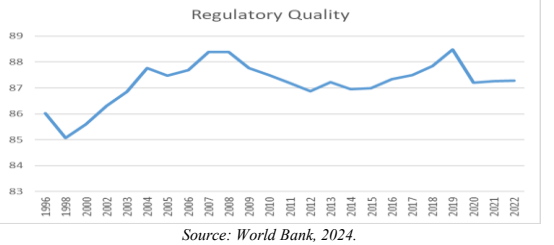
Source: World Bank, 2024.

Figure 4 illustrates the GE indicator graph that was produced using World Bank data. Figure 4 shows that the GE indicator has remained relatively high, though it has not shown consistent performance from 1996 to 2022. This situation demonstrates that governments generally have strong policy-making and implementation capacities, but periodic fluctuations can affect investor confidence and economic decision-making. Therefore, maintaining a stable GE is critical for economic growth, investment attractiveness, and efficient resource use.

2.5. Regulatory Quality

The index is an important indicator of a country's institutional framework. RQ reflects the government's capacity to effectively create and enforce laws and regulations while supporting the private sector (Handoyo, 2023). High quality facilitates sustainable economic practices, while low quality hinders their implementation (North, 1991; Handoyo & Anas, 2024; Singhania & Saini, 2022).

Figure: 5
RQ for G20 Countries



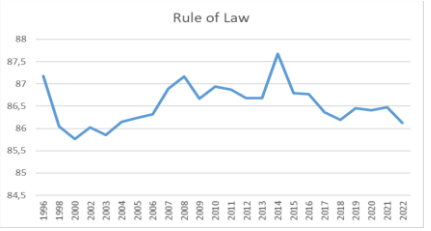
Source: World Bank, 2024.

Figure 5 illustrates the information gathered for this indicator from the World Bank. The data indicates an upward trajectory from 1996 to 2022, although the trend is not entirely stable. While there was a notable surge between 2003 and 2007, a slight decline was observed between 2008 and 2009. This index rating has declined among the G20 nations following the global health crisis caused by COVID-19. These fluctuations indicate that changes in RQ can directly affect economic performance and investment attractiveness. Particularly during times of crisis, low RQ can negatively affect economic stability and sustainable growth.

2.6. Rule of Law

According to Kaufmann et al. (2011), the RL index measures the public's perception of compliance with legislation and assesses the likelihood of violence and crime. Economically, it encompasses functions such as reducing violence, protecting property rights, ensuring government oversight, and regulating corruption (Haggard & Tiede, 2011). A high index predicts an increase in investment, while a low index predicts capital flight (Dobler, 2011; Yasmeen et al., 2023).

Figure: 6
RL Index for G20 Countries



Source: World Bank, 2024.

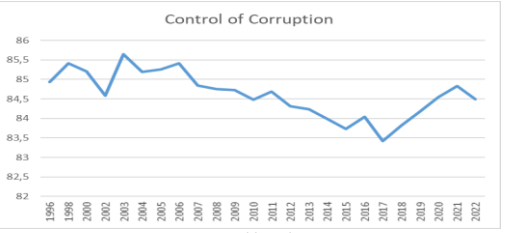
Figure 6 illustrates the RL indicator data acquired from the World Bank. This index exhibited a cyclical fluctuation between 1996 and 2022, reaching a higher level during the 2003-2010 period. Following the advent of the global pandemic, the index values exhibited a sustained decline relative to previous years, ultimately entering a phase of recovery in 2022. These fluctuations demonstrate that changes in the RL have a direct impact on investor confidence and economic performance. The decline during the pandemic period, in particular, may have contributed to decreased investment and economic instability. The recovery of the index can be seen as a positive sign in terms of economic confidence and sustainable growth.

2.7. Control of Corruption

According to the World Bank and UNDP, corruption is the misuse of public office for private gain (World Bank, 1997). The Corruption Control Index measures the level of corruption in the public sector and the capacity to prevent it. Low index values negatively

affect countries in social, economic, and financial areas, while also weakening governance, investment, and policy implementation (Banerjee, 2016; Habib et al., 2020; Acemoglu, 2003). A high index, on the other hand, facilitates access to international finance and supports economic growth (Cieślik & Goczek, 2017).

Figure: 7
CC for G20 Countries



Source: World Bank, 2024.

Figure 7 illustrates the information gathered for this indicator from the World Bank. The indicator has fluctuated considerably in certain years. The index exhibited a notable decline between 1996 and 2022, reaching its lowest point in 2017 and its highest point in 2003. These fluctuations demonstrate that changes in corruption control have a direct impact on economic performance and the investment environment. Low index values can reduce investor confidence, trigger capital outflows, and negatively affect economic growth. Conversely, high index values can support sustainable growth and access to international finance by strengthening governance quality.

3. Literature Review

The relationship between macroeconomic variables has been examined in numerous studies using the PCI and GGI separately. While these studies provide significant insights into economic growth and development, they also demonstrate how the PCI and GGI affect macroeconomic factors. No study that directly examines the connection between the PCI and GGI has been found in a thorough examination of the literature. As a result, several studies deemed pertinent to the subject are detailed below.

Cornia and Scognamillo (2016) examined the productive capacity of 48 less developed countries between 1993 and 2013 using panel data analysis and assessed its impact on economic vulnerability and human development dimensions based on per capita GDP; the findings show that productive capacity has a statistically significant effect on these dimensions. Similarly, Olarte et al. (2021) analysed Productive Capacity Index (PCI) data for South Africa for the first, second, and fifth quarters between 2002 and 2011. They used fixed effects estimation to assess the impact of macroeconomic variables, particularly commodity prices and institutional strengthening processes, on reducing productive capacity inequality. The findings reveal that increasing the productive capacity of individuals with low levels of education plays a significant role in reducing inequality. Demiral and Demiral

(2023) examined the socio-economic data of 125 countries for the period 2000-2018 and investigated the relationship between energy performance and productive capacity using the panel stationarity test method. The three main findings of the study include the positive and significant effect of human capital on energy efficiency, except in middle-income countries; the negative impact of transport capacity on energy efficiency, except in high- and middle-income economies; and the positive and strong correlation between the spread of information and communication technologies and energy efficiency, except in low-income countries. Xin et al. (2023) examined the relationship between material footprint, economic growth, and PCI in China from the first quarter of 2000 to the fourth quarter of 2018 using the Bootstrapping Autoregressive Distributed Lag (BARDL) method. According to the findings of the analysis, a one-unit increase in PCI leads to a 0.298% decrease in the material footprint and a 0.316% increase in economic growth, indicating that developing productive capacity facilitates the efficient management of resources.

Numerous studies in the literature examining the relationship between productive capacity and macroeconomic indicators and GGI are noteworthy. Studies such as Gerring et al. (2005), Persson and Tabellini (2009), Chinn and Ito (2006), Heckelman and Knack (2009), Andersen and Jensen (2013), and Flachaire and Garcia Peñalosa (2014) reveal a meaningful and positive relationship between economic growth and good governance. Persson and Tabellini (1994) showed that economic development is strongly related to social spending, democracy, and education levels. In addition, Mulligan et al. (2004) compared democratic and autocratic forms of government and found that democratic governments improve living standards and make income distribution more equitable. Finally, Han et al. (2014) emphasise that good governance not only increases capital accumulation but also raises countries' economic welfare. These studies provide strong evidence that governance performance is directly related to economic outcomes.

In the existing literature, studies examining the relationship between productive capacity and economic performance have primarily focused on macroeconomic indicators and have generally concentrated on low-income or specific country groups (Cornia & Scognamillo, 2016; Olarte et al., 2021; Demiral & Demiral, 2023; Xin et al., 2023). Similarly, studies investigating the relationship between good governance and economic growth mostly evaluate general economic indicators, while integration with productive capacity indicators is limited (Gerring et al., 2005; Persson & Tabellini, 1994; Mulligan et al., 2004; Han et al., 2014). Furthermore, studies in the literature that provide a comprehensive analysis covering both PCI and World Bank GGI are limited. This study fills this gap by examining all World Bank GGIs using PCI data for G20 countries over the period 2002-2022. Thus, it reveals the interaction between productive capacity and GGI on economic growth and sustainable development in a more comprehensive manner, providing concrete findings for policymakers to identify areas for improvement. In this respect, the study goes beyond analyses in the literature that are reduced to macro indicators and offers a unique contribution by addressing the relationship between productive capacity and good governance from a holistic perspective.

4. Data and Methodology

In this study, the analysis was conducted using the GGI, which constitutes the PCI, according to World Bank data. The main objective of the research is to empirically reveal the effects of the independent variables on the PCI. In this context, the study comprehensively analyses the interaction between productive capacity and good governance, filling a gap in the literature and presenting critical findings that will directly contribute to economic development and sustainability policies. The analysis covers the remaining 19 G20 countries, excluding the European Commission, which was excluded from the sample as it is a single entity. The study uses annual data from 2002 to 2022. This period was chosen because it allows for the observation of global economic crises, financial fluctuations, and the long-term effects of the relationship between productive capacity and good governance. The sample group is selected for several reasons. First, G20 countries represent approximately 70% of the world economy. This increases the validity and importance of the study's results on a global scale. Furthermore, the sample countries are heterogeneous in terms of their economic structures, sizes, and levels of development. This diversity strengthens the generalizability of the analysis findings. Finally, examining this group of countries provides policymakers with strategically important, applicable, and instructive results. Table 1 provides detailed explanations of the variables included in the model and strengthens the methodological transparency of the research.

Table: 1
Information on Variables used in the Model

Symbol	Variables	Description	Source
PCI	Productive Capacities Index	It serves as an indicator of the extent to which a country can effectively utilise its existing resources to demonstrate its economic potential.	UNCTAD
VA	Voice and Accountability	It measures how involved citizens are in governance procedures and how accountable the government is to the people.	WDI
PSA	Political Stability and Absence of Violence/Terrorism	It assesses the political stability and security environment within the country, reflecting the presence of social unrest and threats of terrorism.	WDI
GE	Government Effectiveness	It assesses the state's ability to govern and provide public services.	WDI
RQ	Regulatory Quality	It assesses the dependability and efficiency of the regulatory structure controlling economic activity.	WDI
RL	Rule of Law	It displays the degree of justice administered, the independence of the legal system, and the enforceability of laws.	WDI
CC	Control of Corruption	It assesses the degree of corruption in the government and the ability to stop it.	WDI

Panel data analysis has been conducted based on the variables presented in Table 1, utilising a sample of 19 developed countries. Kaufmann et al. (2011) provided the explanations for the other independent variables, while UNCTAD (2023) provided the explanatory section for the dependent variable, the PCI. Determining whether there is cross-sectional dependence between the series is crucial before moving on to the panel analysis. Consequently, a cross-sectional dependence test is used to begin the investigation. The panel data model developed for this investigation is formulated as follows:

$$PCI_{it} = b_0 + b_1 VA_{it} + b_2 PSA_{it} + b_3 GE_{it} + b_4 RQ_{it} + b_5 RL_{it} + b_6 CC_{it} + \varepsilon_{it} \quad (1)$$

4.1. Variance Inflation Factor (VIF) Test

The multicollinearity problem manifests in multiple regression analyses. This situation pertains to the existence of a perfect or near-perfect linear relationship in one or more of the independent variables for each observation. Hoerl and Kennard (1970) proposed that the most effective method for detecting multicollinearity is to calculate the VIF value. It is asserted that when the VIF value exceeds 5, multicollinearity becomes a possibility.

4.2. Cross-sectional Dependence Test

Several panel data sets exhibit cross-sectional dependence, according to an analysis of the panel data literature. In disturbances without a recognisable pattern of common components or geographical dependence, this can be explained by the presence of idiosyncratic bilateral dependence, shared shocks, and unobservable variables that eventually become integrated into the error term and spatial dependence. Globalisation and the growing economic and financial interdependence of nations and financial institutions are to blame for these trends. Stated differently, strong interdependencies among cross-sectional units can explain these trends (De Hoyos & Sarafidis, 2006).

The cross-section dependence test, developed by Pesaran (2004), is used to select the best-generating unit root test for use. First-generation unit root tests should be utilised unless there is cross-sectional dependence, in which case second-generation unit root tests should be used. This condition is assessed using the LM (Lagrange Multiplier) test developed by Breusch and Pagan in 1980, the LMadj (Adjusted Cross-Sectional Dependence Lagrange Multiplier) test, and the CDLM test developed by Pesaran in 2004. The Lagrange Multiplier test, developed by Pesaran et al. (2008), is used in this case. It is important to keep in mind that analyses may be biased or inconsistent if they do not test for cross-sectional dependence. When the time dimension is greater than the cross-sectional dimension (T>N), the Breusch and Pagan (1980) LM test is employed. It is based on the average of the pairwise correlation coefficient. When (T<N) but the Breusch and Pagan LM test is irrelevant, the Pesaran (2004), Fress (1995), or Friedman (1937) tests would be more appropriate. The Breusch and Pagan (1980) LM test statistic is given by equation (2).

$$LM_1 = T \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \tilde{\rho}_{ij}^2 \tag{2}$$

Equation 2 produces the test statistic, which has N(N-1)/2 degrees of freedom and is asymptotically distributed in accordance with a chi-square distribution. Pesaran addresses the cross-section dependence test in two different ways in his 2004 study. The first is the cross-section dependence test, which is represented by Equation (3) and is applicable when N and T are large.

$$LM = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \left(T\tilde{\rho}_{ij}^2 - 1\right) \tag{3}$$

When the cross-sectional dimension is larger than the time dimension (N>T), the second test statistic proposed by Pesaran (2004) is used. Additionally, this test is particularly suited to unbalanced panels with missing data. The CD test statistic is presented in Equation (4).

$$CD = \sqrt{\left(\frac{2T}{N(N-1)}\right)} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij}\right) \quad (4)$$

In his 2004 study, Pesaran proposed two hypotheses for the CD test statistic:

H_0: There is no cross-section dependence.

H_1: There is cross-section dependence.

4.3. Homogeneity Test

The first studies examining the homogeneity or heterogeneity of slope coefficients in panel data analysis were conducted by Swamy (1970). Later, Pesaran and Yamagata developed Swamy's test, which introduced a new perspective to this field. Pesaran et al. (2008) established the $\tilde{\Delta}$ ve $\tilde{\Delta}_{adj}$ tests, which have been used in subsequent investigations on the homogeneity or heterogeneity of slope coefficients. Equations (5) and (6) present these tests.

$$\tilde{\Delta} = \sqrt{N} \left(\frac{N^{-1}\tilde{S}-k}{\sqrt{2K}}\right) \quad (5)$$

$$\tilde{\Delta}_{adj} = \sqrt{N} \left(\frac{N^{-1}\tilde{S}-E(\tilde{Z}_{it})}{\sqrt{Var(\tilde{Z}_{it})}}\right) \quad (6)$$

$E(\tilde{Z}_{it})$ represents k, $Var(\tilde{Z}_{it})$ represents $2k(T-k-1)/T+1$, $\tilde{S}$ represents the adjusted Swamy statistic, and $\tilde{Z}_{it}$ represents random independent variables with constrained mean-variance.

The following hypotheses are posited for testing:

H_0: $\beta_1 = \beta$ (Slope coefficients contain homogeneity)

H_1: $\beta_1 \neq \beta$ (Slope coefficients contain no homogeneity)

4.4. Second Generation Unit Root Test

The use of first-generation unit root tests, such as those put out by Levin et al. (2002), Im et al. (2003), Breitung (2000), Hadri (2000), Maddala and Wu (1999), and Choi (2001), is useful in panel data analysis when cross-sectional dependency is absent. Second-generation unit root tests, such as SUR-ADF, Boot-IPS, Boot-Hadri, Hadri-Kurazmi, Pesaran (2007) CIPS, and Bai-Ng (2004), may be used when cross-sectional dependence is present. The second-generation Boot-IPS unit root test, which accounts for cross-sectional

dependence and heterogeneity, was employed in this investigation. The $\bar{t}$ test statistic's findings are used in this test. The null hypothesis assumes the existence of a unit root. The bootstrap version of the IPS statistic, which was created by Im et al. (2003), is the $\bar{t}$ test statistic. Equation (7) provides the parameters that are used to generate this statistic (Hurlin & Mignon, 2007).

$$\bar{t} = \frac{1}{N}\sum_{i=1}^{N} t_i \, T \tag{7}$$

4.5. Panel LM Cointegration Test

Tests are conducted in panel data analysis to determine whether there is a long-term cointegration relationship between variables. In this study, the Panel LM cointegration test developed by Westerlund and Edgerton (2007) was employed to ascertain the cointegration relationship between variables. This test accounts for cross-sectional dependence. The test was favoured due to its capacity to accommodate autocorrelation and heteroskedasticity within the cointegration equation, thereby ensuring effective results even when sample sizes are limited. The H_0 hypothesis in the test indicates the presence of cointegration. The methodology is based on the theoretical underpinnings laid out by McCoskey and Kao's (1998) Lagrange multiplier test, providing a robust theoretical foundation. This approach facilitates the analysis of both correlation and heteroskedasticity across distinct cross-sections, thereby offering a comprehensive framework for data-driven insights.

4.6. Panel Mean Group Test

For panel data analysis, Pesaran (2006) created the CCEMG (Common Correlated Effects Mean Group) and CCEP (Common Correlated Effects Pooled) estimators. The long-run coefficients of these two estimation techniques are given in Equations (8) and (9) below. The CCEMG estimator employed in this study is a straightforward average of individual CCE (Common Correlated Effects) estimators.

$$\hat{b}_{CCEMG} = N^{-1}\sum_{i=1}^{N} \hat{b}_i \tag{8}$$

$$\hat{b}_{CCEP} = \left(\sum_{i=1}^{N} \theta_i X_i' \bar{M}_w X_i\right)^{-1} \sum_{i=1}^{N} \theta_i X_i' \bar{M}_w Y_i \tag{9}$$

In the models, $\hat{b}_i$ is defined as the CCE estimate for each cross-sectional unit, $\theta_{i,}$ and the weight matrix N^{-1}. This approach yields asymptotically normally distributed findings, is a consistent estimator regardless of whether the time dimension is greater or lower than the cross-sectional dimension, and enables the computation of long-run equilibrium values for individual cross-sectional units (Pesaran, 2006).

4.7. Dumitrescu and Hurlin Panel Causality Test

This test, as introduced by Dumitrescu and Hurlin in 2012, is an enhanced iteration of the Granger causality test. The test provides the results of Wbar and Zbar statistics, as well as effective results when the time dimension is larger or smaller than the cross-sectional

dimension. A linear heterogeneous equation represents the causality relationship between variables.

$$y_{i,t} = a_i + \sum_{k=1}^{K} \gamma_i^{(k)} y_{i,t-k} + \sum_{k}^{K} \beta_i^{(k)} x_{i,t-k} + \varepsilon_{i,t} \quad (10)$$

The model delineated in equation (10) furnishes insights into the potential causal relationship between variables x and y. The equation $\beta_i = \left(\beta_i^{(1)}, \beta_i^{(2)}, \ldots \ldots \beta_i^{(k)}\right)$ refers to. It is assumed that the individual effects a_i, lagged parameters $\gamma_i^{(k)}$, and slope coefficient $\beta_i^{(k)}$ of the regression vary across units. The results of the causality test under this assumption constitute the fixed effects model. The hypotheses of the test are given below.

$H_0: \beta_i = 0 \; \forall_i = 1, \ldots N$

$H_1: \beta_i = 0 \; \forall_i = 1, \ldots N_1$

$H_0: \beta_i \neq 0 \; \forall_i = N_1 + 1, N_2 + 2, .., N$

5. Empirical Results

The VIF test, utilised to examine the relationship between two or more variables, is used in the multiple linear regression model. In the present study, the VIF test was primarily utilised to ascertain the presence of multicollinearity. In this particular context, this test must be conducted before commencing the analysis.

Table: 2
VIF Test Results

Variables	Centered VIF
VA	2.813915
PSA	4.198922
GE	1.375917
RQ	3.622676
RL	1.166255
CC	1.589452

According to the central VIF results in Table 2, multicollinearity is not a problem in the established model. In our panel data analysis, we first analyse the likelihood of cross-sectional dependence in the series. The presence of cross-sectional dependence indicates that the generating unit root test performs well for the model. If the test results show cross-sectional dependence among the panel's countries and the p-value is below the 5% significance level, the H₀ hypothesis is rejected. Once the null hypothesis has been refuted, second-generation panel unit root tests are employed. The findings of the CD test statistic recommended by Pesaran (2004) for the series are shown in Table 3.

Table: 3
Cross-sectional Dependency Test Results

Test	Statistics	P-value
LM	345,8	0,000
LM adj*	15,38	0,000
LM CD*	13,87	0,000

Table 2 shows that the p-values are less than the 5% significance level. These findings suggest that cross-sectional dependence is present in the analysis. Given this data, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted as the more likely explanation. These findings suggest that a shock in any of the countries under study would have a substantial effect on other countries. When cross-sectional dependence is present, second-generation unit root testing is advised. However, homogeneity and heterogeneity tests must be performed first. The outcomes of the homogeneity or heterogeneity tests can be used to decide which of the unit root, cointegration, or causality tests should be used on the variables. In this regard, Table 4 displays the study's delta homogeneity test results.

Table: 4
Delta Homogeneity Test Results

Test	Delta	P-value
$\tilde{\Delta}$	11,038	0,000
$\tilde{\Delta}_{adj}$	14,029	0,000

The values of both the delta and adjusted delta probabilities in Table 4 are less than the 5% significance level. In this case, it is concluded that the alternative hypothesis, which assumes heterogeneity, should be accepted over the null hypothesis, which assumes homogeneity. Consequently, second-generation unit root tests that account for heterogeneity should be employed.

The most important distinction between panel unit root tests and time series unit root tests is that panel data may exhibit asymptotic behaviour due to the influence of both the temporal and cross-sectional dimensions. The asymptotic properties of these tests may be affected if there is a correlation among the units in a panel. In these cases, this association is taken into account by using second-generation unit root tests (Barbieri, 2006; Hurlin & Mignon, 2007). The Boot-IPS unit root test, developed by Smith et al. (2004), is used in this investigation because it accounts for both heterogeneity and cross-sectional dependence.

Table: 5
Boot-IPS Second Generation Unit Root Test Results

Variables	At level		1st difference		Result
	Statistic	Probability	Statistic	Probability	
PCI	-1,941	0,654	-4,942	0,002	I(1)
VA	-2,422	0,127	-5,109	0,000	I(1)
PSA	-3,185	0,000	-	-	I(0)
GE	-1,538	0,464	-5,336	0,000	I(1)
RQ	-2,885	0,006	-	-	I(0)
RL	-2,663	0,039	-	-	I(0)
CC	-2,768	0,003	-	-	I(0)

The results of the Boot-IPS second-generation unit root test under cross-sectional dependence are shown in Table 5 for the reader's convenience. The findings suggest that the variables PSA, RQ, RL, and CC are level-stationary. In addition, it is found that the other variables become stationary in first differences. In light of the aforementioned, it is advised that an ARDL (Autoregressive Distributed Lag) analysis be carried out to determine the

variables' long-term connection. The ARDL analytical method is appropriate when the dependent variable is I(1) and the independent variables are stationary at several levels. Therefore, one of the ARDL techniques, the CCEMG method, was chosen. This approach works well with models that show heterogeneity and cross-sectional dependence.

Table: 6
Panel LM Cointegration Test Results

Variables	LM Statistic	Bootstrap p-value
VA	10,092	0,000
PSA	11,070	0,001
GE	7,496	0,035
RQ	9,135	0,211
RL	8,841	0,007
CC	6,801	0,128

The Panel LM cointegration test provides results for bootstrap and asymptotic probability values. This test is preferred because it accommodates cross-sectional dependence, which necessitates examining bootstrap probability values. Accordingly, when examining the Panel LM cointegration test results presented in Table 6, it is evident that, as indicated by the bootstrap values, all variables except RQ and CC are below the 5% significance level. The findings indicate a cointegration relationship between the independent variables VA, PSA, GE, and RL and the dependent variable PCI over a long period of time. In this context, the CCEMG analysis method will be used to estimate long-term coefficients for variables showing a cointegration relationship.

Table: 7
CCEMG Panel Test Results

Dependent Variable: PCI			
Variable	**Coefficient**	**Standard Error**	**Probability**
VA	-0,027	0,041	0,503
PSA	0,020	0,011	0,007
GE	0,064	0,021	0,003
RQ	0,005	0,024	0,835
RL	0,030	0,019	0,121
CC	0,035	0,016	0,030

The test's findings, which are shown in Table 7, provide information on how variables affect the PCI. The PCI increases by 0.020 units for every unit rise in the PSA independent variable, 0.064 units for every unit increase in GE, and 0.035 units for every unit increase in CC, according to the findings reported at the 5% significance level. These results show that the independent variables PSA, GE, and CC have a positive association with the dependent variable, PCI.

The inability to find a significant correlation between PCI and the independent variables VA, RQ, and RL precluded further examination of these variables. A survey of the literature found that there is little research that specifically examines the connection between PCI and GGI. Studies examining the relationship between macroeconomic and GGI have found a favourable correlation between economic growth and governance (Persson & Tabellini, 2009; Gerring et al., 2005). Additionally, Mulligan et al. (2004) demonstrate that

democratic governance is associated with higher living standards and a more equitable income distribution.

Table: 8
CCEMG Country Test Results

Dependent Variable: PCI			
Variable	**Coefficient**	**Standard Error**	**Probability**
Argentina			
VA	-0,425	0,236	0,071
PSA	0,045	0,076	0,552
GE	0,038	0,090	0,675
RQ	0,066	0,132	0,616
RL	-0,030	0,093	0,741
CC	0,012	0,050	0,798
Australia			
VA	-0,003	0,198	0,987
PSA	0,011	0,026	0,665
GE	0,173	0,116	0,136
RQ	0,003	0,150	0,979
RL	0,120	0,117	0,307
CC	0,054	0,131	0,678
Brazil			
VA	-0,129	0,062	0,040
PSA	-0,010	0,028	0,719
GE	0,134	0,052	0,010
RQ	-0,156	0,075	0,039
RL	0,013	0,058	0,814
CC	0,069	0,040	0,084
Canada			
VA	-0,006	0,135	0,964
PSA	0,049	0,025	0,051
GE	-0,095	0,124	0,444
RQ	0,235	0,087	0,007
RL	-0,511	0,260	0,049
CC	0,538	0,210	0,011
China			
VA	0,147	0,235	0,532
PSA	0,003	0,078	0,960
GE	0,171	0,092	0,064
RQ	-0,031	0,091	0,729
RL	0,027	0,112	0,806
CC	0,095	0,052	0,071
France			
VA	0,047	0,032	0,141
PSA	0,023	0,022	0,307
GE	-0,005	0,070	0,937
RQ	-0,031	0,047	0,505
RL	-0,053	0,109	0,625
CC	0,065	0,039	0,095
Germany			
VA	-0,192	0,259	0,458
PSA	0,083	0,049	0,090
GE	0,180	0,146	0,216
RQ	-0,151	0,150	0,314
RL	-0,004	0,235	0,984
CC	-0,199	0,264	0,450
India			
VA	-0,049	0,085	0,562
PSA	0,046	0,080	0,562
GE	0,030	0,042	0,476
RQ	-0,032	0,062	0,604
RL	-0,249	0,070	0,000
CC	0,148	0,059	0,013

Indonesia			
VA	0,168	0,164	0,304
PSA	0,113	0,078	0,145
GE	0,109	0,071	0,127
RQ	-0,064	0,096	0,507
RL	0,005	0,127	0,963
CC	0,029	0,054	0,585
Italy			
VA	0,130	0,040	0,001
PSA	0,001	0,040	0,977
GE	0,106	0,032	0,001
RQ	0,144	0,043	0,001
RL	-0,059	0,059	0,321
CC	0,029	0,039	0,461
Japan			
VA	0,174	0,082	0,035
PSA	-0,005	0,046	0,903
GE	0,014	0,122	0,903
RQ	0,012	0,104	0,906
RL	0,101	0,153	0,508
CC	-0,235	0,136	0,084
South Korea			
VA	0,071	0,109	0,516
PSA	0,018	0,066	0,775
GE	0,000	0,111	0,997
RQ	-0,011	0,118	0,920
RL	-0,023	0,072	0,751
CC	0,033	0,092	0,722
Mexico			
VA	-0,079	0,060	0,189
PSA	0,085	0,032	0,008
GE	0,059	0,038	0,120
RQ	-0,033	0,039	0,406
RL	0,060	0,037	0,108
CC	0,016	0,045	0,721
Russian Federation			
VA	0,048	0,049	0,331
PSA	0,013	0,028	0,644
GE	0,056	0,016	0,001
RQ	-0,027	0,016	0,095
RL	0,013	0,036	0,712
CC	-0,017	0,015	0,265
Saudi Arabia			
VA	-0,299	0,134	0,026
PSA	-0,014	0,027	0,611
GE	0,141	0,049	0,005
RQ	0,092	0,059	0,118
RL	0,048	0,098	0,624
CC	-0,016	0,044	0,719
South Africa			
VA	0,410	0,190	0,032
PSA	0,029	0,038	0,444
GE	0,147	0,086	0,088
RQ	0,027	0,082	0,736
RL	0,105	0,074	0,155
CC	-0,193	0,079	0,015
Türkiye			
VA	-0,050	0,091	0,581
PSA	0,095	0,055	0,086
GE	0,044	0,073	0,543
RQ	0,010	0,051	0,836
RL	-0,021	0,072	0,765
CC	0,054	0,082	0,509
United Kingdom			
VA	-0,040	0,203	0,841
PSA	-0,058	0,036	0,105
GE	-0,039	0,103	0,704
RQ	0,151	0,109	0,167
RL	0,183	0,180	0,308
CC	-0,134	0,171	0,430

United States of America			
VA	-0,147	0,083	0,076
PSA	0,012	0,031	0,692
GE	0,112	0,109	0,304
RQ	0,084	0,057	0,140
RL	0,117	0,162	0,471
CC	0,066	0,082	0,422

The findings of the CCEMG estimator panel analysis are shown in Table 8, which indicates that the VA index has a favourable and strong impact on the PCI in South Africa, Japan, and Italy. Conversely, the countries identified as having a negative impact include Argentina, Brazil, Saudi Arabia, and the United States. The analysis indicates that political stability and the PSA have positive and significant effects on the PCI in Canada, Germany, Mexico, and Türkiye, with no negative relationships observed between PSA and PCI in any country. GE demonstrates positive and significant effects on the PCI in Brazil, China, Italy, the Russian Federation, Saudi Arabia, and South Africa, with no findings indicating a negative relationship between these two variables. The RQ positively and significantly affects the PCI in Canada, Italy, and the Russian Federation, although a negative effect is observed only in Brazil. Furthermore, the RL has been found to exert a negative influence on PCI in Canada and India, with no evidence suggesting a positive effect of RL on PCI. The CC shows positive and significant effects on PCI in Brazil, Canada, China, France, India, Japan, and South Africa. Table 8 shows no negative effect between CC and PCI. These results indicate that national governance policies affect PCI. Consequently, countries may increase production capacity by developing policies tailored to their governance structures.

Table: 9
Dumitrescu and Hurlin Panel Causality Test Results

Hypotheses	W-statistic	Zbar-statistic	Probability
ΔVA → ΔPCI	2.012	2.154	0.031**
ΔPCI → ΔVA	2.657	3.736	0.000*
PSA → ΔPCI	1.869	1.804	0.011**
ΔPCI → PSA	2.491	3.330	0.000*
ΔGE → ΔPCI	0.945	-0.459	0.646
ΔPCI → ΔGE	2.421	3.158	0.121
RQ → ΔPCI	0.746	-0.948	0.343
ΔPCI → RQ	2.908	4.352	1.005
RL → ΔPCI	0.725	-0.999	0.317
ΔPCI → RL	4.198	7.514	6.014
CC → ΔPCI	1.459	0.798	0.024**
ΔPCI → CC	3.121	4.874	1.006

It should be noted that the symbols (*), (**) and (***) denote statistical significance levels of 1%, 5% and 10%, respectively. The appropriate lag length is set as 2. The difference operator is denoted by (Δ).

Table 9 presents the results of the causality relationship between the variables. The findings indicate that the voice and accountability index (VA), the political stability and absence of violence/terrorism index (PSA), and the corruption control index (CC) are among the factors contributing to the productive capacity index (PCI). Furthermore, the bidirectional causality relationship between the voice and accountability index (VA) and the political stability and absence of violence/terrorism index (PSA) and the productive capacity index (PCI) was substantiated, while a unidirectional causality relationship was identified from the control of corruption index (CC) to the productive capacity index (PCI). As the probability values of the other variables exceed the 5% significance level, no interpretation

can be made regarding these variables. In this context, it is understood that G20 countries should pay special attention to factors such as voice and accountability, PSA, and the elimination of corruption to increase the productive capacity index.

6. Conclusion and Policy Recommendations

The concept of governance is explained in the World Bank's 1994 study "Governance and World Bank Experiences", which is founded on the ideas of accountability, transparency, predictability, openness, and the RL. This research emphasises the importance of governance indices for nations. The World Bank defines governance as a management strategy for administering social and economic resources essential to a nation's economic growth. In their 1999 definition of governance, Kaufmann et al. (1999) emphasise the state's ability to create and carry out sound public policies. The literature now in publication provides insight into several issues that may affect governance indicators. This study sets itself apart, though, by analysing the connection between governance metrics and the PCI. These governance indicators are included in this study as independent variables because they are thought to affect the PCI: the indices of VA, PSA, GE, RQ, RL, and CC. The analysis also uses data from a sample of 19 G20 nations from 2002 to 2022. To obtain more precise results, this study used the panel data analysis method.

A VIF test was conducted to determine whether multicollinearity existed in a regression model, and it was found that there was no multicollinearity problem in the model established in the study. The first step in this investigation was to perform a cross-sectional dependence test, which revealed variable dependence. This result showed that the variables needed to be subjected to a second-generation unit root test. According to the results of the Boot-IPS unit root test, the variables PSA, RQ, RL, and CC are stationary at levels, while the variables PCI, VA, and GE are stationary at first differences. To elucidate the relationships among these variables, the CCEMG panel analysis method was employed. At a significance level of 5%, the analysis showed that a one-unit increase in political stability and the lack of PSA causes the PCI to rise by 0.020 units, a one-unit increase in GE causes the PCI to rise by 0.064 units, and a one-unit increase in CC causes the PCI to rise by 0.035 units. These study results showed that the independent variables PSA, GE, and CC had a positive connection with the dependent variable PCI. However, further interpretation was not possible because no meaningful correlation between PCI and VA, RQ, and RL was found. The LM cointegration test results clearly indicate that, as shown by the bootstrap values, all variables except RQ and CC are below the 5% significance level. The findings reveal a cointegration relationship between the independent variables VA, PSA, GE, and RL and the PCI over a long period of time. Additionally, the country-specific CCEMG panel test results were presented, allowing for a separate evaluation of the coefficients for each country, indicating that the results may vary across countries. The Dumitrescu and Hurlin panel causality test yielded a causality relationship between PCI and PSA, VA and CC.

The results of the country-specific CCEMG panel test indicate that the GGI and PCI have a considerable impact on each other. Countries where the VA index has positive effects

on productive capacity have more robust democratic structures. Argentina, Brazil, Saudi Arabia, and the United States, the soundness and accountability index has been observed to have negative effects on productive capacity; these effects stem from the unique institutional and political constraints in each country. For example, frequent government changes in Argentina weaken policy continuity. In Brazil, the complexity of the federal structure limits accountability. In Saudi Arabia, centralised governance and limited participation mechanisms hinder the use of productive resources. In the United States, political polarisation and lengthy legislative processes slow down decision-making. In this context, negative effects on productive capacity are directly related not only to the existence of democratic structures but also to how these structures are implemented and their institutional effectiveness. In countries with strong governance structures, political stability and the violence index have been observed to have positive effects on the PCI as an indicator of good governance. The GE index shows positive effects on the PCI in many countries; however, the negative effect observed in Canada is noteworthy. This stems from lengthy approval processes, difficulties coordinating between the federal and provincial governments, and the structure of some public services based on central planning, which limits the effective use of productive resources. Furthermore, the CC index has been observed to have a positive effect on the PCI in many countries. This indicates that reduced corruption enables more efficient use of public resources and investments, increased transparency in bureaucratic processes, and faster decision-making mechanisms, thereby boosting economic efficiency.

Overall, the findings show that it is critically important for G20 countries to implement governance policies to increase their productivity effectively. Countries' ability to increase their production capacity depends primarily on ensuring political stability. Political stability strengthens decision-making consistency and encourages public participation, thereby contributing effectively to governance processes. Furthermore, strengthening transparency in public administration and increasing manager accountability enables more efficient use of resources and effective investment targeting, thereby positively affecting productive capacity. Raising awareness on freedom of expression and the RL supports good governance practices, contributing to long-term economic efficiency and increased productive capacity. The systematic and coordinated implementation of these policies offers a comprehensive, sustainable, and impact-oriented approach to increasing productive capacity.

Country-based analyses show that the impact of GGI on the PCI stems from country-specific dynamics. In Argentina, strengthening VA and implementing reforms in this direction contribute to raising the PCI by ensuring transparency in decision-making processes. In Brazil, in addition to voice and accountability, ensuring political stability, reducing social unrest, increasing GE, and effectively combating corruption are necessary to increase productive potential, as these elements support the efficient use of resources and the effective targeting of investments. In Canada, productive capacity is expected to increase with reforms targeting GGI beyond freedom of expression and GE, as these reforms strengthen the effectiveness of public services and the continuity of policy implementation.

China needs to implement a more transparent and accountable governance model to increase its productive capacity; this will enable the government to become more effective and allow for the optimal use of resources. In Germany, political stability must be ensured, and the absence of terrorism indicator must be improved to increase productive capacity; this is directly related to the resolution of refugee issues. In India, the PCI is expected to benefit from strengthened governance through the implementation of anti-corruption and RL reforms. Italy must undertake reforms that increase government efficiency and RQ and focus on freedom of expression to increase its productive potential; these reforms will increase the efficient use of public resources and economic efficiency.

Japan's PCI improvement depends on enhancing freedom of expression and strengthening government accountability. Furthermore, curbing corruption will directly support productive capacity. In Mexico, productive capacity will be positively affected by ensuring political stability and reducing violence and terrorism. In Russia, strengthening the private sector and implementing a more transparent, accountable style of governance will increase the PCI. In Saudi Arabia and South Africa, productive capacity will improve if GE increases and freedom of expression is ensured. Increasing Türkiye's PCI depends on ensuring political stability and combating corruption. In the US, productive capacity can be increased by enhancing freedom of expression. Policy recommendations are not provided for other countries not mentioned in this study because no meaningful relationship was found between PCI and GGI. Furthermore, all policy recommendations must be implemented taking into account the priorities and institutional conditions of each country.

The analysis of the Dumitrescu and Hurlin panel causality test results indicates that countries should develop a series of policies regarding the impact of voice and accountability, PSA and CC indicators on PCI. Firstly, it is argued that enhancing VA can be achieved through legal provisions aimed at ensuring the transparent and accountable management of public resources, and by fostering media independence. In this context, developing mechanisms to encourage the effective participation of civil society organisations in governance processes will also play an important role. Furthermore, indicators of political stability and the absence of violence/terrorism can be strengthened by establishing dialogue mechanisms to reduce social polarisation, implementing security policies that protect individuals' rights and freedoms, and enhancing international cooperation. In the context of corruption control, it is necessary to implement reforms to increase the transparency of public procurement processes, implement an effective monitoring and sanctioning mechanism to fight corruption, and expand training programmes to raise ethical awareness in the public and private sectors. It is anticipated that these policies will have a substantial impact on enhancing the productive capacities of the countries concerned and on supporting their economic development objectives.

Although it makes significant contributions to the field, it has some limitations. First, only G20 countries were examined, and the findings cannot be generalised to other country groups. In future research, the study period could be extended beyond 2002-2022, and the dataset could be expanded to include countries from different income groups.

Methodologically, using more advanced econometric models or alternative indicators, in addition to panel data analysis, could provide a deeper understanding of the relationship between productive capacity and good governance. Including non-economic factors (social, cultural, or environmental indicators) alongside economic factors (such as GDP growth rate, per capita income, investment level, inflation, unemployment rate, and foreign trade balance) in the analysis can assess the relationship between productive capacity and good governance more comprehensively and robustly. This allows for a clearer understanding of the impact of both institutional and economic conditions on productive capacity. Including such factors in the analysis may contribute to a deeper understanding of the relationship between productive capacity and governance.

References

Acemoglu, D. (2003), "Why Not a Political Coase Theorem? Social Conflict, Commitment, and Politics", *Journal of Comparative Economics*, 31(4), 620-652.

Andersen, T.B. & P.S. Jensen (2013), "Is Africa's Recent Growth Sustainable?", *International Economic Journal*, 28, 207-223.

Bai, J. & S. Ng (2004), "A Panic Attack on Unit Roots and Cointegration", *Econometrica*, 72(4), 1127-1178.

Banerjee, R. (2016), "On the Interpretation of Bribery in a Laboratory Corruption Game: Moral Frames and Social Norms", *Experimental Economics*, 19(1), 240-267.

Barbieri, L. (2006), "Panel Unit Root Tests: A Review", *Economia - Quaderno*, 1-43.

Breitung, J. (2000), "The Local Power of Some Unit Root Tests for Panel Data", *Advances in Econometrics*, 15, 161-177.

Breusch, T.S. & A.R. Pagan (1980), "The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics", *The Review of Economic Studies*, 47(1), 239-253.

Chinn, M.D. & H. Ito (2006), "What Matters for Financial Development? Capital Controls, Institutions, and Interactions", *Journal of Development Economics*, 81(1), 163-192.

Choi, I. (2001), "Unit Root Tests for Panel Data", *Journal of International Money and Finance*, 20, 249-272.

Cieślik, A. & Ł. Goczek (2018), "Control of Corruption, International Investment, and Economic Growth-Evidence from Panel Data", *World Development*, 103, 323-335.

Cooray, A. & Y.S. Nam (2024), "Public Social Spending, Government Effectiveness, and Economic Growth: An Empirical Investigation", *Applied Economics*, 57(1), 52-66.

Cornia, G.A. & A. Scognamillo (2016), "Clusters of Least Developed Countries, Their Evolution Between 1993 and 2013, and Policies to Expand Their Productive Capacity", Department of Economic & Social Affairs, CDP *Background Paper* No. 33 ST/ESA/2016/CDP/33.

De Hoyos, R.E. & V. Sarafidis (2006), "Testing for Cross-sectional Dependence in Panel Data Models", *The Stata Journal*, 6(4), 482-496.

Demiral, M. & Ö. Demiral (2023), "Socio-economic Productive Capacities and Energy Efficiency: Global Evidence by Income Level and Resource Dependence", *Environmental Science and Pollution Research*, 30(15), 42766-42790.

Dobler, C. (2011), *The Impact of Formal and Informal Institutions on Economic Growth: A Case Study on the MENA Region*, Peter Lang.

Dong, Z. et al. (2024), "Are Natural Resources a Blessing or a Curse for Renewable Energy? Uncovering the Role of Regulatory Quality and Government Effectiveness in Mitigating the Curse", *Resources Policy*, 98, 105346.

Dumitrescu, E.I. & C. Hurlin (2012), "Testing for Granger Non-causality in Heterogeneous Panels", *Economic Modelling*, 29(4), 1450-1460.

Flachaire, E. & C. Garcia Peñalosa (2014), "Political Versus Economic Institutions in the Growth Process", *Journal of Comparative Economics*, 42(1), 212-229.

Gerring, J. et al. (2005), "Democracy and Economic Growth: A Historical Perspective", *World Politics*, 57(3), 323-364.

Gnangnon, S.K. (2021), "Effect of Productive Capacities on Economic Complexity: Do Aid for Trade Flows Matter?", *Journal of Economic Integration*, 36(4), 626-688.

Goetz, A.M. & R. Jenkins (2002), "Voice, Accountability and Human Development: The Emergence of a New Agenda", *Background Paper for UNDP, Human Development Report 2002: Deepening Democracy*, New York: UNDP.

Habib, S. et al. (2020), "The Effect of Corruption on the Environmental Quality in African Countries: A Panel Quantile Regression Analysis", *Journal of the Knowledge Economy*, 11(2), 788-804.

Hadri, K. (2000), "Testing for Stationarity in Heterogeneous Panel Data", *The Econometrics Journal*, 3, 148-161.

Haggard, S. & L. Tiede (2011), "The Rule of Law and Economic Growth: Where are We?", *World Development*, 39(5), 673-685.

Hall, E. & C.I. Jones (1996), "Why Do Some Countries Produce so much more Output Per Worker Than Others?", *The Quarterly Journal of Economics*, 114(1), 83-116.

Han, X. et al. (2014), "Do Governance Indicators Explain Development Performance? A Cross-Country Analysis", *ADB Economics Working Paper Series*, No. 417.

Handoyo, S. & S. Anas (2024), "The Effect of Environmental, Social, and Governance (ESG) on Firm Performance: The Moderating Role of Country Regulatory Quality and Government Effectiveness in ASEAN", *Cogent Business & Management*, 11(1), 2371071.

Handoyo, S. (2023), "Worldwide Governance Indicators: Cross Country Data Set 2012-2022", *Data in Brief*, 51, 10981.

Heckelman, J.C. & S. Knack (2009), "Aid, Economic Freedom, and Growth", *Contemporary Economic Policy*, 27(1), 46-53.

Hoerl, A.E. & R.W. Kennard (1970), "Ridge Regression: Biased Estimation for Non-Orthogonal Problems", *Technometrics*, 12, 55-67.

Hurlin, C. & V. Mignon (2007), "Second Generation Panel Unit Root Tests", *Working Papers*, halshs-00159842, HAL.

Im, K.S. et al. (2003), "Testing for Unit Roots in Heterogeneous Panels", *Journal of Econometrics*, 115, 53-74.

Kaufmann, D. et al. (1999), "Aggregating Governance Indicators", World Bank Policy *Research Working Paper*, 2195.

Kaufmann, D. et al. (2009), "Governance Matters VIII: Aggregate and Individual Governance Indicators 1996-2008", World Bank Policy *Research Working Paper*, 4978.

Kaufmann, D. et al. (2011), "The Worldwide Governance Indicators: Methodology and Analytical Issues", *Hague Journal on the Rule of Law*, 3(2), 220-246.

Levin, A. et al. (2002), "Unit Root Tests in Panel Data: Asymptotic and Finite-sample Properties", *Journal of Econometrics*, 108, 1-24.

Maddala, G.S. & S. Wu (1999), "A Comparative Study of Unit Root Tests with Panel Data and A New Simple Test", *Oxford Bulletin of Economics and Statistics*, 61, 631-652.

McCoskey, S. & C. Kao (1998), "A Residual-Based Test of the Null of Cointegration in Panel Data", *Econometric Reviews*, 17(1), 57-84.

Mooneeapen, O. et al. (2022), "The Influence of the Country Governance Environment on Corporate Environmental, Social and Governance (ESG) Performance", *Sustainability Accounting, Management and Policy Journal*, 13(4), 953-985.

Mulligan, C.B. et al. (2004), "Do Democracies have Different Public Policies Than Nondemocracies?", *Journal of Economic Perspectives*, 18(1), 51-74.

North, D.C. (1991), "Institutions, Ideology, and Economic Performance from Plan to Market: The Post-Soviet Challenge: Part II", *Cato J.*, 11(3), 477-488.

Olarte, S.H. et al. (2021), "Is Productive Capacity a Key Factor in Reducing Inequalities in South America?", *Development Studies Research*, 8(1), 94-108.

Oluc, I. et al. (2023), "The Productive Capacity and Environment: Evidence from OECD Countries", *Environmental Science and Pollution Research*, 30, 3453-3466.

Persson, T. & G. Tabellini (1994), "Is Inequality Harmful for Growth?", *The American Economic Review*, 84(3), 600-621.

Persson, T. & G. Tabellini (2009), "Democratic Capital: The Nexus of Political and Economic Change", *American Economic Journal: Macroeconomics*, 1(2), 88-126.

Pesaran, M.H. (2004), "General Diagnostic Tests for Cross Section Dependence in Panels", University of Cambridge, Faculty of Economics, *Cambridge Working Papers in Economics*, No. 0435.

Pesaran, M.H. (2006), "Estimation and Inference in Large Heterogeneous Panels with a Multifactor Error Structure", *Econometrica*, 74(4), 967-1012.

Pesaran, M.H. (2007), "A Simple Panel Unit Root Test in the Presence of Cross-section Dependence", *Journal of Applied Econometrics*, 22, 265-312.

Pesaran, M.H. et al. (2008), "A Bias-adjusted LM Test of Error Cross-section Independence", *Econometrics Journal*, 11(1), 105-127.

Posner, R.A. (1997), "Equality, Wealth, and Political Stability", *The Journal of Law, Economics, and Organization*, 13(2), 344-365.

Sahnoun, M. & C. Abdennadher (2020), "Education and Corruption: A Stochastic Frontier Analysis: Evidence from Developed and Developing Countries", *Journal of the Knowledge Economy*, 11(3), 968-981.

Sharma, B. (2008), *Voice, Accountability and Civic Engagement: A Conceptual Overview*, Commissioned by Oslo Governance Centre, Bureau for Development Policy, UNDP.

Singhania, M. & N. Saini (2022), "Quantification of ESG Regulations: A Cross-country Benchmarking Analysis", *Vision: Journal of Business Perspective*, 26(2), 163-171.

Smith, L.V. et al. (2004), "More Powerful Panel Data Unit Root Tests with an Application to Mean Reversion in Real Exchange Rates", *Journal of Applied Econometrics*, 19(2), 147-170.

UNCTAD (2020), *UNCTAD Productive Capacities Index Focus on Landlocked Developing Countries*, New York: United Nations Publication.

UNCTAD (2023), *First Meeting of the Productive Capacities Index (PCI) Statistical and Technical Task Team Background Note*, <https://unctad.org/meeting/first-meeting-productive-capacities-index-pci-statistical-and-technical-task-team>, 10.08.2024.

Westerlund, J. & D.L. Edgerton (2007), "A Panel Bootstrap Cointegration Test", *Economics Letters*, 97, 185-190.

World Bank (1997), *Helping Countries to Combat Corruption*, World Bank.

World Bank (2024), *World Bank Open Data*, <https://data.worldbank.org/>, 10.09.2024.

Xin, Y. et al. (2023), "How Productive Capacities Influence Trade-Adjusted Resources Consumption in China: Testing Resource-based EKC", *Resources Policy*, 81, 103329.

Yasmeen, R. et al. (2023), "The Impact of Green Technology, Environmental Tax and Natural Resources on Energy Efficiency and Productivity: Perspective of OECD Rule of Law", *Energy Reports*, 9, 1308-1319.

Sosyoekonomi

2026, Vol. 34(70), 101-130

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.05
Date Submitted: 17.07.2025
Date Revised: 08.06.2026
Date Accepted: 03.08.2026

The Relationship Between CO_2 Emissions, Economic Growth, Energy Intensity, Urbanisation, Life Expectancy at Birth, And Renewable Energy Consumption in BRICS Countries

Zeynep KÖSE *(https://orcid.org/0000-0002-9494-3098), Hasan Kalyoncu University, Türkiye; zeynep.kose@hku.edu.tr*

Eda DİNERİ *(https://orcid.org/0000-0002-5637-594X), Hasan Kalyoncu University, Türkiye; eda.dineri@hku.edu.tr*

Gözde TUĞAN-MERAL *(https://orcid.org/0000-0002-1918-1249), İstanbul Kent University, Türkiye; gozde.meral@kent.edu.tr*

Yakup DURMAZ *(https://orcid.org/0000-0003-0332-4185), Kilis 7 Aralık University, Türkiye; yakup.durmaz@kilis.edu.tr*

BRICS Ülkelerinde CO_2 Emisyonları, Ekonomik Büyüme, Enerji Yoğunluğu, Kentleşme, Doğumda Beklenen Yaşam Süresi ve Yenilenebilir Enerji Tüketimi Arasındaki İlişki

Abstract

This study examines the relationships between CO_2 emissions and economic growth, energy intensity, life expectancy at birth, urbanisation and renewable energy consumption in the BRICS countries over the period 2000-2022 using panel data analysis. The analysis applied cross-sectional dependence and Delta tests; the stationarity of the series was assessed using the CIPS unit root test, whilst long-run relationships were analysed using the Westerlund cointegration test. Causal relationships were determined using the Dumitrescu-Hurlin panel causality test. The findings indicate the existence of a bidirectional causal relationship between energy intensity, economic growth, life expectancy and CO_2 emissions. Conversely, a unidirectional causal relationship from renewable energy consumption and urbanisation to CO_2 emissions was identified. The results reveal strong and multifaceted interactions between energy structure, economic growth and environmental sustainability in BRICS countries.

Keywords : CO_2 Emissions, Energy Intensity, Life Expectancy, Urbanisation, Renewable Energy, BRICS Countries.

JEL Classification Codes : Q43, Q54, Q56.

Öz

Bu çalışmada, BRICS ülkelerinde 2000-2022 dönemi için CO_2 emisyonları ile ekonomik büyüme, enerji yoğunluğu, doğumda yaşam beklentisi, kentleşme ve yenilenebilir enerji tüketimi arasındaki ilişki panel veri analizi yöntemi kullanılarak incelenmektedir. Analizde yatay kesit bağımlılığı ve Delta testleri uygulanmış; serilerin durağanlığı da CIPS birim kök testi ile değerlendirilmiştir. Değişkenler arasındaki uzun vadeli ilişki, Westerlund eşbütünleme testi kullanılarak analiz edilmiştir. Değişkenler arasındaki nedensellik ilişkisinin test edilmesi için Dumitrescu-Hurlin Nedensellik Testi'ne başvurulmuştur. Elde edilen bulgular, enerji yoğunluğu, ekonomik büyüme, yaşam beklentisi ve CO_2 emisyonları arasında çift yönlü bir nedensel ilişkinin varlığını göstermektedir. Buna karşılık, yenilenebilir enerji tüketimi ve kentleşme ile CO_2 emisyonları arasında tek yönlü bir nedensel ilişki tespit edilmiştir. Sonuçlar, BRICS ülkelerinde enerji yapısı,

ekonomik büyüme ve çevresel sürdürülebilirlik arasında güçlü ve çok yönlü etkileşimlerin bulunduğunu ortaya koymaktadır.

Anahtar Sözcükler : CO_2 Emisyonları, Enerji Yoğunluğu, Yaşam Beklentisi, Kentleşme, Yenilenebilir Enerji, BRICS Ülkeleri.

1. Introduction

In recent years, energy demand has risen significantly globally due to the acceleration of industrialisation, rapid population growth, the expansion of production and consumption activities, and the impact of globalisation. Rising fossil fuel consumption due to energy demand increases carbon levels in the atmosphere, thus leading to global warming, climate change and environmental degradation (Kasman & Duman, 2015; Shuai et al., 2017). The rapid growth of world energy use has also increased concerns about supply problems. Therefore, energy efficiency and conservation and the reduction in carbon emissions (CO_2) caused by energy use have become important issues (Perez-Lombard et al., 2008; Chu & Majumdar, 2012). Along with rising energy consumption, dependence on fossil fuels brings multifaceted challenges, such as high energy intensity, energy security risks, and environmental pollution (Shahbaz, 2015; Ulucak, 2020). In this context, the relationship between energy consumption, economic growth, and environmental degradation has been extensively addressed in the literature. Indeed, studies such as those by Chang et al. (2009), Von (2009), Khan et al. (2014), Arouri et al. (2012), and Shyamal and Rabindra (2004) demonstrate that there is a strong relationship between energy consumption and economic growth, and that this relationship often leads to outcomes that exacerbate environmental degradation.

However, while these studies emphasise that energy consumption is one of the fundamental inputs of economic growth, they also point out that uncontrolled and intensive use of fossil fuels threatens environmental sustainability. Therefore, in recent years, the need to increase the use of renewable energy sources, reduce energy intensity, and adopt low-carbon growth strategies has come to the forefront in the literature. Furthermore, it is stressed that countries' levels of development, energy policies, and structural characteristics should be taken into account to understand the energy-economy-environment relationship more comprehensively.

The relationship between renewable energy consumption and CO_2 emissions holds a significant place in the environmental sustainability literature. Generally, increased use of renewable energy sources contributes to reduced carbon emissions by decreasing dependence on fossil fuels. This allows for the use of lower carbon-intensive technologies in the energy production process, helping to limit environmental degradation. Indeed, many studies in the literature show that renewable energy consumption has a statistically significant effect in reducing CO_2 emissions (Sadorsky, 2009; Apergis & Payne, 2010). However, it is also emphasised that the impact of renewable energy use on emissions may

vary depending on factors such as countries' energy policies, technological advancement levels, and economic structures. Therefore, increasing renewable energy investments and accelerating energy transition processes are critically important for achieving a low-carbon and sustainable growth path.

CO_2 emissions are affected by many factors, such as population growth, energy consumption, urban population growth, and capital accumulation. Increasing population, economic activities, technology, politics, institutions, beliefs, and attitudes are factors that increase greenhouse gas emissions (Dietz & Rosa, 1997). These variables are important in sustainable economic growth (Khan, 2020). In this context, population growth and urbanisation processes, in particular, indirectly increase carbon emissions by increasing energy demand. Increased production and consumption activities intensify energy use and strengthen dependence on fossil fuels. However, the direction of capital accumulation and technological developments plays a significant role in determining the extent of environmental impacts. While the adoption and dissemination of environmentally friendly technologies contribute to reducing carbon emissions, growth models that disregard environmental concerns can accelerate environmental degradation. Urbanisation is one of the basic elements of development. However, rapid urbanisation can also hurt growth by straining existing infrastructure. For example, population growth and rapid urbanisation cause environmental problems, particularly by increasing fossil energy demand. In this case, improving the economic structure and applying advanced technologies are highly important for sustainability. In situations where energy efficiency is low, energy-efficient technologies are limited, and environmental awareness is insufficient, urbanisation increases per capita energy consumption and carbon emissions (Zheng & Walsh, 2019; Lindle, 2013; Fan et al., 2006; Zhang & Lin, 2012). The environmental impacts of urbanisation are not limited solely to negative aspects. Planned and sustainable urbanisation policies can help reduce carbon emissions through increased energy efficiency, the development of public transportation systems, and investments in green infrastructure. In particular, smart city initiatives, the widespread adoption of renewable energy, and the implementation of eco-friendly building technologies play a balancing role in mitigating the environmental impacts of urbanisation.

Along with globalisation, countries entered a transformation process involving urbanisation and infrastructure investments; the transition from agriculture to industry accelerated, and rural-urban migration also increased. The changing population structure with urbanisation first creates differences in lifestyles in terms of clothing, food, housing, and transportation; industrialisation and urbanisation also increase energy consumption. As a result of the widespread use of industrial production, infrastructure development processes and the expansion of the industrial production scale increase CO_2 emissions (Wang et al., 2019; Destek & Ozsoy, 2015; Ahmad et al., 2019). The impact of urbanisation on energy use is not homogeneous among countries and varies depending on the level of development. For low-income countries, urbanisation relatively reduces energy use by providing access to modern fuels rather than using inefficient traditional fuels. In summary, energy use increases with urbanisation across income levels, but the patterns differ. To reduce long-term energy

demand, developing countries should build relatively efficient and sustainable urban infrastructure systems (Poumanyvong & Kaneko, 2010).

Energy is an important input in achieving economic growth and development goals (Shahbaz, 2015), but negative development due to energy consumption poses an obstacle to achieving sustainable economic growth and development in the long run. Especially in developing countries, as energy needs are met, fossil fuel CO_2 emissions have increased (Mensah, 2014; Bacon & Bhattacharya, 2007). The expansion of economic activity leads to increased production volume, a parallel rise in energy consumption, and accelerated urbanisation. However, the reliance on fossil fuels for energy supply in this process increases environmental costs, deepening problems such as air pollution, carbon emissions, and ecological degradation. This situation negatively affects not only environmental sustainability but also social welfare and economic stability. Increased production raises energy consumption and urbanisation. In this case, because energy needs are mostly met from fossil fuels, environmental destruction increases as CO_2 emissions rise. The deterioration of environmental quality and increasing global warming have led to many health problems. In recent years, global warming and environmental and health problems have been important issues that policymakers have focused on. Sulfur dioxide and carbon dioxide emissions from fossil fuel use cause serious environmental pollution (Kırıkkaleli & Kalmaz, 2020; Odusanya et al., 2014). In this context, increasing energy efficiency, raising the share of renewable energy sources in the energy supply, and widespread adoption of low-carbon production technologies are of critical importance. At the same time, strengthening environmental regulations and adopting holistic policy approaches in line with sustainable development goals have become inevitable for both the continuation of economic growth and the protection of environmental quality.

The negative effects of increasing environmental pollution on public health have begun to cause concern worldwide. Environmental pollution is an important factor affecting human health, human life expectancy, and sustainability (Stern, 2006; Rjoub et al., 2021). Health problems arising from environmental pollution increase individual and public healthcare expenditures. Respiratory illnesses and chronic diseases, particularly those caused by air pollution, put pressure on healthcare budgets by raising treatment and care costs. Furthermore, health problems negatively impact individuals' participation in the workforce and productivity, resulting in indirect costs to economic performance. Environmental pollution not only reduces the quality of life. It also increases private and public health expenditures. Health expenditures for emerging health problems constitute an extra expense for both individuals and the state budget. Environmental pollution generally causes respiratory diseases and affects the working life of individuals with deteriorating health, resulting in serious consequences for labour productivity and life expectancy. This situation, directly and indirectly, affects sustainable economic growth and development by decreasing the human capital stock in the long run (Igbinedion, 2019).

Kumari (2025) identified the key determinants of carbon dioxide emissions for BRICS countries using the Autoregressive Distributed Lag (ARDL) model. To this end, economic, demographic, and energy-related variables- including carbon dioxide emissions, access to electricity, renewable energy consumption, fuel imports, access to clean fuel, urban population, and total population- were considered. The study sought to identify long- and short-term relationships among these variables. The researcher emphasised the importance of aligning economic growth with environmental sustainability, ensuring energy efficiency, and reducing fossil fuel consumption within the BRICS framework. However, while the relevant study identified the determinants of carbon dioxide emissions, it used the total population variable to represent demographic structure. In our study, however, we used the life expectancy at birth variable, which is an important indicator of socio-economic development. Life expectancy at birth goes beyond being a demographic indicator; it provides a comprehensive assessment that includes the population's health, income, and living conditions. This significance stems from the variable's role in our study. Life expectancy at birth is a strong indicator of development; it provides important signals not only regarding countries' health systems but also concerning education, living standards, and institutional structures.

The relationships between CO_2 emissions, energy consumption, renewable energy use, life expectancy at birth, and urbanisation form a multidimensional network of interdependent interactions in the literature on sustainable development and the environment-economy. While increasing energy consumption and fossil fuel use directly raise CO_2 emissions, renewable energy consumption plays a critical role in reducing carbon emissions by decreasing reliance on fossil fuels (Sadorsky, 2009; Apergis & Payne, 2010). Urbanisation and population growth intensify environmental pressures by increasing energy demand, while life expectancy at birth can indirectly influence energy consumption and emissions through rising levels of prosperity and health. In this context, while energy consumption and urbanisation emerge as driving factors increasing CO_2 emissions, the implementation of renewable energy and advanced technologies functions as balancing elements. To achieve sustainable development, environmental policies must be integrated with the energy structure, urban planning, and human capital dynamics.

The original value of this study lies not merely in following the existing literature, but in presenting a comprehensive and methodologically consistent framework that advances it in specific ways. The most important point distinguishing this study from others is that few studies have investigated the relationship between life expectancy and CO_2 in BRICS countries. Furthermore, while analysing the determinants of environmental degradation in BRICS countries, the study integrates variables such as economic growth, energy intensity, renewable energy consumption, urbanisation, and life expectancy at birth, which are typically addressed separately in the literature, into a single model. This multidimensional approach distinguishes itself clearly from previous studies by enabling the assessment of environmental impacts not only in terms of economic factors but also in conjunction with social and energy-based dynamics. The study covers the period from 2000

to 2022, which encompasses the effects of the accelerating energy transition, urbanisation, and environmental pressures in BRICS countries in recent years. In particular, the identified unidirectional causal relationship from urbanisation to CO_2 emissions highlights the environmental costs of unplanned urbanisation in developing economies, offering important insights for policymakers. This aspect also holds original value.

2. Literature Review

CO_2 emissions are almost the only variable considered in regulating environmental quality, and many variables increase these emissions (Noshen et al., 2020; Wang et al., 2012). However, recent studies have focused on the impact of life expectancy on reducing carbon emissions.

2.1. Studies on Urbanisation and CO_2 Emissions

After the 1990s, the rapid increase in urbanisation has led to rising energy demand and heightened environmental pollution, prompting numerous studies on the relationship between urbanisation and CO_2 emissions (Behera & Dash, 2017). The results of these studies, however, vary depending on the country, region, city, income level, methodology, and sample period (Poumanyvong & Kaneko, 2010; Shuai et al., 2017).

Early cross-country studies highlighted the positive impact of urbanisation on CO_2 emissions. Parikh and Shukla (1995) analysed 83 developing and developed countries and found that urbanisation increases CO_2 emissions. Similarly, York et al. (2003) reported a global increase in emissions due to urbanisation, while Cole and Neumayer (2004) observed that larger populations and higher urbanisation rates contributed to higher CO_2 emissions across 86 countries from 1975 to 1998. Poumanyvong and Kaneko (2010) confirmed these findings for 99 countries over the period 1975-2005. Conversely, York et al. (2008) found that in the former Soviet Republics, a decline in urbanisation contributed to decreasing CO_2 emissions between 1992 and 2000.

Studies examining regional and income-level variations reveal more nuanced effects. Al-Mulali et al. (2012) reported a positive relationship between urbanisation and CO_2 emissions across seven regions from 1980 to 2018. However, some low-income countries in the early stages of development showed a negative relationship. Zhu et al. (2012) similarly found limited evidence for emerging economies. In MENA countries, Al-Mulali et al. (2013) demonstrated long-term relationships between urbanisation and emissions, with the strength of these relationships varying by income and development levels. Li and Lind (2015) confirmed a positive association in 73 countries when divided into low-, lower-middle-, and high-income groups, whereas Sharma (2011) found that urbanisation reduced CO_2 emissions in 69 countries, particularly in high- and middle-income nations. Lin et al. (2017) further indicated that in non-high-income countries, urbanisation had only a modest effect on CO_2 emissions between 1991 and 2013.

Country-specific studies, particularly on developed and newly industrialised nations, provide additional insights. Liddle and Lung (2010) found a positive relationship between urbanisation and CO_2 emissions in 17 developed countries, while Hossain (2011) observed a long-term reduction in emissions due to urbanisation in newly industrialised countries.

City-level analyses, especially for China, dominate the literature due to its high urbanisation rate and status as the world's largest CO_2 emitter. Zhang and Lin (2012) analysed 29 Chinese provinces from 1995 to 2010 and found that urbanisation increased CO_2 emissions, although the magnitude varied by region. Ma (2015) reported a statistically significant positive impact of urbanisation on energy intensity from 1986 to 2011. Similar results were reported by Wang et al. (2012, 2019), Zhang et al. (2014), Xiangyang and Guiqiu (2011), Su et al. (2018), and Ahmad and Zhao (2018), confirming the consistent positive effect of urbanisation on emissions at the city and provincial levels.

Recent studies focusing on Asian countries, including India and Southeast Asia, also emphasise the role of urbanisation in increasing CO_2 emissions. Behera and Dash (2017) examined the South and Southeast Asia region between 1980 and 2012, showing higher emissions particularly in high-income countries. Abbasi et al. (2020) confirmed similar trends in eight Asian countries from 1982 to 2017, while Nosheen et al. (2020) highlighted the combined impact of urbanisation and energy use on emissions in China, India, and other Asian nations. Siddique et al. (2020) further revealed a bidirectional causality between urbanisation and CO_2 emissions, indicating a reinforcing cycle between urban growth and environmental pressure.

Recent studies on urbanisation and CO_2 emissions in BRICS countries have provided detailed information on the environmental impacts of urban growth. Somoye and Akinwande (2023) examined BRICS-T (BRICS + Türkiye) countries using panel data methods. They found that urban population growth reduced CO_2 emissions in some models, while energy intensity and economic growth contributed to increased emissions. Their findings highlight the importance of sustainable urban planning and the integration of renewable energy for emission reduction. Similarly, Türk and Barışık (2024) analysed the dynamics between urbanisation, economic growth, and CO_2 emissions in BRICS-T countries using panel cointegration and causality analyses. The researchers reported that urbanisation has a stronger effect on CO_2 emissions than economic growth and identified a predominantly bidirectional causality between urbanisation-emissions and growth-emissions relationships, emphasising the need to consider environmental impacts in urban transformation processes. Hlongwane (2026) examined the role of energy transition in BRICS countries in more detail and revealed that changes in the energy mix significantly affect CO_2 emissions, and that energy efficiency policies, when combined with urbanisation management, can alleviate environmental pressures. The study highlighted the critical role of renewable energy adoption in reducing emissions from urbanisation. Taken collectively, these studies demonstrate that urbanisation in BRICS countries is closely intertwined with energy use, economic growth, and emissions, and that effective policy interventions, particularly in

renewable energy use and sustainable urban planning, are vital for achieving long-term emission reductions.

2.2. Studies on Life Expectancy and CO_2 Emissions

A range of interrelated economic, environmental, and social factors determines life expectancy at birth. While existing studies on BRICS economies address economic growth, demographic shifts, and environmental pressures, research that systematically evaluates these parameters together remains extremely limited. Given that BRICS countries account for more than half of the world's population, neglecting population dynamics is of the utmost importance. In this context, Audi et al. (2026) analysed the impact of carbon emissions and globalisation on life expectancy in BRICS countries for the period 1990-2023. Ordinary least squares, fixed-effects models, fully modified ordinary least squares, and quantile regression were applied to examine the static and dynamic relationships among the variables. The study specifically focused on gender-specific inequalities in carbon dioxide emissions and economic growth. Consequently, life expectancy serves as the dependent variable in the study. However, in our study, it was included in the model as an explanatory variable. Zhan et al. (2025) similarly noted that environmental degradation and geopolitical risks have negative consequences on public health through pollution and ecosystem damage. For the BRICS countries, using the CS-ARDL, FMOLS, and DOLS methods over the time period spanning 1993-2022, it was concluded that environmental degradation and geopolitical risks negatively affect life expectancy, while institutional quality and GDP have a positive effect.

Several studies have examined the relationship between life expectancy, CO_2 emissions, economic growth, and health investments across different countries and time periods. Early research by Cervellati and Sunde (2005) highlighted the reciprocal effects of economic development and life expectancy in the historical development of Western countries, emphasising that improvements in health conditions stimulate human capital investments, such as education, which in turn reinforce economic growth. Jayachandran and Ileras-Muney (2009) also underscored that longer life expectancy positively affects education investments, while Oster et al. (2013) reported that life expectancy promotes economic growth through enhanced human capital accumulation.

Empirical analyses of CO_2 emissions and life expectancy reveal mixed effects depending on the country group and period. In selected European Union countries, Balan (2016) found a positive association between CO_2 emissions and life expectancy, while Monsef and Mehrjardi (2015) reported a similar direct relationship for 136 countries. In contrast, studies in oil-exporting and highly polluted countries highlighted negative effects: Assadzadeh et al. (2014) identified a negative impact of CO_2 emissions on life expectancy in eight oil-exporting countries (2000-2010), and Rahman et al. (2022) found a unidirectional causal effect of CO_2 emissions reducing life expectancy across 31 high-pollution countries. Radmehr and Adebayo (2022) also confirmed that CO_2 emissions reduce

life expectancy in Mediterranean countries between 2000 and 2018, whereas economic growth, health expenditures, and improved sanitation positively affect life expectancy.

Country-specific studies further support these findings. Rjoub et al. (2021) examined Türkiye (1960-2018). They reported a positive correlation between life expectancy and both CO_2 emissions and GDP, with unidirectional causality from CO_2 emissions to life expectancy and bidirectional causality between life expectancy and GDP. Similarly, Murthy et al. (2021) found that CO_2 emissions negatively affect life expectancy, whereas economic growth, health expenditures, and life expectancy itself exert positive effects (1992-2017). Erdogan et al. (2019) confirmed that CO_2 emissions reduce life expectancy at birth and increase infant mortality in Türkiye (1971-2016), highlighting the need for renewable energy investments.

Studies examining the role of renewable energy indicate that it can mitigate the negative effects of CO_2 on health. Mutajaba et al. (2021) reported a positive relationship between renewable energy consumption and health expenditures in 28 OECD countries (2002-2018), suggesting that increased renewable energy investments reduce air pollution, improve health services, and stimulate economic growth. Apergis et al. (2018, 2020) showed that renewable energy consumption reduces health expenditures and that there is bidirectional causality between health expenditures and CO_2 emissions across Sub-Saharan Africa and global income groups (1995-2017). Ben Jebli (2016) found similar positive effects of renewable energy on health indicators in Tunisia (1990-2011), whereas CO_2 emissions and railway transportation negatively affected health.

While Ridwan et al. (2026) examine the economic, environmental, and development dimensions of life expectancy in BRICS economies, our study examines life expectancy with environmental stress as a determinant. Kumar et al. (2026) analysed the relationship between climate change and human health and mortality rates in BRICS countries for the 2000-2022 period. The study's findings revealed that climate change has led to serious long-term health problems due to relatively high levels of precipitation and temperature. Consequently, life expectancy has been negatively affected by this development. On the other hand, the study concluded that increases in health expenditures and the growing share of renewable energy consumption contribute to longer life expectancy. However, like the studies developed by Ridwan et al. (2026) and Zhan et al. (2025), this study also focused on potential determinants of life expectancy.

Collectively, these studies indicate that CO_2 emissions generally exert negative effects on life expectancy and health outcomes, particularly in developing, oil-exporting, and highly polluted countries, while economic growth, health investments, and renewable energy consumption serve as mitigating factors. The findings emphasise the importance of integrating environmental policies, renewable energy adoption, and health investment strategies to improve life expectancy and overall human capital.

Sart et al. (2025) analysed the effects of life expectancy, education, and income on CO_2 emissions in BRICS countries using panel integration and causality methods. Their findings show a bidirectional causality between life expectancy and CO_2 emissions, revealing that increases in life expectancy are associated with changes in emissions. While life expectancy and income tend to increase CO_2 levels, education indicators were found to reduce emissions; this highlights the balancing role of human capital in environmental outcomes. This study is one of the few studies that specifically examines the long-term dynamics of life expectancy and environmental impacts in BRICS countries. Kaya et al. (2024) analysed the relationship between CO_2 emissions, economic growth, fossil fuel use, and life expectancy in BRICS countries using the PMG-ARDL method. The results showed a negative relationship between life expectancy and CO_2 emissions. Furthermore, a bidirectional causality has been observed between emissions, economic growth, and fossil fuel consumption; this highlights the intertwined nature of environmental pressures and human well-being in these developing economies. Yeboah et al. (2024) analysed the time-frequency relationships between economic growth, CO_2 emissions, and life expectancy in BRICS countries using a wavelet-based analysis method. They found a positive correlation between CO_2 emissions and life expectancy in these countries. Hlongwane (2025) analysed the adoption of renewable energy in BRICS countries and its effect on life expectancy using panel regression. The results showed that increased renewable energy consumption positively affects life expectancy and also mitigates the negative effects of environmental degradation on health outcomes.

2.3. Studies on Energy Intensity and CO_2 Emissions

Although improvements in global energy intensity continue, it remains important in terms of environmental pollution (Ulucak & Khan, 2020). When literature studies are examined, results are generally obtained that energy intensity increases emissions. Shahbaz et al. (2015) revealed that energy intensity has an increasing impact on CO_2 emissions in most African countries from 1980-2012. Ulucak and Khan (2020), in their study of North America, found that high energy intensity causes pollution, thus increasing CO_2 emissions from 1985 to 2017. Sadorsky (2014) examined 18 emerging countries and found that positive impacts of energy intensity, affluence, and urbanisation increase CO_2 emissions between 1971 and 2009.

The share of BRICS countries in the world population is increasing daily. The energy demand of these countries, whose economies are growing rapidly, is increasing (Akram et al., 2021). Despite rapidly rising economies, they show similar growth in human capital and lag in the human capital index. Zhu et al. (2024) conducted a comprehensive study on combating environmental pollution and reducing energy intensity in the pursuit of sustainable development. In this context, they examined the relationship between energy intensity, the frequency of environmental policies, and the integration of renewable energy in BRICS countries between 1991 and 2021 using cross-sectional regression tests, second-generation unit root tests, and panel cointegration tests. The study's findings reveal that

when institutional quality and research and development capabilities reach a certain threshold, the impact of energy intensity on reducing carbon emissions is strengthened. Consequently, the importance of a comprehensive policy approach for effectively reducing carbon emissions has been emphasised. However, this study has focused solely on the aspects of combating environmental pollution related to energy use and energy intensity. It has overlooked social and demographic impacts such as urbanisation and life expectancy at birth.

Koilakou et al. (2024), who emphasise the need to analyse emissions given their economic and demographic dynamics, examined three BRICS economies, China, India, and Brazil, for the period 2000-2018, incorporating energy intensity, household size, and the number of households into their model. At this point, the researchers emphasised that these indicators differ from population size and play a critical role in carbon dioxide levels due to rising electricity consumption. Consequently, the findings underscore that the cost of increasing the standard of living for a growing population is relatively high emissions. In particular, they noted that incorporating additional socio-demographic factors into an integrated econometric model would offer new perspectives on the relationship between energy, society, and the environment. In this context, taking data limitations into account, variables such as urbanisation and life expectancy at birth were included, in addition to those in the existing literature.

2.4. Studies on Renewable Energy and CO_2 Emissions

Many theoretical and empirical studies have emphasised the critical role of renewable energy consumption in achieving environmental sustainability. A consistent finding across these studies is that increased renewable energy consumption generally reduces CO_2 emissions (Ehigiamusoe & Doğan, 2022; Fu et al., 2021; Kırıkkaleli & Adebayo, 2020; Liu et al., 2020). Recent panel data analyses indicate that the magnitude and significance of this effect often vary by country income level and regional characteristics. For instance, Ehigiamusoe and Doğan (2022) found that renewable energy consumption significantly reduced CO_2 emissions in low-income countries between 1990 and 2016, though the marginal impact differed across countries. Similarly, Khan et al. (2021) reported a significant emission-reducing effect of renewable energy across low-, high-, and global-income panels for the 2002-2019 period. On a global scale, Kırıkkaleli and Adebayo (2020) showed that renewable energy consumption decreased CO_2 emissions between 1995 and 2017, while Haldar and Selti (2020) confirmed the long-term mitigating effect of renewable energy in 39 developing countries during the same period. Conversely, Jebli et al. (2020) noted that, for the 1990-2015 period, renewable energy had a negative impact on emissions in all income groups except low-income countries.

With the rapid economic growth and rising energy demand in BRICS countries, environmental degradation has become a growing concern (Abbas et al., 2022). Recent studies focusing specifically on BRICS countries have provided clear evidence that

renewable energy consumption mitigates CO_2 emissions. For example, Liu et al. (2020), Fu et al. (2021), and Abbas et al. (2022) all reported a significant negative effect of renewable energy on CO_2 emissions, highlighting its potential as a policy tool to balance economic growth with environmental sustainability.

Funda et al. (2024) tested the effects of carbon dioxide emissions, gross domestic product, fossil fuels, renewable energy consumption, and the trade deficit on life expectancy using PMG-ARDL approaches. The research findings concluded that carbon dioxide emissions have a negative and statistically significant effect on life expectancy, whereas per capita GDP and renewable energy consumption have a positive effect on life expectancy. However, as previously stated, life expectancy served as the dependent variable in the studies; the aim was to identify the impact of economic growth and environmental improvement on public health.

Recent empirical findings focusing on BRICS countries confirm the importance of renewable energy and energy efficiency in reducing carbon emissions. Mandimby (2024) analysed the impact of renewable energy on CO_2 emissions in BRICS countries using the PMG-ARDL method. Accordingly, although industrialisation and economic growth create increasing pressure on emissions, it was found that renewable energy consumption significantly reduces emissions in both the short and long term. Addis (2026) examined the Westerlund cointegration and Dumitrescu-Hurlin panel causality tests between renewable energy consumption and CO_2 emissions in the Middle East and BRICS countries. The results show that increases in renewable energy use have a stronger mitigating effect on CO_2 emissions in BRICS countries compared to countries in the Middle East. Furthermore, it highlights the critical role of expanding renewable energy in the energy transition in BRICS countries. Tukhtamurodov et al. (2024) analysed the impact of foreign direct investment, economic growth, trade openness, energy consumption, and renewable energy on carbon dioxide emissions in BRICS countries for the period 1996-2020 using the Panel ARDL and PMG models. The study's findings highlighted the short- and long-term effects of free trade and energy consumption on emissions; the positive short-term effect of foreign investment; and the negative short-term effect of renewable energy. The findings revealed no correlation between economic development and emissions in BRICS countries. Li et al. (2024) analysed the effects of renewable and non-renewable energy sources, natural resource revenues, financial development, and economic growth in BRICS economies for the period 1990-2018 using the Westerlund cointegration test and the cross-sectional dependence (CSD) test. The research findings revealed that economic growth, financial development, and non-renewable energy sources have negative effects on ecological quality, while highlighting the positive impact of renewable energy sources. However, this study addresses environmental damage from an economic perspective for BRICS countries and does not include the demographic aspect in its analysis. Consequently, developing an approach focused solely on energy sources to improve environmental quality amounts to completely disregarding the urbanisation and demographic impacts of the issue and offers an extremely limited conclusion. Similarly, Raza et al. (2025) analysed the relationship between carbon dioxide

emissions, energy consumption, and GDP growth in BRICS countries for the 2009-2022 period using Pedroni cointegration tests and Dumitrescu-Hurlin Granger causality tests. The study concluded that the economic impacts and the potential for environmental damage exhibit an extremely heterogeneous distribution across countries. Ultimately, the importance of investments in clean technologies, energy efficiency, and renewable energy sources for improving environmental quality was emphasised. Erkılıc et al. (2025), on the other hand, analysed the relationship between carbon dioxide emissions, GDP, renewable energy use, and the KOF Globalisation Index in BRICS countries between 1990 and 2020 using cointegration, unit root tests, panel data analysis, and FGLS regression methods. The results indicate that while economic growth and globalisation increase carbon dioxide emissions, the effect of renewable energy use on reducing carbon dioxide emissions is insufficient. Huang et al. (2026), motivated by the need to reduce environmental pollution and harmful emissions in BRICS countries, examined the relationship between renewable energy consumption, global value chains, urbanisation, and carbon dioxide emissions for the period 2000-2018. The study utilised average group and augmented average group estimators; the findings revealed an inverse relationship between renewable energy consumption and carbon dioxide emissions within global value chains, and a positive relationship with urbanisation. This highlights the importance of green initiatives for reducing environmental pressures on BRICS economies. However, this study completely disregarded the impact of demographic factors.

3. Data & Methodology

In this study, the relationship between carbon dioxide (CO_2) emissions, economic growth, life expectancy at birth, energy intensity, urbanisation and renewable energy consumption in the BRICS countries between 2000 and 2022 was tested using panel data analysis. The study first applied cross-sectional dependence and Delta tests. Subsequently, a stationarity test was conducted using the CIPS unit root test. Based on the unit root test results, the long-term relationship between the variables was analysed using the Westerlund Cointegration Test. Finally, the causal relationship was analysed using the Dumitrescu-Hurlin Causality Test. Table 1 below includes information about the variables used in the model. The equation created using data compiled from the World Bank official database is given below. The following equation was derived by taking the natural logarithm of data compiled from the World Bank's official database:

$$lnCO2_{it} = \beta_0 + \beta_1 * lnrew_{it} + \beta_2 * lnurban_{it} + \beta_3 * lnprim_{it} + \beta_4 * life_{it} + \beta_5 * lnGDP_{it} + -\mu_{it}$$

Table: 1
Summary of Variables

Variables	Unit	Symbol	References
CO_2 emissions	(metric tons per capita)	lnCO2	World bank
Urban population	(% of the total population)	lnurban	World bank
Renewable energy consumption	(% of total final energy consumption)	lnrew	World bank
Life expectancy at birth, total	(years)	life	World bank
The energy intensity	(MJ/$2017 PPP GDP)	lnprim	World bank
Economic Growth	GDP (Constant US$)	lnGDP	World Bank

Note: CO_2 is the dependent variable and is used to measure environmental performance in BRICS countries.

While the BRICS countries are undergoing rapid urbanisation, they are also largely responsible for the rise in global energy consumption and carbon emissions. In 2023, the BRICS countries accounted for nearly half of the world's population and 28% of global gross domestic product (GDP). At the same time, there are serious concerns regarding the negative environmental impacts of BRICS countries' dependence on fossil fuels. Because BRICS economies are major exporters in energy-intensive sectors such as iron and steel, aluminium, and fertilisers, which are also high-risk in terms of emissions, this creates a negative situation in terms of high carbon emissions in production processes and global climate goals. The countries' dependence on fossil fuels has led to significant increases in greenhouse gas emissions over time (Udeagha & Ngepah, 2023; UNCTAD, 2025). Consequently, reducing environmental damage has become a major challenge for BRICS countries within this structure characterised by urbanisation and high fossil fuel consumption. Green energy transitions are a critical step for BRICS countries to sustain their economic progress and protect the environment (Hussain et al., 2025). Koilakou et al. (2024) note that China, India, and Brazil, in addition to their geopolitical status at the regional and global levels, possess the potential to create significant environmental impacts as rapidly rising economies. The reason for selecting the BRICS countries in this study is that they form a group of emerging economies characterised by rapid growth within the global economy, rising energy consumption and significant environmental impacts. Furthermore, these countries exhibit common structural characteristics, such as accelerating industrialisation, rising urbanisation rates and increasing energy demand; consequently, carbon dioxide (CO_2) emissions are also rising significantly. Consequently, the BRICS countries present a sample that can be considered homogeneous for analysing the relationship between economic growth and environmental sustainability, yet they also possess distinct development dynamics. This situation enables both cross-sectional comparisons and the derivation of generalisable conclusions in panel data analyses. Furthermore, the high share of these countries in global carbon emissions enhances the study's policy implications.

In this study, the period 2000-2022 was selected as it provides an appropriate time frame covering both data availability and the structural transformations of the variables analysed. This timeframe was chosen specifically because, from the early 2000s onwards, significant changes were observed in economic growth, urbanisation, energy consumption and environmental indicators across the BRICS countries, and because this period also marked the start of the more systematic implementation of renewable energy policies. Furthermore, the 2000-2022 period encompasses critical global developments such as the 2008 Global Financial Crisis and the Paris Climate Agreement, a significant turning point in climate policy. In this context, the 2000-2022 period has been assessed as a balanced and highly representative timeframe that allows for the analysis of both long-term trends and structural shifts.

The variables used in this study were determined based on theoretical frameworks commonly employed in the literature on environmental economics and energy, as well as

previous empirical findings. Accordingly, carbon dioxide emissions (CO_2) are used as the dependent variable in the literature as the most common indicator of environmental degradation (Grossman & Krueger, 1995; IPCC, 2014). Economic growth, meanwhile, is one of the key determinants of environmental pressure, and its relationship with emissions is frequently tested within the framework of the EKC hypothesis (Grossman & Krueger, 1995; Nemat Shafik & Bandyopadhyay, 1992).

Energy intensity is regarded as a key determinant of emissions, as it indicates how much energy an economy uses in its production processes. Higher energy intensity is generally associated with greater fossil fuel consumption and, consequently, higher CO_2 emissions (Sadorsky, 2014). In contrast, renewable energy consumption is a variable shown to support environmental sustainability and reduce emissions (Shahbaz Khan et al., 2015; Apergis & Payne, 2010).

Urbanisation is a significant demographic factor influencing environmental pressure by increasing energy demand and infrastructure use, particularly in developing countries. The literature contains findings suggesting that the effect of urbanisation on CO_2 emissions can be both increasing and decreasing (Poumanyvong & Kaneko, 2010).

Life expectancy at birth is included in the model as an indicator of social welfare and human development. This variable indirectly reflects the relationship between environmental quality and human health and holds a significant place in the literature on sustainable development (United Nations Development Programme, 2020).

In the first stage of the empirical analysis, the CD (cross-sectional dependence) and slope homogeneity tests are performed. Breusch and Pagan's (1980) LM (Lagrange Multiplier) test, CD (Cross Section Dependency) test and CDLM test (Pesaran, 2004), and LMadj (Bias-Adjusted Cross Sectionally Dependent Lagrange Multiplier) tests developed by Pesaran et al. (2008) were applied (Breusch & Pagan, 1980; Pesaran, 2004; Pesaran et al., 2008). The slope homogeneity test (delta test) was used to assess whether units respond at the same level to a shock effect on the panel following cross-sectional dependence.

After the CD and slope homogeneity test, CIPS unit root tests were performed. Since the unit root test results indicated that all variables are first-order integrated (I(1)), a panel cointegration analysis was conducted to examine the long-run relationship among the variables. In this context, the tests include first-generation panel cointegration tests widely used in the literature, such as those by Chihwa Kao (1999) and Peter Pedroni (2004), and second-generation tests, such as the Error Correction Model (ECM) test and the Durbin-Hausman (DH) cointegration test, also developed by Joakim Westerlund (2008).

A fundamental prerequisite for applying the Durbin-Hausman test is that the dependent variable in the cointegration model must not be stationary at the level. In contrast, the independent variables are allowed to be stationary at the level or in the first difference. In this study, in line with these assumptions, the Westerlund (2008) Durbin-Hausman (DH)

panel cointegration test was chosen to analyse the existence of a long-run relationship between the variables.

Following the coefficient estimation, Dumitrescu and Hurlin Causality tests were used to determine the causality. Dumitrescu and Hurlin (2012) test examines whether the causal relationship valid in one country is valid in other countries. In addition, this test is also used if T>N or N>T.

4. Findings

In this section of the study, the information obtained is presented in tables in the order it was gathered.

Table: 2
Descriptive Statistics

	lnCO2	lnprim	lnGDP	life	lnurban	lnrew
Mean	0,6559	0.8129	4.1180	1,8375	1,7562	1.1885
Median	0,8377	0.8407	4.1593	1,8455	1.8002	1.1731
Max.	1,1268	1.0813	4,5870	1,8932	1.9412	1.6989
Min	-0,0269	0.5728	3.4912	1,7317	1.4416	0.5051
Standard Dev.	0.3676	0.1486	0.2878	0.0402	0.1572	0.4196
Skewness	-0,3165	-0.2838	-0.3810	-0,9281	-0.7184	-0.3459
Kurtosis	1,5875	1.8284	2,4417	3,3411	2.1480	1.7393
Jarque Bera	10,3131	8,4092	4,5417	16,9016	10,2153	9,9052
Probability	0,0058	0,0149	0,1034	0,0002	0,0060	0,0070

The descriptive statistics in Table 2 indicate that the variables generally exhibit negative skewness. The kurtosis coefficients below 3 suggest that the data series are platykurtic relative to a normal distribution. According to the results of the Jarque-Bera normality test, the hypothesis of normal distribution is rejected for the lnCO2, lnprim, life, lnurban, and lnrew variables ($p<0.05$), while the assumption of normality cannot be rejected for the lngdp variable ($p>0.05$).

In this section of the study, cross-sectional dependence and the delta test were first applied.

Table: 3
Cross-Sectional Dependence Test

Test	Statistic	Prob.
Breusch -Pagan LM	69.29432	0.0000
Pesaran LM	12.14058	0.0000
Pesaran CD	6.751450	0.0000

Upon examining the table of cross-sectional dependence test results, it is concluded that there is cross-sectional dependence in the series, as the p-values are statistically significant (<0.10). In cross-sectional dependence tests, the Pesaran CD test yields more reliable results when T > N. Accordingly, as the Pesaran CD statistic is also <0.10, cross-sectional dependence has been identified between the variables. Consequently, there is a

statistically significant dependence between the units in the panel. In this case, it would be appropriate to opt for second-generation panel data techniques that account for cross-sectional dependence.

Table: 4
The Result of the Slope Homogeneity Test

	Statistics	Probability
Δtilde	7.551	0,000
Δtilde adj.	9.053	0,000

Given that the p-value in Table 4 is less than 0.10, it is concluded that the slope coefficients are heterogeneous. Accordingly, the effects of the variables included in the model on the dependent variable are not of the same magnitude across the units in the panel, but vary between units.

The study then continues with the CIPS unit root test to determine whether the variables are stationary.

Table: 5
CIPS Unit Root Test

Variable(s)	I(0)	I(1)
lnCO2	-0.930	-2.345**
lnGDP	-0.537	-2.173**
lnprim	-1.316	-3.832**
life	-0.550	-2.477**
lnurban	-0.420	-1.979**
lnrew	-1.006	-3.498**

*Note: The critical values were calculated as -1.57, -1.72, and -1.98 for 10%, 5%, and 1%, respectively. Also, in the table, ** represents stationarity at the first difference I(1).*

Table 5 presents the results of the CIPS unit root test. In the CIPS test, the null hypothesis states that the series contains a unit root, while rejection of the null indicates stationarity. The results show that the variables are not stationary in levels but become stationary after first differencing. Accordingly, carbon dioxide emissions, energy intensity, life expectancy at birth, economic growth, urbanisation, and renewable energy consumption are integrated of order one, I(1). As the unit root test results indicate that the variables are stationary at the first difference, the analysis proceeds with the Westerlund cointegration test.

Table: 6
Westerlund-Durbin-Hausman Cointegration Test

	Statistic		Asym. p-value
DH_g	-20,632	p_valu	0,040*
DH_p	-5,910	p_valu	0,100

The results of the Durbin-Hausman (DH) test developed by Westerlund (2008) are presented in Table 6. In this cointegration test, which accounts for cross-sectional dependence, the panel statistic (DH_p) is analysed when the coefficients in the panel are

homogeneous, whilst the group statistic (DH_g) is interpreted when the coefficients are heterogeneous. As there is heterogeneity and cross-sectional dependence in this study, the interpretation is based on the DH_g and Asym. p-value; consequently, given that the probability value is significant, it has been concluded that a cointegration relationship exists.

Finally, the Dumitrescu-Hurlin Causality Test was applied to examine the causal relationship between the variables.

Table: 7
Dumitrescu-Hurlin Causality Test

	W-Stat	Z- Stat	Prob.
lnprim-lnCO2	4.78052	2.11364	0.0345**
lnCO2- lnprim	8.65776	5.39849	0.0007*
lnGDP-lnCO2	4.23186	1.64880	0.0992***
lnCO2-lnGDP	4.60320	1.96341	0.0496**
life-lnCO2	4.83215	2.15738	0.0310**
lnCO2-life	15.5068	11.2011	0.0000*
lnurban-lnCO2	4.47103	1.85143	0.0641***
lnCO2-lnurban	2.29726	0.00978	0.9922
lnrew-lnCO2	4.51281	1.88683	0.0592***
lnCO2-lnrew	1.10279	0.3162	0.3162

*Note: * p<0.01, ** p<0.05, *** p<0.10.*

Upon examining the table containing the results of the Dumitescu-Hurlin Causality Test, which assesses the causal relationship between variables, a bidirectional causal relationship was identified between energy intensity and CO_2 emissions. This finding is consistent with studies highlighting the reciprocal interaction between energy efficiency and environmental impact. Sadorsky (2014) states that an increase in energy intensity raises emissions, but at the same time, environmental pressures are driving countries to improve energy efficiency. In this context, both the energy-dependent growth structure and increasing environmental regulations in BRICS countries explain this bidirectional relationship.

A bidirectional causal relationship has been identified between life expectancy at birth and carbon dioxide emissions. These results were previously reported by Jayachandran and Ileras-Muney (2009), Monsef and Mehrjardi (2015), Balan (2016), Murthy et al. (2021), Kaya (2024) and Sart et al (2025).

A reciprocal causal relationship has also been identified between economic growth and carbon dioxide emissions. Studies by Mikayilov et al. (2018) and Dinda (2004) also demonstrate a reciprocal interaction between economic growth and CO_2 emissions. In this context, the findings for the BRICS countries indicate that economic growth increases emissions, whilst environmental pressures, in turn, influence growth policies and the transformation of energy choices.

Furthermore, a unidirectional causal relationship has been identified between renewable energy consumption and carbon dioxide emissions. Apergis and Payne (2010) and Shahbaz et al. (2015) have empirically demonstrated that renewable energy consumption reduces CO_2 emissions by decreasing reliance on fossil fuels. In BRICS

countries, this finding also demonstrates the impact of energy transition policies on environmental quality. The findings of this study are supported by the results of studies conducted by Jebli et al. (2020), Liu et al. (2020), Mandimby (2024), and Addis (2026).

A unidirectional causal relationship has also been identified between urbanisation and carbon dioxide emissions. This finding is consistent with the literature suggesting that urbanisation increases environmental pressure. Poumanyvong and Kaneko (2010) demonstrate that urbanisation increases energy consumption and, consequently, emissions, particularly in developing countries. Rapid and unplanned urbanisation in BRICS countries supports this finding by increasing energy demand from transport, housing and industry. Findings from studies by Ang et al. (2014), Xiangyang and Guiqiu (2011), Su et al. (2018), Ahmad and Zhao (2018), Akinwande (2023), and Türk and Barısık (2024) also confirm the relationship between urbanisation and CO_2 emissions.

5. Conclusion and Policy Implications

In this study, the relationship between carbon dioxide emissions and economic growth, life expectancy at birth, urbanisation, renewable energy consumption, and energy intensity in BRICS countries between 2000 and 2022 was tested using panel data analysis. First, cross-sectional dependence and the delta test were applied. Cross-sectional dependence and heteroskedasticity were detected. In line with these results, the CIPS unit root test, a second-generation unit root test, was applied, and it was determined that all variables were I(1) stationary in first-difference form. Consistent with this result, the long-run relationship among the variables was analysed using the Westerlund D.H. test, and a long-run relationship was found to exist among the variables. Finally, the causal relationship among the variables was analysed using the Dumitrescu-Hurlin Causality Test. According to this, a bidirectional causal relationship was found between energy intensity and CO_2. Similarly, a reciprocal causal relationship was found between economic growth and CO_2, as well as between life expectancy at birth and CO_2. Finally, a one-way causal relationship from urbanisation to CO_2 was identified.

Environmental problems such as global warming and climate change caused by the deterioration of the CO_2 emission balance in the atmosphere have serious effects on natural ecosystems. In addition to increasing the risk to humanity in the future (Shuai et al, 2017), economic, social, health, demographic, etc., have negative effects on many areas. Countries take measures to reduce CO_2 emissions, which are important for ensuring sustainability. The use of fossil energy increases energy intensity and CO_2 emissions. Although energy intensity decreases daily, it is still an important factor in environmental degradation. An increase in consumer demand due to population growth stimulates production and increases energy consumption. Urbanisation, which has been rapidly increasing in recent years, is one of the factors affecting CO_2 emissions. The increase in the urban population as a result of migration from rural areas to cities has also led to an increase in energy consumption. Unplanned urbanisation increases CO_2 emissions and poses a threat to global warming and climate.

Countries can reduce carbon emissions by increasing financial support for technological innovation to increase the production of renewable energy (Shuai et al., 2017). A sustainable green economy can be achieved through technological innovations, particularly (Su, 2020) environmentally friendly technologies in energy (Hao, 2021). An improved quality of life will lead to an increase in life expectancy. For this purpose, it is necessary to strengthen strategies and policies to increase investments in renewable energy sources.

Taken together, these findings show a reciprocal and dynamic interaction between environmental degradation and economic and social indicators in BRICS countries. In particular, the bidirectional relationship between energy intensity and CO_2 emissions demonstrates that energy efficiency policies play a critical role in environmental sustainability. Similarly, the reciprocal relationship between economic growth and emissions reveals that growth processes can incur environmental costs, highlighting the importance of sustainable growth strategies. The bidirectional relationship between life expectancy at birth and CO_2 reflects the impact of environmental quality on human health and the relationship between health indicators and environmental pressures. The unidirectional causality identified from urbanisation to CO_2 emissions points to the increasing effect of rapid and unplanned urbanisation on environmental pressures.

Policy recommendations to be developed within the framework of the sustainable development paradigm focus on promoting technological innovations aimed at improving energy efficiency and expanding the renewable energy portfolio. In this context, strategically supporting low-carbon production technologies is of vital importance to maintain a balance between economic growth targets and environmental sustainability.

In urban development processes as well, sustainable urban planning models that respect ecological balances, resilient infrastructure investments, and decarbonization policies aimed at reducing emissions should be prioritised. Ultimately, integrating public health and environmental policies through a holistic approach is critical for achieving a sustainable socio-economic transformation.

For future studies, it is suggested that comparative analyses of different country groups be conducted, and that additional variables such as institutional quality, technological innovations, or environmental policies be included in the model. Furthermore, testing for nonlinear relationships, considering structural breaks, and using alternative panel data methods will make significant contributions to the literature. In addition, detailed country-specific analyses and a deeper examination of heterogeneous structures offer an important research area for future studies.

References

Abbas, S. et al. (2022), "The effect of renewable energy development, market regulation, and environmental innovation on CO_2 emissions in BRICS countries", *Environmental Science and Pollution Research*, 29(39), 59483-59501.

Abbasi, M.A. et al. (2020), "Urbanization and energy consumption effects on carbon dioxide emissions: evidence from Asian-8 countries using panel data analysis", *Environmental Science and Pollution Research*, 27, 18029-18043.

Addis, A.K. (2026), "The impact of renewable energy on CO_2 emissions in Middle Eastern and BRICS economies", *Humanities and Social Sciences Communications*, 13, 194.

Ahmad, M. et al. (2018), "Empirics on linkages among industrialization, urbanization, energy consumption, CO_2 emissions and economic growth: a heterogeneous panel study of China", *Environmental Science and Pollution Research*, 25(30), 30617-30632.

Ahmad, M. et al. (2019), "Revealing stylized empirical interactions among construction sector, urbanization, energy consumption, economic growth and CO_2 emissions in China", *Science of the Total Environment*, 657, 1085-1098.

Ahmed, Z. & Z. Wang (2019), "Investigating the impact of human capital on the ecological footprint in India: An empirical analysis", *Environmental Science and Pollution Research*, 26(26), 26782-26796.

Akram, R. et al. (2021), "Heterogeneous effects of energy efficiency and renewable energy on economic growth of BRICS countries: A fixed effect panel quantile regression analysis", *Energy*, 215, 119019.

Al-Mulali, U. et al. (2012), "Exploring the bidirectional long-run relationship between urbanization, energy consumption, and carbon dioxide emission", *Energy*, 46(1), 156-167.

Al-Mulali, U. et al. (2013), "Exploring the relationship between urbanization, energy consumption, and CO_2 emission in MENA countries", *Renewable and Sustainable Energy Reviews*, 23, 107-112.

Apergis, N. & J.E. Payne (2010), "Renewable energy consumption and economic growth: Evidence from a panel of OECD countries", *Energy Policy*, 38(1), 656-660.

Apergis, N. et al. (2018), "Does renewable energy consumption and health expenditures decrease carbon dioxide emissions? Evidence for sub-Saharan Africa countries", *Renewable Energy*, 127, 1011-1016.

Apergis, N. et al. (2020), "Health care expenditure and environmental pollution: a cross-country comparison across different income groups", *Environmental Science and Pollution Research*, 27(8), 8142-8156.

Arouri, M.E. et al. (2012), "Energy consumption, economic growth and CO_2 emissions in Middle East and North African countries", *Energy Policy*, 45, 342-349.

Asif, M. et al. (2015), "An empirical investigation of the relationship between economic growth, urbanization, energy consumption, and CO_2 emission in GCC countries: a panel data analysis", *Asian Social Science*, 11(21), 270-284.

Assadzadeh, A. et al. (2014), "The Impact of Environmental Quality and Pollution on Health Expenditures: A Case Study of Petroleum Exporting Countries", in: *Proceedings of the 29th International Business Research Conference*, November 24-25, Australia: Sydney.

Audi, M. et al. (2025), "CO_2 emissions, globalization, and health: A dynamic panel analysis of life expectancy in BRICS", *Environment, Development and Sustainability*, https://doi.org/10.1007/s10668-025-06964-0

Bacon, R.W. & S. Bhattacharya (2007), "Growth and CO_2 Emissions: How Do Different Countries Fare?", *Environment Working Paper Series*, No: 113.

Balan, F. (2016), "Environmental quality and its human health effects: A causal analysis for the EU-25", *International Journal of Applied Economics*, 13(1), 57-71.

Baltagi, B.H. (2008), *Econometric Analysis of Panel Data*, John Wiley & Sons.

Bano, S. et al. (2018), "Identifying the impacts of human capital on carbon emissions in Pakistan", *Journal of Cleaner Production*, 183, 1082-1092.

Bashir, et al. (2019), "The Causality between Human Capital, Energy Consumption, CO_2 Emissions, and Economic Growth: Empirical Evidence from Indonesia", *International Journal of Energy Economics and Policy*, 9(2), 98-104.

Behera, S.R. & D.P Dash (2017), "The effect of urbanization, energy consumption, and foreign direct investment on the carbon dioxide emission in the SSEA (South and Southeast Asian) region", *Renewable and Sustainable Energy Reviews*, 70, 96-106.

Breusch, T.S. & A.R. Pagan (1980), "The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics", *The Review of Economic Studies*, 47(1), 239-253.

Broadstock, D.C. et al. (2016), "Efficiency snakes and energy ladders: a (meta-) frontier demand analysis of electricity consumption efficiency in Chinese households", *Energy Policy*, 91, 383-396.

Cervellati, M. & W. Sunde (2005), "Human Capital Formation, Life Expectancy, and the Process of Development", *The American Economic Review*, 95(5), 1653-1672.

Chang, T.H. et al. (2009), "Threshold effect of the economic growth rate on the renewable energy development from a change in energy price: evidence from OECD countries", *Energy Policy*, 37, 5796-5802.

Cheng, Y. & X. Yao (2021), "Carbon intensity reduction assessment of renewable energy technology innovation in China: A panel data model with cross-section dependence and slope heterogeneity", *Renewable and Sustainable Energy Reviews*, 135, 110157.

Chester, M.V. et al. (2014), "Positioning Infrastructure and Technologies for Low-Carbon Urbanization", *Earth's Future*, 2(10), 533-547.

Chu, S. & A. Majumdar (2012), "Opportunities and challenges for a sustainable energy future", *Nature*, 488(7411), 294-303.

Churchill, S.A. et al. (2019), "R&D intensity and carbon emissions in the G7: 1870-2014", *Energy Economics*, 80, 30-37.

Cole, M.A. & E. Neumayer (2004), "Examining the impact of demographic factors on air pollution", *Population and Environment*, 26(1), 5-21.

Cole, M.A. et al. (2005) "Industrial characteristics, environmental regulations and air pollution: An analysis of the UK manufacturing sector", *J Environ Econ Manage*, 50(1), 121-143.

Démurger, S. & M. Fournier (2011), "Poverty and firewood consumption: a case study of rural households in northern China", *China Econ. Rev.*, 22, 512-523.

Destek, M.A. & F.N. Ozsoy (2015), "Relationships between economic growth, energy consumption, globalization, urbanization and environmental degradation in Turkey", *International Journal of Energy and Statistics*, 03(04), 1550017.

Destek, M.A. (2018), "Çevresel Kuznets eğrisi hipotezinin Türkiye için incelenmesi: STIRPAT modelinden bulgular", *C.Ü. İktisadi ve İdari Bilimler Dergisi*, 19(2), 268-283.

Dietz, T. & E.A. Rosa (1994), "Rethinking the environmental impacts of population, affluence and technology", *Human Ecology Review*, 1(2), 277-300.

Dietz, T. & E.A. Rosa (1997), "Effects of Population And Affluence on CO_2 Emissions", *Proceedings of the National Academy of Sciences*, 94(1), 175-179.

Dinda, S. (2004), "Environmental Kuznets curve hypothesis: A survey", *Ecological Economics*, 49(4), 431-455.

Dong, K. et al. (2018), "Energy intensity and energy conservation potential in China: a regional comparison perspective", *Energy*, 155, 782-795.

Dumitrescu, E.I. & C. Hurlin (2012), "Testing For Granger Noncausality in Heterogeneous Panels", *Economic Modeling*, 29(4), 1450-1460.

Ehigiamusoe, K.U. & E. Dogan (2022), "The role of interaction effect between renewable energy consumption and real income in carbon emissions: evidence from low-income countries", *Renewable and Sustainable Energy Reviews*, 154, 111883.

Ehrlich, P.R. & J.P. Holdren (1971), "Impact of population growth", *Science*, 171(3977), 1212-1217.

Erdoğan, S. et al. (2019), "The relationship between CO_2 emissions and health indicators: The case of Turkey", *Econ Lett*, 6(1), 28-39.

Erkılıç, E. et al. (2025), "Renewable Energy Solution to Carbon Emissions: BRICS Countries in the Grip of Globalization and Economic Growth", *Sustainability*, 17(9), 4117.

Ewing, R. & F. Rong (2008), "The impact of urban form on US residential energy use", *Hous. Policy Debate*, 19(1), 1-30.

Fan, Y. et al. (2006), "Analyzing impact factors of CO_2 emissions using the STIRPAT model", *Environmental Impact Assessment Review*, 26, 377-395.

Farsi, M. et al. (2007), "Fuel choices in urban Indian households", *Environment and Development Economics*, 12(6), 757-774.

Fu, Q. et al. (2021), "Impact of renewable energy on economic growth and CO_2 emissions evidence from BRICS countries", *Processes*, 9(8), 1281.

Goldewijk, K. (2005), "Three Centuries of Global Population Growth: A Spatial Referenced Population Density Database for 1700-2000", *Population and Environment*, 26(5), 343-367.

Grossman, G.M. & A.B. Krueger (1995), "Economic growth and the environment", *The Quarterly Journal of Economics*, 110(2), 353-377.

Hao, L.N. et al. (2021), "Green growth and low carbon emission in G7 countries: How critical the network of environmental taxes, renewable energy and human capital is?", *Science of the Total Environment*, 752, 141853.

Hartwick, J.M. (1977), "Intergenerational equity and the investing of rents from exhaustible resources", *American Economic Review*, 67(5), 972-974.

He, X. & D. Reiner (2016), "Electricity demand and basic needs: empirical evidence from China's households", *Energy Policy*, 90, 212-221.

Hlongwane, N.W. & H. Khobai (2026), "The Impact of Energy Transition on CO_2 Emissions in BRICS Nations: Evidence from Linear and Nonlinear Approaches", *Sustainability*, 18(6), 3109.

Hlongwane, T. (2025), "Renewable energy consumption and life expectancy in BRICS countries: Panel regression evidence", *Renewable Energy*, 210, 1234-1248.

Hossain, M.S. (2011), "Panel estimation for CO_2 emissions, energy consumption, economic growth, trade openness and urbanization of newly industrialized countries", *Energy Policy*, 39(11), 6991-6999.

Huang, H. et al. (2026), "Renewable energy and global value chains: catalysts for reducing carbon emissions in BRICS countries", *Polish Journal of Environmental Studies*, 35(1), 657-671.

Hussain, I. et al. (2025), "Economic policy uncertainty and green energy in BRICS: Impacts on sustainability", *Energy*, 317, 134717.

Igbinedion, S.O. (2019), "Environmental Emissions and Life Expectancy Nexus: Further Evidence from Nigeria", *Annals of the University of Petroşani, Economics*, 19(1), 115-128.

IPCC Intergovernmental Panel on Climate Change (2014), *Climate Change 2014: Synthesis Report*, Geneva: IPCC.

Jayachandran, S. & A. Lleras-Muney (2009), "Life expectancy and human capital investments: evidence from maternal mortality declines", *The Quarterly Journal of Economics*, 124(1), 349-397.

Jebli, M.B. (2016), "On the causal links between health indicator, output, combustible renewables and waste consumption, rail transport, and CO_2 emissions: the case of Tunisia", *Environmental Science and Pollution Research*, 23(16), 16699-16715.

Jebli, M.B. et al. (2020), "Renewable energy, CO_2 emissions and value added: Empirical evidence from countries with different income levels", *Structural Change and Economic Dynamics*, 53, 402-410.

Jones, D.W. (1991), "How urbanization affects energy-use in developing countries", *Energy Policy*, 19(7), 621-630.

Kao, C. (1999), "Spurious regression and residual-based tests for cointegration in panel data", *Journal of Econometrics*, 90(1), 1-44.

Kasman, A. & Y.S. Duman (2015), "CO_2 emissions, economic growth, energy consumption, trade and urbanization in new EU member and candidate countries: A panel data analysis", *Economic Modeling*, 44, 97-103.

Kaya, F. et al. (2024), "Energy choices to health outcomes: A multidimensional analysis of risk in BRICS via PMG-ARDL approach", *PLOS One*, 19(12), e0310558.

Ketenci, N. (2018), "The environmental Kuznets curve in the case of Russia", *Russian Journal of Economics*, 4(3), 249-265.

Khan, I. et al. (2021), "Renewable energy consumption and local environmental effects for economic growth and carbon emission: evidence from global income countries", *Environmental Science and Pollution Research*, 29, 13071-13088.

Khan, M. (2020), "CO_2 emissions and sustainable economic development: New evidence on the role of human capital", *Sustainable Development*, 28(5), 1279-1288.

Khan, M.A. et al. (2014), "Global estimates of energy consumption and greenhouse gas emissions. Renew", *Sustain. Energy Rev*., 29, 336-344.

Khanna, N.Z. et al. (2016), "Effects of demand side management on Chinese household electricity consumption: Empirical findings from Chinese household survey", *Energy Policy*, 95, 113-125.

Khattak, S.I. et al. (2020), "Exploring the impact of innovation, renewable energy consumption and income on CO_2 emissions: new evidence from the BRICS economies", *Environmental Science and Pollution Research*, 27(12), 13866-13881.

Kirikkaleli, D. & D.B. Kalmaz (2020), "Testing the moderating role of urbanization on the environmental Kuznets curve: Evidence from an emerging market", *Environ. Sci. Pollut. Res*., 27, 38169-38180.

Kirikkaleli, D. & T.S. Adebayo (2021), "Do renewable energy consumption and financial development matter for environmental sustainability? New global evidence", *Sustainable Development*, 29(4), 583-594.

Koilakou, E. et al. (2024), "Social and economic driving forces of recent CO_2 emissions in three major BRICS economies", *Scientific Reports*, 14(1), 8047.

Kónya, L. (2006), "Exports and growth: Granger causality analysis on OECD Countries with a panel data approach", *Econ Model*, 23, 978-992.

Kumar, K.K. (2026), "Exploring the Impact of Climate Change on Life Expectancy and Youth Death in BRICS Countries: Empirical Evidence Through the Pooled Mean Group Approach", in: *Climate Action and Sustainable Development Goals* (92-113), CRC Press.

Kumari, N. (2025), "Determinants of Carbon Dioxide Emissions in BRICS Nations: An Empirical Analysis", *International Research Journal of Economics and Management Studies*, 4(12), 108-114.

Levin, A. et al. (2002), "Unit Root Tests in Panel Data: Asymptotic and Finite- Sample Properties", *Journal of Econometrics*, 108(1), 1-24.

Li, B. et al. (2015), "Using the STIRPAT model to explore the factors driving regional CO_2 emissions: A case of Tianjin, China", *Natural Hazards*, 76(3), 1667-1685.

Li, K. & B. Lin (2015), "Impacts of urbanization and industrialization on energy consumption/CO_2 emissions: Does the level of development matter?", *Renewable and Sustainable Energy Reviews*, 52, 1107-1122.

Li, P. & Y. Ouyang (2019), "The dynamic impacts of financial development and human capital on CO_2 emission intensity in China: An ARDL approach", *Journal of Business Economics and Management*, 20(5), 939-957.

Li, S. et al. (2024), "Moving towards a sustainable environment in the BRICS economies: What are the effects of financial development, renewable energy and natural resources within the LCC hypothesis?", *Resources Policy*, 88, 104457.

Liddle, B. & S. Lung (2010), "Age-structure, urbanization and climate change in developed countries: revisiting STIRPAT for disaggregated population and consumption-related environmental impacts", *Popul Environ*, 31(5), 317-343.

Liddle, B. (2013), "The energy, economic growth, urbanization nexus across development: Evidence from heterogeneous panel estimates robust to cross-sectional dependence", *Energy*, 34(2), 223-244.

Lin, S. et al. (2017), "Impacts of urbanization and real economic development on CO_2 emissions in non-high income countries: Empirical research based on the extended STIRPAT model", *Journal of Cleaner Production*, 166, 952-966.

Liu, J.L. et al. (2020), "Do real output and renewable energy consumption affect CO_2 emissions? Evidence for selected BRICS countries", *Energies*, 13(4), 960.

Ma, B. (2015), "Does urbanization affect energy intensities across provinces in China? Long-run elasticities estimation using dynamic panels with heterogeneous slopes", *Energy Economics*, 49, 390-401.

Mahmood, N. et al. (2019), "Renewable energy, economic growth, human capital and CO_2 emission: an empirical analysis", *Environmental Science and Pollution Research*, 26(20), 20619-20630.

Manderson, E. & R. Kneller (2012), "Environmental regulations, outward FDI and heterogeneous firms: are countries used as pollution havens?", *Environmental and Resource Economics*, 51(3), 317-352.

Mandimby, A.S. (2024), "Effect of renewable energy on CO_2 emissions in BRICS countries", *Quantitative Economics and Management Studies*, 5(2), 372-386.

Martínez-Zarzoso, I. & A. Maruotti (2011), "The impact of urbanization on CO_2 emissions: evidence from developing countries", *Ecological Economics*, 70(7), 1344-1353.

Martínez-Zarzoso, I. et al. (2007), "The impact of population on CO_2 emissions: evidence from European countries", *Environmental and Resource Economics*, 38(4), 497-512.

Mehta, D. & M.A. Shah (2024), "BRICS carbon emissions: Asymmetric impact of energy mix, financial development, and digitalization", *Environmental and Development Economics*, 10(1), 2418162.

Mensah, J.T. (2014), "Carbon Emissions, Energy Consumption and Output: A Threshold Analysis on the Causal Dynamics in African Economies", *Energy Policy*, 70, 172-182.

Mikayilov, J.I. et al. (2018), "Carbon emissions and economic growth: An empirical investigation of Azerbaijan", *Energy Policy*, 115, 255-262.

Monsef, A. & A.S. Mehrjardi (2015), "Determinants of Life Expectancy: A Panel Data Approach", *Asian Economic and Financial Review*, 5(11), 1251-1257.

Mujtaba, G. & S.J.H. Shahzad (2021), "Air pollutants, economic growth and public health: implications for sustainable development in OECD countries", *Environmental Science and Pollution Research*, 28(10), 12686-12698.

Murthy, U. et al. (2021), "The Relationships Between CO_2 Emissions, Economic Growth And Life Expectancy", *The Journal of Asian Finance, Economics and Business*, 8(2), 801-808.

Nazlıoğlu, Ş. (2010), "Makro İktisat Politikalarının Tarım Sektörü Üzerindeki Etkileri: Gelişmiş Ve Gelişmekte Olan Ülkeler İçin Bir Karşılaştırma", *Doctoral Dissertation*, T.C. Erciyes Üniversitesi Sosyal Bilimler Enstitüsü, Kayseri.

Nejat, P. et al. (2015), "A global review of energy consumption, CO_2 emissions and policy in the residential sector (with an overview of the top ten CO_2 emitting countries)", *Renewable and Sustainable Energy Reviews*, 43, 843-862.

Newman, P.W.G. & J.R. Kenworthy (1989), "Gasoline consumption and cities", *J.Am.Plan.Assoc.*, 55, 24-37.

Nosheen, M. et al. (2020), "Analyzing extended STIRPAT model of urbanization and CO_2 emissions in Asian countries", *Environmental Science and Pollution Research*, 27(36), 45911-45924.

Odusanya, A.I. et al. (2014), "Environmental Quality and Health Care Spending in Nigeria", *Fountain Journal of Management and Social Sciences*, 3(2), 57-67.

Oster E. et al. (2013), "Limited Life Expectancy, Human Capital and Health Investments", *American Economic Review*, 103(5), 1977-2002.

Pablo-Romero, M. del P. & A. Sánchez-Braza (2015), "Productive energy use and economic growth: Energy, physical and human capital relationships", *Energy Economics*, 49, 420-429.

Pachauri, S. & L. Jiang (2008), "The household energy transition in India and China", *Energy Policy*, 36, 4022-4035.

Parikh, J. & V. Shukla (1995), "Urbanization, energy use and greenhouse effects in economic development: Results from a cross-national study of developing countries", *Global Environmental Change*, 5(2), 87-103.

Pedroni, P. (2004), "Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis", *Econometric Theory*, 20(3), 597-625.

Pérez-Lombard, L. et al. (2008), "A review on buildings energy consumption information", *Energy and Buildings*, 40(3), 394-398.

Pesaran, M.H. & T. Yamagata (2008), "Testing Slope Homogeneity in Large Panels", *Journal of Econometrics*, (142), 50-93.

Pesaran, M.H. (2004), "General Diagnostic Tests for Cross Section Dependence in Panels", Cambridge: *University of Cambridge Working Paper*.

Pesaran, M.H. (2006), "A Simple Panel Unit Root Test in the Presence of Crosssection Dependecy", *Cambridge Working Papers in Economics*, 0346.

Pesaran, M.H. (2007), "A simple panel unit root test in the presence of cross-section dependence", *Journal of Applied Econometrics*, 22(2), 265-312.

Pesaran, M.H. et al. (1999), "Pooled Mean Group Estimation of Dynamic Heterogeneous Panels", *Journal of the American Statistical Association*, 94(446), 621-634.

Pesaran, M.H. et al. (2008), "A Bias-adjusted LM Test of Error Cross-section Independence", *Econometrics Journal*, 11, 105-127.

Pîrlogea, C. (2012), "The human development relies on energy. Panel data evidence", *Procedia Economics and Finance*, 3, 496-501.

Poumanyvong, P. & S. Kaneko (2010), "Does urbanization lead to less energy use and lower CO_2 emissions? A cross-country analysis", *Ecological Economics*, 70(2), 434-444.

Radmehr, M. & T.S. Adebayo (2022), "Does health expenditure matter for life expectancy in Mediterranean countries?", *Environmental Science and Pollution Research*, 29, 60314-60326.

Rahman, M.M. et al. (2022), "Determinants of life expectancy in most polluted countries: Exploring the effect of environmental degradation", *PLOS One*, 17(1), e0262802.

Raza, A. et al. (2025), "Nexus between CO_2 emissions, economic growth, and energy consumption with special reference to BRICS: A panel data approach", *Energy Nexus*, 20, 100556.

Ridwan, M. et al. (2026), "Heterogeneous associations of health expenditure, environmental pollution, and economic growth on life expectancy in BRICS economies", *Frontiers in Public Health*, 14, 1767163.

Rjoub, H. et al. (2021), "Sustainability of the Moderating Role of Financial Development in the Determinants of Environmental Degradation: Evidence from Turkey", *Sustainability*, 13(4), 1844.

Romer, P.M. (1990), "Endogenous Technological Change", *Journal of Political Economy*, 98(5), S71-S102.

Sadorsky, P. (2014), "The effect of urbanization on CO_2 emissions in emerging economies", *Energy Economics*, 41, 147-153.

Salim, R. et al. (2017), "Does human capital matter for energy consumption in China?", *Energy Economics*, 67, 49-59.

Sart, G. et al. (2025), "The effect of shadow economy, life expectancy, education, and income on CO_2 emissions: an analysis of BRICS countries", *Frontiers in Environmental Science*, 13, 1550389.

Sarwar, S. et al. (2020), "Revisiting the empirical relationship among the main targets of sustainable development: Growth, education, health and carbon emissions", *Sustainable Development*, 29(2), 419-440.

Satterthwaite. D. (2009), "The implications of population growth and urbanization for climate change", *International Institute for Environment and Development (IIED)*, 21(2), 545-567.

Schultz, T.W. (1961), "Investment in Human Capital", *The American Economic Review*, 51(1), 1-17.

Shafik, N. & S. Bandyopadhyay (1992), "Economic growth and environmental quality: Time series and cross-country evidence", *Policy Research Working Paper* No. 904, Washington, DC: World Bank.

Shahbaz, M. et al. (2015), "Does energy intensity contribute to CO_2 emissions? A trivariate analysis in selected African countries", *Ecological Indicators*, 50, 215-224.

Shahbaz, M. et al. (2015), "Does renewable energy consumption add in economic growth? An application of autoregressive distributed lag model in Pakistan", *Renewable and Sustainable Energy Reviews*, 44, 576-585.

Shahbaz. M. et al. (2017), "CO_2 emissions in Australia: economic and noneconomic drivers in the long-run", *Applied Economics*, 49(13), 1273-1286.

Sharma, S.S. (2011), "Determinants of carbon dioxide emissions: empirical evidence from 69 countries", *Applied Energy*, 88(1), 376-382.

Shuai, C. et al. (2017), "Identifying key impact factors on carbon emission: Evidence from panel and time-series data of 125 countries from 1990 to 2011", *Applied Energy*, 187, 310-325.

Shyamal, P. & B.N. Rabindra (2004), "Causality between energy consumption and economic growth in India: a note on conflicting results", *Energy Econ*., 26, 977-983.

Siddique, H.M.A. et al. (2020), "The impact of urbanization and energy consumption on CO_2 emissions in South Asia", *South Asian Studies*, 31(2), 745-757.

Sinha, A. & S. Sen (2016), "Atmospheric consequences of trade and human development: A case of BRIC countries", *Atmospheric Pollution Research*, 7(6), 980-989.

Solow, R.M. (1986), "On the intergenerational allocation of exhaustible resources", *The Scandinavian Journal of Economics*, 88(1), 141-149.

Somoye, O.A. & T.S. Akinwande (2023), "Can urbanization influence carbon dioxide emissions? Evidence from BRICS-T countries", *Journal of Contemporary Urban Affairs*, 7(1), 164-174.

Stern, N. (2006), *Stern Review Report on the Economics of Climate Change*, HM Treasury, London.

Su, C.W. et al. (2020), "Trade and technological innovation: the catalysts for climate change and way forward for COP21", *Journal of Environmental Management*, 269, 110774.

Tamazian, M. & B.B. Rao (2010), "Do economic, financial and institutional developments matter for environmental degradation? Evidence from transitional economies", *Energy Economics*, 32(1), 137-145.

Tamazian, M. et al. (2009), "Does higher economic and financial development lead to environmental degradation: Evidence from BRIC countries", *Energy Policy*, 37(1), 246-253.

Udeagha, M.C. & N. Ngepah (2023), "The drivers of environmental sustainability in BRICS economies: do green finance and fintech matter?", *World Development Sustainability*, 3, 100096.

Ullah, S. et al. (2020), "On the asymmetric effects of premature deindustrialization on CO_2 emissions: evidence from Pakistan", *Environmental Science and Pollution Research*, 27, 13692-13702.

Ulucak, R. & S.U.D. Khan (2020), "Relationship between energy intensity and CO_2 emissions: Does economic policy matter?", *Sustainable Development*, 28(5), 1457-1464.

UNCTAD (2025), *Fostering BRICS leadership on climate ambition amid trade and climate tensions*, <https://unctad.org/system/files/official-document/tcsditcinf2025d11_en.pdf>, 03.03.2026.

UNDP (2020), *Human Development Report 2020*, New York.

Von, P.N. (2009), "Energy consumption and income: A semiparametric panel data analysis", *Energy Economics*, 32(3), 557-563.

Wang, C.M. et al. (2019), "Bootstrap ARDL on health expenditure, CO_2 emissions and GDP growth relationship for 18 OECD countries", *Frontiers in Public Health*, 7, 324.

Wang, Q. et al. (2019), "The effects of energy prices, urbanization and economic growth on energy consumption per capita in 186 countries", *Journal of Cleaner Production*, 225, 1017-1032.

Wang, S. et al. (2014), "Urbanization, energy consumption and carbon dioxide emissions in China: A panel data analysis of China's provinces", *Applied Energy*, 136, 738-749.

Wang, Z. et al. (2012), "An empirical research on the influencing factors of regional CO_2 emissions: evidence from Beijing city, China", *Applied Energy*, 100, 277-284.

Wang, Z. et al. (2019), "Dynamic linkages among CO_2 emissions, human development, financial development and globalization: empirical evidence based on PMG long-run panel estimation", *Environmental Science and Pollution Research*, 26(36), 36248-36263.

Wang, Z. et al. (2019), "How does the new-type urbanization affect CO_2 emissions in China? An empirical analysis from the perspective of technological progress", *Energy Economics*, 80, 917-927.

Westerlund, J. (2008), "Panel Cointegration Tests of the Fisher Effect", *Journal of Applied Econometrics*, 23(2), 193-233.

Xiangyang, D. & Y. Guiqiu (2011), "China's Greenhouse Gas emissions' dynamic effects in the process of its urbanization: A perspective from shocks decomposition under long-term constraints", *Energy Procedia*, 5, 1660-1665.

Yang, L. et al. (2017), "Can China meet its 2020 economic growth and carbon emissions reduction targets?", *J. Clean. Prod*., 142, 993-1001.

Yao, Y. et al. (2020), "Human capital and CO_2 emissions in the long run", *Energy Economics*, 91, 104907.

Ye, Y. et al. (2018), "Low-carbon transportation oriented urban spatial structure: Theory, model and case study", *Sustainability*, 10(1), 19.

Yeboah, F. et al. (2024), "Wavelet-based analysis of economic growth, CO_2 emissions, and life expectancy in BRICS countries", *Journal of Cleaner Production*, 406, 136884.

York, R. (2008), "Decarbonization in former Soviet republics, 1992-2000: The ecological consequences of demodernization", *Social Problems*, 55(3), 370-390.

York, R. et al. (2003), "STIRPAT, IPAT and ImPACT: analytic tools for unpacking the driving forces of environmental impacts", *Ecological Economics*, 46(3), 351-365.

Zhan, Y. et al. (2025), "Do environmental degradation and geopolitical risk hinder life expectancy? The role of institutional quality and technological innovation", *Frontiers in Public Health*, 13, 1650912.

Zhang, C. & Y. Lin (2012), "Panel estimation for urbanization, energy consumption and CO_2 emissions: A regional analysis in China", *Energy Policy*, 49, 488-498.

Zhang, Y.J. et al. (2014), "The impact of economic growth, industrial structure and urbanization on carbon emission intensity in China", *Natural Hazards*, 73(2), 579-595.

Zheng, W. & P.P. Walsh (2019), "Economic growth, urbanization and energy consumption A provincial level analysis of China", *Energy Economics*, 80, 153-162.

Zhu, H.M. et al. (2012), "Urbanization and CO_2 emissions: A semiparametric panel data analysis", *Economics Letters*, 117(3), 848-850.

Zhu, X. et al. (2025), "The BRICS nations framework for curbing carbon emissions: Evidence from energy intensity, renewable energy, and environmental policy", *Asia & the Pacific Policy Studies*, 12(1), e70002.

Sosyoekonomi

2026, Vol. 34(70), 131-154

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.06
Date Submitted: 18.07.2025
Date Revised: 05.02.2026
Date Accepted: 18.08.2026

Evaluation of Financial Performance of the Ministry of Health with Entropy-Based TOPSIS Method

Tuğba ŞAHİN-ÇİÇEK *(https://orcid.org/0000-0001-9246-9647), İstanbul Aydın University, Türkiye; tugbasahincicek@aydin.edu.tr*

Fatma BENK *(https://orcid.org/0000-0002-8401-1385), Sakarya University, Türkiye; fatma.benk1@ogr.sakarya.edu.tr*

T.C. Sağlık Bakanlığı'nın Entropi Tabanlı TOPSIS Yöntemiyle Finansal Performansının Değerlendirilmesi

Abstract

This study evaluates the financial performance of the Ministry of Health of the Republic of Türkiye for 2015-2023 using 13 financial ratios derived from balance sheets and activity statements. The Entropy-weighted TOPSIS method ranked annual performance. The findings show that 2015 (C_i = 0.6839) had the highest performance, whereas 2023 (C_i = 0.3105) had the lowest. Performance fluctuations were linked to slower receivables collection, rising short-term liabilities, weakened liquidity, and reduced operational efficiency. The results indicate that sustainable public health financing requires systematic management of collection processes and debt structure, highlighting collection performance as critical.

Keywords : Ministry of Health, Financial Performance, Financial Analysis, TOPSIS, Entropy.

JEL Classification Codes : I18, H51, C65.

Öz

Bu çalışma, Türkiye Cumhuriyeti Sağlık Bakanlığı'nın 2015-2023 dönemindeki finansal performansını değerlendirmek amacıyla, bilanço ve faaliyet tablolarından elde edilen verilere dayalı 13 finansal oran kullanılarak gerçekleştirilmiştir. Yıllar arasındaki performans farklarını belirlemek için Entropi ağırlıklı TOPSIS yöntemi uygulanmıştır. Bulgular, en yüksek performansın 2015'te (C_i = 0,6839), en düşük performansın ise 2023'te (C_i = 0,3105) görüldüğünü göstermektedir. Performans dalgalanmaları, tahsilat yavaşlaması, artan kısa vadeli borçlar, zayıflayan likidite ve azalan faaliyet verimliliği ile ilişkilendirilmiştir. Sonuçlar, sürdürülebilir kamu sağlık finansmanı için tahsilat süreçlerinin ve borç yapısının daha sistematik bir biçimde yönetilmesi gerektiğini vurgulamaktadır.

Anahtar Sözcükler : Sağlık Bakanlığı, Finansal Performans, Finansal Analiz, TOPSIS, Entropi.

1. Introduction

Healthcare systems have a complex and resource-intensive structure. This complexity reflects not only the technical nature of healthcare delivery but also the scale at which resources are mobilised. This structure requires robust and multidimensional financial management to ensure the continuity, effectiveness, and sustainability of services. Measuring financial performance plays a critical role in supporting strategic planning, budgeting, and resource allocation, especially for public authorities responsible for national-level service delivery (Gapenski & Pink, 2015; WHO, 2020; OECD, 2023).

In Türkiye, the Ministry of Health is primarily responsible for protecting public health, executing large-scale investments, and managing population-level health programs. It carries out these responsibilities within a highly centralised public financing framework. The Ministry's capacity to fulfil these responsibilities effectively is closely linked to the effectiveness of its financial policies. The literature shows that financial performance evaluation contributes not only to financial sustainability but also to improved service quality, efficiency, and effective management of public resources (Sonğur et al., 2016; Kefe, 2023). During periods of budgetary constraints, financial evaluation becomes even more important for maintaining equitable access to health services (Altan & Akça, 2024).

Reforms and large-scale investments in Türkiye in recent years have directly affected the healthcare system's financial structure. While these investments aim to strengthen healthcare infrastructure and improve service delivery, they also create significant financial obligations that require careful monitoring and evaluation (Altan & Akça, 2024). This dual effect has made financial oversight an increasingly prominent issue. Furthermore, the financial pressures experienced during the COVID-19 pandemic have clearly demonstrated the importance of strengthening healthcare system resilience. The role of financial performance analyses in supporting preparedness capacity and sustainability has become more visible (Kefe, 2023). In this context, evaluating the Ministry of Health's financial performance is critical not only to ensure financial sustainability but also to maintain service quality and guide health policies.

One of the most commonly used approaches for evaluating financial performance in healthcare institutions is ratio analysis. Ratio analysis enables the systematic interpretation of liquidity, profitability, efficiency, and leverage indicators derived from financial statements. Its continued use in public-sector studies largely reflects data accessibility. It is a widely accepted method in the healthcare finance literature (Gapenski & Pink, 2015). Trend analysis, comparative analysis, regression-based models, Data Envelopment Analysis (DEA), and various multi-criteria methods also appear in the healthcare financing literature. In this respect, these alternative approaches generally require detailed micro-cost data, operational indicators, or longitudinal data sets that are not publicly available at the Ministry level. The Ministry of Health publishes only consolidated balance sheets and income statements. Therefore, ratio analysis remains the most transparent, applicable, and literature-compliant method for this study. Accordingly, this study selected 13 basic financial ratio

evaluation criteria commonly used in previous studies (Yeşiltaş, 2020; Çil-Koçyiğit & Karakoç, 2021; Durmuş & Durmuş, 2023; Kabak & Yurttadur, 2023).

To enhance the evaluation's objectivity, the financial ratios were analysed within a multi-criteria decision-making (MCDM) framework. The Entropy method determined objective criteria weights based on the dataset's information value. This approach keeps the weighting process independent of subjective judgments. The TOPSIS method ranked financial performance over the years based on its proximity to the ideal solution. The literature shows that MCDM methods are effectively used in the healthcare sector for performance evaluation and resource allocation (Yazdani-Chamzini et al., 2013). Integrating these two methods allows a more comprehensive, multidimensional interpretation of the Ministry's financial structure, producing more reliable and analytically robust results for decision-makers.

In recent years, the Turkish healthcare system has faced significant financial challenges, including the expansion of city hospitals, rising operational and personnel costs, high post-pandemic expenditures, inflationary pressures, and structural deficits in the Social Security Institution. These dynamics have increased the importance of institution-level financial assessments. Although numerous studies examine the financial performance of public, university, and private hospitals, the literature lacks a comprehensive, multi-year financial performance analysis at the ministry level. This gap highlights the need for an analytical perspective on the institutional evaluation of the healthcare system. To address this gap, the present study analyses the financial performance of the Ministry of Health of the Republic of Türkiye between 2015 and 2023 using 13 key financial ratios and the Entropy-based TOPSIS method. This ministry-level evaluation provides a macro-structural perspective that hospital- or sub-sector studies cannot capture, making a unique contribution to the literature. Furthermore, the study provides a valuable, evidence-based analytical framework for developing health policies.

2. Literature

To present the research scope more systematically, the literature is classified into three main categories. First, studies on general financial performance analysis in the healthcare sector were summarised, and the fundamental analytical approaches used were identified. Second, studies using the TOPSIS method in healthcare were examined, showing how multi-criteria decision-making techniques are applied in healthcare services. Third, studies using the TOPSIS method in both healthcare and finance were evaluated, and examples of the method's interdisciplinary use were presented.

While some studies examine the financial performance of public hospitals, few have evaluated all Ministry of Health hospitals across Türkiye. However, no research has treated the Ministry of Health as a single institution and conducted a multi-year, comprehensive financial performance analysis based on the Ministry's own financial statements. Most existing studies focus on public hospital unions, public hospitals, city hospitals, public

university hospitals, and teaching and research hospitals, evaluating each separately. Therefore, the literature review clearly shows that no study has analysed the Ministry's financial performance using its consolidated balance sheet and income statement. The literature summary in Table 1 highlights examples of financial analysis studies in the health sector and further emphasises the need for this original analysis at the Ministry level.

Table: 1
Summary of Literature on Financial Performance Analysis in Healthcare

Reference(s)	Methodology	Explanation
Dayı & Akdemir (2013)	Ratio Analysis	This article analyses the financial risks of public hospitals in Kastamonu province and evaluates them using ratio analysis methods.
Sonğur et al. (2016)	Ratio Analysis, Vertical and Horizontal Analyses	This study analyses the financial status of the hospitals affiliated to the Ministry of Health between 2008 and 2015, before and after the establishment of public hospital unions.
Aydemir (2018)	Ratio Analysis	This study analysed the balance sheets of the hospital services sector at the Central Bank of the Republic of Türkiye. The study found that the sector's asset structure is predominantly fixed assets and that it relies on long-term borrowing. In terms of liquidity ratios, the sector's liquidity status was moderate, except for the current ratio. The sector's financial structure relies heavily on borrowing, and shareholders' equity is weak. In terms of asset utilisation ratios, the study concludes that enterprises in the sector cannot use their stocks effectively and face delays in collecting receivables. When the study analysed the sector's profitability ratios, it found weak profitability and high sales costs during the analysis period.
Yeşiltaş (2020)	Literature Review	The study evaluates criticisms of constructing city hospitals through public-private partnerships from financial, legal, and economic perspectives. The study analyses the sustainability of city hospitals and their effects on the public budget.
Çil-Koçyiğit & Kocakoç (2021)	Ratio Analysis	The study analysed the financial statements of public hospitals in Ankara for 2008-2017 using ratio analysis. The study found that training and research hospitals' liquidity ratios were lower than expected. These ratios decreased further during the general secretariat period. The results showed increased risk, excessive use of tangible fixed assets, and an inability to achieve profitability. Short-term liabilities increased, while shareholders' equity decreased. This situation accelerated especially during the General Secretariat period.
Ekinci & Bakır, (2021)	Ratio Analysis	In the study, the financial performance of an A1 Branch Hospital was analysed by ratio analysis. The research found no liquidity shortage, but costs were high, and receivables and debt management were ineffective.
Durmuş & Durmuş (2023)	Ratio Analysis	The financial analysis of the public university hospital was carried out by analysing the final account reports between 2017 and 2020. The comparison between 2017 and 2020 shows a decrease in the organisation's liquid assets, a reduced ability to cover current assets and short-term liabilities, and overinvestment in inventories, indicating inventory management problems, heavy reliance on inventories, and cash shortages. The indicators point to a deterioration in the university hospital's financial position and business performance.
Kabak & Yurttadur (2023)	Ratio Analysis	The study evaluated the financial performance of the Q-861 Hospital Sub-Sector, included in the Sector Balance Sheets published by the CBRT, using the hospital financial life index. The results showed that hospitals experienced financial difficulties between 2017 and 2020, but their financial situation was at an ideal level in 2021, including the pandemic period.
Babacan & Akça (2024)	Ratio Analysis	In the study, the financial performance of public hospitals was evaluated by ratio analysis using the financial statements of the hospitals. The analyses showed that public hospitals have high liquidity, generally good turnover rates, and low profitability ratios because they are public. The study found that hospitals use short-term debt to finance operations, and that the Social Security Institution is the largest source of income.

Numerous studies in the health sector have used multi-criteria decision-making (MCDM) methods. MCDM approaches have been applied in a wide range of areas, including site selection, hospital performance evaluation, inventory management, health indicator analysis, supplier selection, personnel selection, performance measurement, and evaluation of regional health services. Table 2 highlights examples of research using MCDM techniques in the healthcare sector.

Table: 2
Literature Summary on the Studies Using Multi-Criteria Decision-Making Methods in the Field of Health

Reference(s)	Methodology	Explanation
Sharifabadi & Ardakani (2014)	Fuzzy TOPSIS and Interpretive Structural Modelling	This study used the fuzzy TOPSIS method and found that factors related to hospital staff updating information and the relevance of physicians' specialities to their tasks are key to developing health tourism.
Zaidan, et al. (2015)	AHP and TOPSIS methods	This study aims to evaluate and select open-source EMR software packages using multi-criteria decision making. The study implemented different EMR software packages separately to better analyse the systems. Criteria were identified for the evaluation. The systems were ranked using TOPSIS and AHP methods. As a result, GNUmed and OpenEMR software provide a better basis for application than other open-source EMR software.
Taş et al. (2018)	AHP-TOPSIS methods	In this study, cardiovascular surgery outpatient clinics were evaluated using the Analytical Hierarchy Process (AHP) and TOPSIS methods. The criteria used to evaluate the hospital were hospital physician knowledge, cleanliness and physical conditions, general hospital knowledge, and hospital image, based on expert opinions and literature. The AHP method determined the criteria weights, and the TOPSIS method ranked them. As a result, the study identified the most appropriate hospital.

Rajak & Shaw (2019)	AHP and Fuzzy TOPSIS	In this study, the authors created a model for selecting mobile health applications using AHP and TOPSIS. The study concluded that two criteria are important in choosing mobile health applications. These two criteria are learning and usage, and information quality. The results are expected to help physicians and consumers choose the most appropriate mobile health application.
Yiğit (2019)	TOPSIS method	The study finds that training and research hospitals affiliated with the Ministry of Health perform better than hospitals in regions with smaller populations, staff, and bed counts. Approximately half of the A1 group hospitals affiliated with the Ministry of Health, in terms of number of facilities, beds, and staff, are located in Antalya, Istanbul, Ankara, and Izmir. The study finds that these hospitals produce fewer health service indicators per unit than other hospitals.
Değirmenci & Yakıcı-Ayan (2020)	Fuzzy Clustering Analysis and TOPSIS Method	This study analyses OECD countries using fuzzy clustering and the TOPSIS method based on key health indicators, allowing evaluation of health system performance both in grouped form (clusters) and through a ranking structure (TOPSIS). The findings show that Türkiye occupies a relatively weak position among OECD countries in terms of health resources.
Böker & Çetin (2020)	ABC-VED AHP and TOPSIS methods	This study uses the ABC-VED, AHP, and TOPSIS methods to classify stocks in the health sector. Using the ABC-VED method, which includes cost, consumption, and criticality criteria, we classified hospital drugs by both cost and criticality. In addition, we re-established the ABC-VED Matrix method using AHP and TOPSIS, adding a criterion related to supplier risk. Finally, we compare the results from the triple ABCVED method with the matrix results from the ABC-VED AHP and TOPSIS methods.
Mojtahedi et al. (2021)	TOPSIS method	In this study, the resilience of hospitals against crises and natural disasters is assessed using the TOPSIS method and the Hospital Security Index. The study evaluates regional preparedness and resilience levels and highlights the need to prioritise the most vulnerable hospitals through budget planning and resource allocation.
Akgün & Günay (2021)	TOPSIS, ELECTRE, MAPPAC, ORESTE and WSA	The study showed that among the components of intellectual capital in the healthcare services sector, human capital had the highest priority and was the strongest determinant of performance. The other components varied across the applied MCDM methods, but none were as influential as human capital, and their contribution to operational effectiveness was more limited.
Al-Awadh (2022)	Analytic Hierarchy Process (AHP)	The findings showed that reliability, assurance, and tangibles were the most influential factors for healthcare service quality and received the highest priority weights in the AHP model. The study concluded that improving these dimensions would most strongly affect overall patient satisfaction and perceived service quality.
Güler & Polatgil (2023)	Critic-TOPSIS method	In the study, university hospitals were evaluated by service and ranked using the weighted CRITIC and TOPSIS methods. As a result, the study identified Erciyes University as the closest to the ideal. The study identified three non-ideal universities. These universities were Bozok University Hospital, Kafkas University Hospital and Düzce University Hospital, respectively.
Fanaei et al. (2023)	TOPSIS method	The study evaluated 20 performance indicators used in human resource management. These performance indicators were evaluated according to the criteria of 'importance' and 'measurability in military hospitals. The Entropy method weighted the performance indicators, and the TOPSIS method analysed them. As a result, the study identified the performance indicators with the highest coefficients. These were: staff satisfaction index in military hospitals, salaries in military hospitals compared to the private sector, percentage of contracted labour cost in hospitals, and number of permanent staff in military hospitals.

The literature also includes studies using multi-criteria decision-making (MCDM) methods to evaluate financial performance in the healthcare sector. Both national and international studies have analysed the financial performance of hospitals, insurance companies, and the healthcare sector in general using MCDM approaches. In these studies, MCDM methods have sometimes been applied alone and sometimes alongside other analytical techniques. Table 3 summarises studies that evaluate the financial performance of healthcare institutions using MCDM methods.

Table: 3
Literature Summary on the Studies Using Multi-Criteria Decision-Making Methods in Health and Finance

Reference(s)	Methodology	Explanation
Balcı (2017)	TOPSIS	The study conducted a performance analysis using the TOPSIS method. The study analysed the financial performance of 27 state university hospitals included in the Court of Accounts Audit reports between 2014 and 2015 using eight ratios. As a result, the ranking of the highest- and lowest-performing university hospitals varies considerably over the years. However, during the study period, Atatürk University Hospital was among the three highest-performing hospitals, while Hacettepe University Hospital was among the three lowest-performing hospitals.
Avcı (2018)	TOPSIS	The study used balance sheet and income statement data from a training and research hospital for 2007-2014. The study calculated twelve ratios that provide information on the hospital's liquidity, financial structure, profitability, and operating performance. The TOPSIS method transformed these financial ratios into a single score indicating overall business performance, and the scores were tested for financial importance. According to the performance ranking, the most successful period was 2007 (closeness: 0.52) and the least successful period was 2010 (0.26).
Pourmohammadi et al. (2018)	Shannon Entropy for criteria weighting and Grey Relational Analysis (GRA)	The analysis showed that some countries had stable, sustainable health financing structures based on their financial indicators. Countries with weaker performance were characterised by insufficient health expenditures relative to income and unstable financing models.
Kar et al. (2019)	TOPSIS	The TOPSIS method evaluated the financial performance of all public oral and dental health centres operating in Tuürkiye based on financial ratios. As a result, the oral and dental health centre closest to ideal financial performance was the unit with ID number 1603530, followed by the unit with ID number 986730.
Bozdoğan & Odabas (2020)	ELECTRE multi-criteria decision-making method	The ELECTRE findings showed that some firms consistently outperformed others due to stronger liquidity, profitability, and operational efficiency indicators. High leverage levels and low profitability primarily characterised firms with weaker performance.
Yiğit (2020)	TOPSIS and Altman Z Score	In this study, the financial performance of the hospital services sub-sector (between 2009-2019) was analysed using the TOPSIS technique and Altman Z Score. The results show that the financial risk of the hospital services sub-sector has increased significantly in recent years, while financial success has decreased. The analysis produced similar results. Both TOPSIS and Altman Z Score analyses show that financial risk has increased and the sector's financial success has decreased in these years.

Erkılıç (2021)	Critic-based TOPSIS	The study used balance sheet and income statement data for the sector published by the Central Bank of the Republic of Türkiye. To measure financial performance, the study used 12 ratios as criteria and weighted them using the CRITIC method. The study used the TOPSIS method, and financial performance scores increased and decreased over the years. The highest performance was realised in 2009 (0.963), and the lowest in 2011 (0.115).
Akgün & Ahmadzadab (2022)	Entropy and TOPSIS	In the study, the financial performance criteria calculated from the annual financial statements were first weighted by the Entropy method. The study then obtained annual financial performance rankings using the TOPSIS method. According to the findings, SELEC in 2019, RTALB in 2020, and SELEC in 2021 had the best financial performance. MPARK had the lowest financial performance in all three years. RTALB was identified as the company whose financial performance increased during the COVID-19 pandemic.
Işıkçelik & Ağırbaş (2022)	Grey Relational Analysis (GRA)	The GRA results indicated that institutions with higher profitability, stronger liquidity, and more efficient resource utilisation achieved superior financial performance. Institutions with lower performance were largely affected by high debt ratios and heavier cost structures.
Akın & Aktan (2024)	Grey Relational Analysis (GRA) and Entropy	This study examines the financial performance of the public health system in Türkiye from 2015 to 2023. The study aims to identify financial performance trends using financial ratio analysis. The results indicate a weakening liquidity structure and increasing debt levels, particularly in the post-2020 period. These findings point to growing financial fragility in public health financing.

3. Research Methodology

This study used the Entropy-weighted TOPSIS method to evaluate the financial performance of the Ministry of Health of the Republic of Türkiye over time. The main reason for choosing this method is that TOPSIS is one of the most widely used and methodologically robust multi-criteria decision-making techniques in the literature for converting numerous heterogeneous financial ratios into a single composite performance indicator. Behzadian and colleagues' (2012) comprehensive review, covering 266 academic studies, revealed that TOPSIS is one of the most frequently applied methods for performance ranking in the fields of finance, health, and public administration. Methods such as AHP, ANP, or DEMATEL, which rely on expert judgments and pairwise comparisons, are not suitable for evaluating financial statement data published objectively at the ministry level. In contrast, the Entropy method, based on Shannon's (1948) information theory, determines criterion weights solely based on the amount of information contained in the data and is therefore considered one of the most reliable weighting techniques in the literature, free from subjective influences (e.g., Chen, 2019; Ersoy, 2022). In this regard, integrating Entropy and TOPSIS allows objective determination of criterion weights and numerical comparison of financial performance over the years based on proximity to the ideal solution. Thus, it provides a robust, reproducible, and methodologically consistent analytical framework aligned with similar studies in the literature.

3.1. Entropy Method

The entropy method is based on Shannon's (1948) information theory and determines criterion weights by measuring uncertainty in the data set. Criteria with low entropy values have higher information values and therefore receive higher weights, reducing subjective influence in the decision-making process (Yang et al., 2013; Qu et al., 2022). Over time, the method has been widely applied in fields such as engineering, finance, energy, and education, and it has gained acceptance for its flexibility and methodological robustness (Ersoy, 2022). In healthcare, entropy-based weighting has been used, particularly in studies evaluating the effectiveness and performance of hospitals and healthcare institutions. In this context, early applications by Balcı (2017) and Işıkçelik (2024) showed that the method produces objective, reliable weight estimates, providing a methodological basis for using the Entropy-Weighted TOPSIS approach to evaluate the financial performance of public health institutions. The entropy method consists of five basic steps: creating the decision matrix,

normalising the decision matrix, calculating the entropy values for the criteria, determining the degree of differentiation, and calculating the entropy criterion weights (Ayçin, 2019).

The literature describes the method in four main steps (Ulutaş, 2019). The criterion weights obtained at the end of these stages are applied to the TOPSIS method, enabling objective performance ranking.

Step 1: Constructing the decision matrix: Z_{ij} is the value of the i-th alternative for the j-th criterion. m represents the number of alternatives; n represents the number of criteria.

$$Z_{ij} = \begin{bmatrix} z_{11} & z_{12} & z_{13} \dots\dots\dots\dots & z_{1n} \\ z_{21} & z_{22} & z_{22} \dots\dots\dots\dots & z_{2n} \\ z_{31} & z_{32} & z_{33} \dots\dots\dots\dots & z_{3n} \\ z_{41} & z_{42} & z_{43} \dots\dots\dots\dots & z_{4n} \\ \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots \\ z_{m1} & z_{m2} & z_{m3} \dots\dots\dots & z_{mn} \end{bmatrix} \quad (1)$$

Step 2: Normalising the decision matrix: Normalisation calculation is done for the criteria according to their benefit and cost characteristics. Normalised values are expressed by r_{ij} .

$$r_{ij} = \frac{xij}{max_j\ (Z_{ij})} \quad (2)$$

$$r_{ij} = \frac{min_j\ (Z_{ij})}{Z_{ij}}, min_j\ (Z_{ij}) \neq 0 \quad (3)$$

The value of r_{ij} is normalised, and t_{ij} is found.

$$t_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}} \quad (4)$$

Step 3: Calculation of Entropy values: The Entropy values e_j for each criterion are calculated by the following equation.

$$e_j = - \frac{\sum_{i=1}^{m} t_{ij\, ln(t_{ij})}}{ln(m)} \quad (5)$$

Step 4: Determination of criteria weights (w_j):

$$w_j = \frac{1- e_j}{\sum_{j=1}^{n}(1- e_j)} \quad (6)$$

The criteria weights are transferred to the TOPSIS method.

3.2. TOPSIS Method and Application Areas

TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) is a multi-criteria decision-making (MCDM) method. Developed by Hwang and Yoon in 1981, this method helps decision-makers determine the most suitable option when there are numerous criteria and alternatives. TOPSIS provides an objective evaluation by ranking alternatives based on their distance from the ideal and negative ideal solutions. The method is widely used in many fields such as engineering, finance, supply chain management, and performance evaluation (Chen, 2000; Deng et al., 2000; Mikhailov, 2004). Kayalı and Aktaş (2018) state that the method consists of six steps.

Step 1: Creating the Decision Matrix: The first step in the TOPSIS method is creating the decision matrix (A matrix). In the decision matrix, alternatives are evaluated according to various criteria. In the decision matrix, m is the number of alternatives and n is the number of criteria.

$$A_{ij}=\begin{bmatrix} a_{11} & a_{12} & a_{13} \dots\dots\dots\dots & a_{1n} \\ a_{21} & a_{22} & a_{22} \dots\dots\dots\dots & a_{2n} \\ a_{31} & a_{32} & a_{33} \dots\dots\dots\dots & a_{3n} \\ a_{41} & a_{42} & a_{43} \dots\dots\dots\dots & a_{4n} \\ \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots \\ a_{m1} & a_{m2} & a_{m3} \dots\dots\dots & a_{mn} \end{bmatrix} \quad (7)$$

Step 2: Normalisation of the Decision Matrix: Normalise the decision matrix created in Step 1. Each alternative is normalised by dividing the square root of the relevant criterion by its sum. In the created normalized decision matrix, $\boldsymbol{r_{ij}}$ represents the normalized value.

$$r_{ij} = \frac{a_{ij}}{\sqrt{\sum_{i=1}^{m} a_{ij}^2}} \quad (8)$$

$$R_{ij}=\begin{bmatrix} r_{11} & r_{12} & r_{13} \dots\dots\dots\dots & r_{1n} \\ r_{21} & r_{22} & r_{22} \dots\dots\dots\dots & r_{2n} \\ r_{31} & r_{32} & r_{33} \dots\dots\dots\dots & r_{3n} \\ r_{41} & r_{42} & r_{43} \dots\dots\dots\dots & r_{4n} \\ \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots \\ r_{m1} & r_{m2} & r_{m3} \dots\dots\dots & r_{mn} \end{bmatrix} \quad (9)$$

Step 3: Weighting the Normalised Decision Matrix: In the third step, the criteria weights are determined and the weight values (w) are multiplied by the normalised matrix values. Here, $\boldsymbol{w_{ij}}$ denotes the weighted normalized matrix value.

$$w_{ij} = \begin{bmatrix} w_1\ r_{11} & w_2\ r_{12} & w_3\ r_{13} & \dots\dots\dots & w_n\ r_{1n} \\ w_1\ r_{21} & w_2\ r_{22} & w_3\ r_{23} & \dots\dots\dots & w_n\ r_{2n} \\ w_1\ r_{31} & w_2\ r_{32} & w_3\ r_{33} & \dots\dots\dots & w_n\ r_{3n} \\ w_1\ r_{41} & w_2\ r_{41} & w_4\ r_{43} & \dots\dots\dots & w_n\ r_{4n} \\ \dots & \dots & \dots & \dots\dots\dots & \dots \\ \dots & \dots & \dots & \dots\dots\dots & \dots \\ w_1\ r_{m1} & w_2\ r_{m2} & w_3\ r_{m4} & \dots\dots\dots & w_n\ r_{mn} \end{bmatrix} \quad (10)$$

Step 4: Determination of Ideal and Negative Ideal Solution: In this step, the positive ideal solution (A+) and the negative ideal solution (A-) are found.

$$A^{+} = \langle (max\ vij \mid j \in J), min\ vij \mid j \in J' \rangle \quad (11)$$

$$A^{-} = \langle (min\ vij \mid j \in J), max\ vij \mid j \in J' \rangle \quad (12)$$

In the formulas, J is the maximum value and J' is the minimum value.

A^{+} = ($v1^{+}$, $v2^{+}$, $v3^{+}$,….vn^{+}) (maximum values)

A^{-} = ($v1^{-}$, $v2^{-}$, $v3^{-}$,……..vn^{-}) (minimum values)

Step 5: Calculation of Distances to the Ideal and Negative Ideal Solution: In the fifth step, the distances of each alternative to the positive ideal (Si+) and negative ideal (Si-) solutions are calculated.

$$S_i^{+} = \sqrt{\sum_{J=1}^{n} (vij - vj^{+})^2}\ \text{i = 1, 2, 3, 4,……., m} \quad (13)$$

$$S_i^{-} = \sqrt{\sum_{J=1}^{n} (vij - vj^{-})^2}\ \text{i = 1, 2, 3, 4,……., m} \quad (14)$$

Step 6: Calculation of Relative Proximities and Ranking of Alternatives: In this step, the closeness is calculated for each alternative. Here, $\boldsymbol{C_i^j}$ indicates how close each alternative is to the best solution. The alternatives are ranked according to the relative closeness; the alternative with the highest relative closeness (highest C_i) is considered the best alternative.

$$C_i^{*} = \frac{Si^{+-}}{Si^{-} + Si^{*}}\ \text{i = 1, 2, 3, 4,……., m} \quad (15)$$

Since its development, the method has found wide application in research. In recent years, researchers have examined the application areas of the TOPSIS method in detail. Chen's 2019 and 2021 studies evaluated the effects of weighting and normalisation techniques on TOPSIS results. Behzadian and colleagues (2012) analysed 266 articles that used the TOPSIS method and found that the method was successfully used in a wide range of applications and industrial sectors, but was less preferred for interdisciplinary and social decision-making problems.

Similarly, Corrente and Tasiou's 2023 study examined studies using the TOPSIS method between 1981 and 2023. The review found that TOPSIS applications were quite limited in areas such as human resource management, health and medical problem analysis, environmental issues, risk management, agricultural problems, renewable energy, and waste management. Furthermore, the study emphasised that dependencies or interactions between criteria were not sufficiently integrated into the TOPSIS method and that this methodological shortcoming is an important issue that needs to be addressed in the literature.

Chen's 2019 and 2021 studies also mention the Modified TOPSIS approach, which includes some adjustments or alternative techniques in addition to the classic TOPSIS method. In this method, adjustments such as recalculating weights or considering relationships between criteria can evaluate alternatives more accurately. Chakraborty (2022), in his study comparing classical TOPSIS and modified TOPSIS, showed that TOPSIS provides an accurate weight-combination process and that both methods can be used effectively to solve customer relationship management (CRM) problems.

The study utilised 13 financial ratios derived from the Ministry of Health's balance sheet and activity results tables for the period 2015-2023. Three main reasons explain the selection of the 2015-2023 period. First, starting in 2015, the Ministry of Health's Balance Sheet and Activity Results tables began to be published regularly, completely, and in a comparable format. The accessibility and comparability of tables for years before 2015 vary from year to year. This makes a methodologically consistent, multi-year analysis difficult. For this reason, the study has taken 2015 as its starting point. Second, the period after 2015 encompasses policy and structural developments that have significantly affected the financial framework of the Turkish healthcare system, such as the proliferation of city hospitals, changes in the structure of healthcare expenditures, a significant increase in the Ministry's budget, and the financial impacts of the COVID-19 pandemic. Therefore, the selected period provides a critical window for comprehensively assessing changes in the Ministry's financial performance. Third, including 2023 ensures the analysis uses the most up-to-date data. This allows for an assessment of current financial trends and policy implications from a contemporary perspective. A standard decision matrix was created for the Ministry's financial ratios and analysed using the Entropy Weighted TOPSIS method to obtain the financial performance ranking for the specified years. The study data were obtained from the Ministry of Health's Strategy Development Directorate website. Balance Sheets and Income Statements for the relevant years were used as a basis, and calculations were performed using Microsoft Office Excel. The 13 financial ratios used in the study are based on key indicators commonly used in the literature on the financial performance of public health institutions. Previous studies evaluating the financial performance of university hospitals, public hospitals, and the health sector have used similar liquidity, operating efficiency, capital structure, and profitability ratios (Dayı & Akdemir, 2013; Çil-Koçyiğit & Kocakoç, 2021; Balcı, 2017; Yiğit, 2020; Erkılıç, 2021). The main reason for selecting these ratios is the structure of the financial data disclosed to the public at the Ministry level. The Ministry of Health only publishes consolidated Balance Sheet and Income Statement tables. At the Ministry level, it is not possible to calculate micro-level performance indicators such

as inventory turnover, operating profit margin, cost ratios, depreciation-based indicators, or performance measures adjusted for service volume. Therefore, the analysis is limited to 13 ratios that can be reliably derived from the Ministry's financial statements and best reflect its macro-level financial position.

Additionally, the selected ratios represent the four fundamental dimensions policymakers and researchers widely use to assess the financial sustainability of public health authorities. (1) Short-term payment capacity (liquidity), (2) financial independence and debt structure (capital structure), (3) efficiency in the use of assets (operating efficiency), and (4) long-term sustainability of healthcare service delivery (profitability). This conceptual framework is well established in the literature, and the ratios used in the study align with methodological approaches proposed in previous research. Therefore, the selected ratios are the most appropriate, literature-supported indicators for assessing the Ministry of Health's macro-level financial performance. Table 4 presents the financial ratios and formulas used in the study. The analysis excludes other financial ratios such as inventory turnover, operating profit margin, net working capital ratio, debt coverage ratios, and cost-based measures for methodological reasons. First, some alternative ratios show a high degree of conceptual or statistical overlap with the selected indicators, and adding them would cause multicollinearity problems, weakening the discriminatory power of the TOPSIS method. Furthermore, some of these ratios are better suited to micro-level assessments at the institutional or hospital level and have limited capacity to explain the Ministry's macro-level financial structure. For these reasons, the model includes 13 ratios that most comprehensively represent the Ministry's liquidity, operating efficiency, financial structure, and profitability dimensions.

Table: 4
Financial Ratios, Formulas, and Direction Statuses Used in the Study

Abbreviation	Ratio Name	Formula	Direction Status
O1	Current ratio	Current Assets / Short-term Liabilities	Max
O2	Assist Test Ratio	(Current Assets - Inventories) / Short-term Liabilities	Max
O3	Cash Ratio	Cash and Cash Equivalents Assets / Short-term Liabilities	Max
O4	Receivables Turnover	Net Sales / Trade Receivables	Max
O5	Asset Turnover	Net Sales / Total Assets	Max
O6	Current Assets Turnover	Net Sales / Current Assets	Max
O7	Financial Leverage Ratio	Foreign Liabilities / Total Liabilities	Min
O8	Shareholders' Equity Ratio	Shareholders' Equity /Total Assets	Max
O9	Financing Rate	Shareholders' Equity / (Short-term Foreign Liabilities + Long-term Foreign Liabilities)	Min
O10	Short-Term Liabilities Ratio	Short-term Foreign Liabilities /Total Assets	Min
O11	Long-Term Liabilities Ratio	Long-term Foreign Liabilities /Total Assets	Min
O12	Profitability Ratio	Net Profit / Total Assets	Max
O13	Return on Equity Ratio	Net Profit / Shareholders' Equity	Max

In the TOPSIS method, each criterion is assigned a positive (benefit) or negative (cost) direction. Accordingly, high values are preferred for positive criteria, while low values are preferred for negative criteria (Chen, 2000). The study determined the positive (benefit) and negative (cost) directions for the financial ratios used and presents them in Table 4. As positive ratios increase, the Ministry's financial performance improves; as negative ratios increase, financial performance weakens.

This study examined how changes in weights affect the ranking to evaluate the model's sensitivity. The sensitivity analysis measured how much the ranking changed at each level of adjustment by increasing the weights by 5%, 10%, and 20%. During this process, we calculated the sensitivity index after each change and evaluated the model's stability and reliability. The analysis revealed the model's overall stability by examining its sensitivity to small changes and its response to large changes. The findings indicate that the model produces reliable results. The effect of 5% and 10% changes on the ranking was limited; the sensitivity index ranged between 0.10 and 0.19. These values show that the model is moderately sensitive and that the ranking remains largely stable under small changes. On the other hand, the sensitivity index of 0.37 for a 20% change indicates that the ranking fluctuates moderately but remains within acceptable limits. These results show that the model is reliable and that weight variability does not significantly disrupt the ranking. In conclusion, the model's sensitivity is acceptable, and the rankings are reliable and stable.

4. Results

Step 1: Creating the Decision Matrix

In multi-criteria decision-making methods, the first stage involves creating a decision matrix. In the criteria section of the decision matrix, the financial analysis ratios are listed in columns, and the years constituting the alternatives are listed in rows. We used the Balance Sheet and Financial Status tables on the Ministry of Health website, Presidency of Strategy Development, to calculate the determined ratios, and we created the Standard Decision Matrix in Table 5.

Table: 5
Decision Matrix (A)

Years	O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13
2015	0,15626	0,10772	-0,02434	62,96362	0,00011	0,01060	0,06364	0,93636	14,71229	0,06364	0,00000	-0,18664	-0,19932
2016	0,27174	0,20826	0,00689	8,09309	0,00002	0,00171	0,03934	0,96066	24,42028	0,03422	0,00512	-0,18191	-0,18936
2017	4,21753	1,39586	0,08780	4,37408	0,00003	0,00027	0,18222	0,81778	4,48776	0,02331	0,15892	-0,50062	-0,61218
2018	6,79532	3,84771	1,80063	1,73226	0,00013	0,00109	0,25100	0,74900	2,98403	0,01696	0,23405	-1,05316	-1,40610
2019	4,84377	2,43060	0,51385	1,09770	0,00010	0,00076	0,35028	0,64972	1,85489	0,02717	0,32311	-1,95109	-3,00295
2020	1,90857	0,86891	0,30329	1,07960	0,00009	0,00043	0,71587	0,28413	0,39690	0,10340	0,61247	-2,27393	-8,00316
2021	4,98847	5,55778	0,29216	1,32228	0,00006	0,00020	0,34620	0,65380	1,88852	0,06205	0,28415	-1,47583	-2,25731
2022	2,12583	11,76778	0,15205	4,19231	0,00010	0,00038	0,24494	0,75506	3,08266	0,12317	0,12176	-2,00656	-2,65748
2023	1,78996	21,16131	0,10155	5,96886	0,00004	0,00044	0,15046	0,84954	5,64608	0,05106	0,09941	-1,24091	-1,46069

Table 5 shows that liquidity indicators O1 and O2 increased markedly in 2017-2018, while O4 (Receivables Turnover) declined sharply after 2015. O7 (Financial Leverage) reached its highest level in 2020, indicating greater reliance on external financing that year. Profitability indicators O12 and O13 remain negative across all years and deteriorate further between 2019 and 2022. Overall, the findings show notable fluctuations in liquidity, collection performance, and profitability indicators throughout 2015-2023.

Step 2: Creating the Normalised Decision Matrix

The decision matrix values are normalised to enable comparison across criteria. With the normalisation formula, the value of each alternative with respect to a particular criterion

is divided by the square root of the sum of the squares of the values of that criterion for all alternatives. This standardises the criterion values between 0 and 1.

Table: 6
Normalised Decision Matrix (R)

Years	O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13
2015	0.0	0.0	0.0	1.0	0.81923	1.0	0.96407	0.96407	0.40411	0.56045	1.0	0.99774	0.99873
2016	0.01739	0.00478	0.01712	0.11333	0.0	0.14438	1.0	1.0	0.0	0.8375	0.99164	1.0	1.0
2017	0.61172	0.06118	0.06145	0.05324	0.09469	0.00598	0.7888	0.7888	0.82971	0.94019	0.74054	0.84765	0.94589
2018	1.0	0.17764	1.0	0.01055	1.0	0.08484	0.68714	0.68714	0.89231	1.0	0.61787	0.58354	0.84428
2019	0.70605	0.11033	0.29491	0.00029	0.77092	0.05353	0.5404	0.5404	0.93931	0.90384	0.47246	0.15432	0.63992
2020	0.26394	0.03615	0.17953	0.0	0.63297	0.02179	0.0	0.0	1.0	0.18618	0.0	0.0	0.0
2021	0.72785	0.25887	0.17343	0.00392	0.43388	0.0	0.54642	0.54642	0.93791	0.57547	0.53606	0.3815	0.73535
2022	0.29666	0.55383	0.09666	0.0503	0.76497	0.01688	0.6961	0.6961	0.8882	0.0	0.80119	0.1278	0.68413
2023	0.24607	1.0	0.06898	0.07901	0.21945	0.02227	0.83574	0.83574	0.7815	0.67895	0.83769	0.49379	0.8373

Table 6 shows that the normalised values of O1 and O3 reach their highest levels in 2018, while O2 reaches its maximum in 2023. O4 (Receivables Turnover) stands out only in 2015 with a normalised value of 1.0, followed by a marked decline in subsequent years. O7 and O8 reach their highest normalised values in 2016, but both drop to near-zero levels in 2020. Profitability indicators such as O12 and O13 display consistently low normalised values across all years, reflecting a persistent weakness in profitability. Overall, the table indicates considerable variation among the criteria over time, with 2015 and 2018 demonstrating relatively stronger performance across several indicators.

Step 3: Weighting the Normalised Decision Matrix with the Entropy Method

Before constructing the weighted normalised matrix, the Entropy method is applied to determine the objective weight of each financial criterion. This method measures variability among the criteria and assigns higher weights to indicators with greater discriminatory power across the years. Table 7 presents the weight values obtained through the Entropy method.

Table: 7
Weight Values of Criteria Determined by the Entropy Method

Criteria	Weight Value
O1	0.02936
O2	0.06570
O3	0.05767
O4	0.13787
O5	0.04229
O6	0.12912
O7	0.06556
O8	0.06556
O9	0.11639
O10	0.06847
O11	0.06581
O12	0.04757
O13	0.10862

An examination of Table 7 shows that O4 (Receivables Turnover) has the highest weight (0.13787), indicating that it is the most influential criterion in differentiating the

Ministry's financial performance across years. O6 (Current Assets Turnover) and O9 (Financing Rate) also have relatively high weights, suggesting that asset utilisation and financing structure are key determinants of overall performance. In contrast, O1 (Current Ratio) and O5 (Asset Turnover) have the lowest weights, reflecting their limited variability within the Ministry's financial structure. Overall, the results imply that performance assessments should place greater emphasis on criteria such as O4, O6, O9, and O13, which contribute most strongly to distinguishing financial outcomes.

Using the normalised decision matrix and the criterion weights obtained through the Entropy method, we constructed the weighted normalised decision matrix. This step integrates each criterion's relative importance into the analysis, allowing a more accurate assessment of annual financial performance. Table 8 presents the weighted normalised values for each criterion across the years.

Table: 8
Weighted Normalized Decision Matrix (V_{ij})

Years	O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13
2015	0.0	0.0	0.0	0.13787	0.034645	0.12912	0.063204	0.063204	0.047034	0.038374	0.06581	0.047462	0.108482
2016	0.000511	0.000314	0.000987	0.015625	0.0	0.018642	0.06556	0.06556	0.0	0.057344	0.06526	0.04757	0.10862
2017	0.01796	0.00402	0.003544	0.00734	0.004004	0.000772	0.051714	0.051714	0.09657	0.064375	0.048735	0.040323	0.102743
2018	0.02936	0.011671	0.05767	0.001455	0.04229	0.010955	0.045049	0.045049	0.103856	0.06847	0.040662	0.027759	0.091706
2019	0.02073	0.007249	0.017007	0.00004	0.032602	0.006912	0.035429	0.035429	0.109326	0.061886	0.031093	0.007341	0.069508
2020	0.007749	0.002375	0.010353	0.0	0.026768	0.002814	0.0	0.0	0.11639	0.012748	0.0	0.0	0.0
2021	0.02137	0.017008	0.010002	0.00054	0.018349	0.0	0.035823	0.035823	0.109163	0.039402	0.035278	0.018148	0.079874
2022	0.00871	0.036387	0.005574	0.006935	0.032351	0.00218	0.045636	0.045636	0.103378	0.0	0.052726	0.006079	0.07431
2023	0.007225	0.0657	0.003978	0.010893	0.009281	0.002876	0.054791	0.054791	0.090959	0.046488	0.055128	0.02349	0.090948

Table 8 shows that indicators O4 (Receivables Turnover Ratio) and O6 (Current Assets Turnover Ratio) reached their highest weighted values in 2015. This indicates stronger performance in collection efficiency and asset utilisation efficiency in 2015. The O9 (Financing Ratio) indicator reached its maximum value (0.11639) in 2020, revealing a significant change in the Ministry's financing structure that year. O2 (Acid-Test Ratio) achieved its highest weighted value in 2023 (0.06570). In contrast, profitability indicators such as O12 and O13 have relatively low weighted values in most years. Overall, the table shows significant differences in financial performance throughout the period, and 2015, 2018, and 2020 stand out under different criteria.

Step 4: Identifying Positive and Negative Ideal Solutions

The positive ideal solution is the highest normalised and weighted value for each criterion; the negative ideal solution is the lowest normalised value for each criterion. Table 9 presents these values.

Table: 9
Positive Ideal (A+) and Negative Ideal (A-) Solutions

	O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13
(A^+)	0.02936	0.0657	0.05767	0.13787	0.04229	0.12912	0.06556	0.06556	0.11639	0.06847	0.06581	0.04757	0.10862
(A-)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 9 shows that the positive ideal solution (A^+) represents the highest weighted normalised value for each criterion. In contrast, the negative ideal solution (A^-) is equal to zero for all criteria. This situation stems from the minimum value for each criterion being zero in the weighted normalised decision matrix (Table 8). Therefore, the TOPSIS methodology assigns a negative ideal value of 0 for all indicators. The relatively high A^+ values for criteria such as O4, O6, and O9 indicate that these indicators have stronger discriminatory capacity in evaluating the Ministry's financial performance. These reference points form the basis for calculating the distances to the positive and negative ideal solutions for each year in the next stage.

Step 5: Determining the Distance of Alternatives to Ideal Solution and Negative Ideal Solution

At this stage, the distance of each alternative from the positive ideal solution (S^+) and the negative ideal solution (S^-) was calculated using the weighted normalised matrix with A^+ and A^- values. This process determines each year's relative position based on its best and worst possible financial performance outcomes. The S^+ and S^- distances calculated for each year are presented in Table 10.

Table: 10
Distance to Ideal Solution and Negative Ideal Solution Points

YEAR	S_i^+	S_{i-}
O1	0.11954	0.258663
O2	0.225674	0.175493
O3	0.207395	0.183841
O4	0.194424	0.191315
O5	0.213149	0.161328
O6	0.26835	0.120857
O7	0.214713	0.158658
O8	0.214657	0.16038
O9	0.197209	0.18138

Table 10 shows that 2015 is the year closest to the positive ideal solution, with the lowest S^+ value (0.11954) and the highest S^- value (0.258663) among the analysed years. This finding indicates that 2015 demonstrated the strongest overall financial performance among the years analysed. In contrast, 2020 has the highest S^+ value (0.26835) and the lowest S^- value (0.120857); therefore, it is identified as the alternative furthest from the positive ideal solution and is evaluated as the weakest year in terms of financial performance. The fact that the S^+ and S^- values for other years are clustered closer together indicates that performance was more balanced and moderate during these years. These distance values form the basis for calculating proximity coefficients in the next stage.

Step 6: Determining the Distance of Alternatives to the Ideal Solution and Ranking the Alternatives

In this step, the closeness coefficient (C*) indicating the proximity of each alternative (year) to the positive ideal solution was calculated. The C* value reflects how close a given year is to the ideal financial performance, with values approaching 1 indicating stronger

performance. Using these coefficients, the years were ranked from the highest to the lowest financial performance. Table 11 presents the C* values for each year along with the final performance ranking.

Table: 11
Distance of Alternatives to the Ideal Solution and Ranking of Alternatives

Years	C*	Ranking
2015	0.683926	1
2016	0.49597	2
2017	0.479095	3
2018	0.469898	4
2019	0.437456	5
2020	0.430809	6
2021	0.427638	7
2022	0.424934	8
2023	0.310521	9

Table 11 shows that the year 2015 (C* = 0.683926), which has the highest proximity coefficient, is the alternative closest to the positive ideal solution and demonstrates the strongest financial performance during the analysis period. 2016 (C* = 0.49597) and 2017 (C* = 0.479095) rank second and third, respectively, indicating relatively stable and balanced financial performance. In contrast, 2023 has the lowest proximity coefficient (C* = 0.310521) and ranks lowest in terms of financial performance. These findings show significant fluctuations in financial performance across years, with 2015 standing out as the period with the strongest overall performance.

5. Discussion

In this study, the financial performance of the Ministry of Health for 2015-2023 was analysed using the Entropy and TOPSIS methods, and the years were ranked from most to least successful. The analysis used 13 financial ratios. The results indicate differences in financial performance across the years, mainly driven by fluctuations in liquidity, profitability, leverage, and efficiency indicators. The year 2015 ranked first with the highest closeness coefficient (C* = 0.6839) and was identified as the most financially successful year. The main determinants of financial success in this period were a high receivables turnover ratio, effective use of current assets, a strong equity ratio, and relatively favourable return on equity. This result suggests that macroeconomic conditions were stable in 2015 and that resource management was maintained effectively (TÜİK, 2016).

The year 2016 (C* = 0.49597) was ranked second in terms of financial performance. Key factors contributing to financial success in this period included improved asset turnover, higher current asset turnover, and a financing ratio maintained at a reasonable level. From a national perspective, 2016 was marked by economic uncertainty in Türkiye. Nevertheless, the Ministry of Health maintained budgetary control, and short-term assets contributed positively to financial performance. In addition, the financing ratio gradually increased during this period, indicating weaker financial independence and greater reliance on external resources.

The year 2017 (C* = 0.479095) was ranked third in the financial performance evaluation. In 2017, liquidity indicators such as the acid-test ratio and cash ratio were relatively stronger than in other years. However, equity and leverage ratios remained moderate. Although economic activity slowed, financial stability was preserved. By contrast, weak profitability indicators limited the overall performance score for 2017.

The year 2023 ranked last with the lowest closeness coefficient (C* = 0.310521). While certain liquidity indicators showed partial resilience, this was not enough to ensure overall financial success. The year 2023 can be characterised by high inflation, increasing budget deficits, rising borrowing needs, and weakened financial leverage. These factors are considered to have played a significant role in the weak financial performance observed in 2023 (TÜİK, 2023). The conditions described negatively affect the long-term sustainability of health expenditures and increase financial risks.

The year 2020 also showed low performance and ranked just above 2023 (C* = 0.430809). The main reasons for this decline are the sharp decline in receivables turnover, increased financial leverage, and rising financing rates. The COVID-19 pandemic created an extraordinary financial burden on the Ministry due to increased healthcare expenditures, additional personnel costs, and extraordinary transfers to the Social Security Institution (Kıymık & Karaçayır, 2024).

Overall, the findings indicate that 2015 was the best-performing period, while 2023 and 2020 stood out as periods of significant financial pressure. High-performance years were characterised by effective use of current assets, strong collection performance, and healthier equity structures. In contrast, low-performance years were marked by increased indebtedness, declining financial activity, and extraordinary expenditures related to macroeconomic shocks and public health crises.

The financial performance of the Ministry of Health of the Republic of Türkiye for the period 2015-2023 presents a mixed picture, with significant achievements alongside serious challenges. On the one hand, the health budget increased nominally during this period; large-scale investments such as city hospitals were financed, and an unforeseen global crisis such as COVID-19 was managed (Eriçok, 2023). Per capita health expenditure reached 7,141 TL in 2022, a marked increase from previous years that indicates expanded access to health services (TÜİK, 2023). Meanwhile, high inflation, the depreciation of the Turkish lira, and rising borrowing needs have undermined financial sustainability (Yöyen, 2023). As seen in city hospitals, strategic policy choices create long-term financial burdens on the health budget (Yeşiltaş, 2020). Furthermore, the growing deficits of the Social Security Institution (SGK) indicate that the health system's overall financing structure needs reassessment. Although the Ministry is attempting to increase the appeal of public service through initiatives such as the "White Reform" launched in 2022, which aims to improve the professional and financial rights of healthcare workers (Akay & Yaltagil, 2024), it must simultaneously maintain fiscal discipline.

A review of the literature reveals numerous studies analysing the financial performance of public hospitals. However, no research directly examines the Ministry of Health's financial performance at the institutional level on an annual basis. Therefore, the findings obtained at the Ministry level are compared with the literature through studies conducted at the health sector and sub-sector (public hospitals, hospital unions) levels, rather than through direct institutional studies. In this respect, the current study contributes to the literature as one of the first analyses based on the Ministry's central budget, rather than focusing on hospital-level indicators. For example, Sonğur et al. (2016) examined the financial performance of hospitals affiliated with Public Hospital Associations between 2008 and 2015 and noted an improvement after 2012. This finding is consistent with our study, which identified 2015 as the year with the highest performance.

Koçyiğit and Kocakoç (2019) examined public hospitals in Ankara and identified a partial improvement in financial performance after 2012. The authors attributed this improvement to the Public Hospital Unions structure implemented between 2011 and 2016, which aimed to provide hospitals with administrative and financial autonomy. Similarly, Babacan and Akça (2024), in their analysis of public hospitals in Türkiye for 2016-2020, identified structural vulnerabilities in financial structure, liquidity, and indebtedness indicators; they showed limited improvement in 2016-2017, but deterioration became apparent after 2018. These findings are consistent with the relatively strong performance observed in our study for 2015-2017.

Our study found that 2015 was the best-performing year and 2023 the weakest, consistent with findings in the literature. Yiğit (2020) reported that 2018 was the weakest period financially in the hospital services sub-sector. Işıkçelik (2024) stated that private hospitals performed relatively well in 2016-2018 but declined after 2019. Taken together, these results suggest 2015 was a peak period, followed by a steady decline through 2023, reflecting broader financial vulnerabilities in the healthcare sector.

Karaçadır (2025) identified 2023 as the most profitable period for the private health sector; however, this finding does not extend to the public sector. In contrast, the present study indicates that 2023 was a financially challenging period for public hospitals, reflecting structural differences between public and private healthcare systems. These findings align with the literature, suggesting that direct comparisons between the two sectors should be interpreted with caution because of differences in financial structures, institutional responsibilities, and funding mechanisms. Future studies that comparatively examine the financial performance of public and private hospitals may contribute to the literature by providing evidence to support the development of sustainable hospital financing systems.

The effects of the pandemic years (2020-2021) have produced mixed results in the literature. Başaran and Özdemir (2022) reported that the pandemic period had a positive financial impact on private hospitals in the hospital services sub-sector. In contrast, the current study found a significant decline in the Ministry of Health's financial performance in 2020. This difference stems from the different roles that institutions assumed during the

pandemic. While hospitals increased revenue due to higher service demand, the Ministry faced an additional budget burden from public responsibilities such as vaccine procurement, additional payments to healthcare personnel, and medical supply procurement. Kabak and Yurttadur (2023) identified 2021 as the year with the best performance for the hospital sector; however, in this study, the Ministry's performance in the same year is relatively low. This difference reflects the functional distinctions between the two levels. Since the study focuses on university hospitals, whose financing model differs significantly from that of public hospitals, the findings cannot be directly generalised to the Ministry level.

Dayı and Akdemir (2013) determined that liquidity management in public hospitals in Kastamonu was weak and debt repayment capacity was limited. This finding supports the notion that the liquidity deterioration and increase in indebtedness observed after 2020 in this study reflect a broader and more systematic situation. Aydemir (2018) identified high long-term borrowing, weak equity structure, and low profitability in the hospital services sector. This aligns with the Ministry's poor financial performance in 2023 and points to macro-level fragility. Similarly, Durmuş and Durmuş (2023) showed that rising short-term debt, cash shortages, and excessive inventory investments weakened the financial position of a public university hospital; this trend parallels the decline observed in our study after 2018. Ekinci and Bakır (2021) revealed that collection and debt management were ineffective in a Class A1 branch hospital. This situation suggests that the collection problems that became more apparent in Ministry data after 2020 may reflect a structural weakness. Taken together, these studies suggest that the financial vulnerabilities observed at the hospital level may explain changes in the Ministry's financial performance.

The financial ratios used in this study indicate that declining collection rates and rising debt indicators have exerted considerable pressure on public health financing. However, interpreting these findings requires considering structural factors discussed in the literature that lie beyond the empirical scope of the present study. Previous studies and Court of Accounts reports highlight that delays in reimbursements from the Social Security Institution (SGK), uncollectible receivables from foreign patients, and irregularities in revolving fund revenues weaken hospital-level cash flow. In addition, various audit reports published by the Court of Accounts (2022) emphasise that city hospitals impose an additional burden on the public budget through long-term rent and service payments. Similarly, Babacan and Akça (2024) report increasing indebtedness, deteriorating liquidity, and persistent collection problems in public hospitals. These literature-based findings align with the liquidity deterioration and rising debt ratios observed in our study for 2020-2023 and point to broader structural fragilities affecting the Ministry's financial performance. Nevertheless, because city hospital liabilities and the SGK financing model could not be included as independent variables in the study's dataset, these effects cannot be tested causally and are therefore discussed only in the context of the existing literature.

The financial performance trends observed in this study suggest a gradual weakening in the public health system over the 2015-2023 period. These trends are generally consistent with assessments reported in hospital-level studies, sector reports, and official audit

documents. In particular, 2015's comparatively stronger position and 2023's comparatively weaker position may reflect macroeconomic developments and the structure of public health expenditures. In addition, the literature indicates that differences in financial performance between the public and private health sectors became more pronounced in the post-pandemic period.

6. Conclusion

This study evaluated the Ministry of Health's financial performance during 2015-2023 using the entropy-based TOPSIS method and presented a multi-year analysis at the ministry level. The findings suggest that 2015 had the strongest financial performance, while 2023 had the weakest. The main reasons for these fluctuations include slower collection rates, rising short-term liabilities, weakening liquidity indicators, and declining operational efficiency. Taken together, these dynamics highlight the sensitivity of public health financing to macro-level financial pressures. The results reveal that collection processes, debt obligations, and cash flow must be managed more systematically to maintain a stable public health financing structure. Furthermore, the analysis shows that the most critical ministry-level financial indicators are collection performance, current ratio, debt structure, and operating profitability, while some indicators, such as inventory turnover, have limited policy value at the macro level.

Based on these findings, the Ministry developed several operational recommendations. First, to strengthen collection management, the Directorate General of Financial Services and Revolving Fund should establish a standard monitoring system covering all hospitals. Generate monthly hospital-level collection reports and conduct regular reconciliation with the Social Security Institution (SGK) and other stakeholders. Second, to manage short-term borrowing pressure, the General Directorate of Budget and Financial Management should prepare a debt restructuring and cash-planning program that clearly defines spending priorities and payment schedules. To improve cash management, the Strategy Development Department should update its revenue-expenditure forecasting models, expand e-invoicing and early collection practices, and develop mechanisms to shorten cash conversion cycles. Implement measures to reduce short-term spending pressure to strengthen liquidity, and establish monthly liquidity monitoring panels by evaluating early payment incentives. Additionally, the General Directorate of Financial Services and the General Directorate of Health Information Systems will develop a joint digital receivables management project to ensure regular report production and centralised monitoring of collection processes. Linking these steps to a specific timeline and reporting progress every three months will support more predictable, stable financial performance.

Since the dataset used in this study consists solely of the Ministry's macro-level financial indicators, elements such as obligations related to city hospitals or the SGK financing model could only be discussed within the framework of the existing literature. Future research should focus on comparative analyses covering the Ministry, university hospitals, and public hospitals; detailed examination of operational processes affecting

collection management and cash conversion; and applications evaluating the impact of different multi-criteria decision-making methods on performance outcomes. Within these constraints, the study not only offers concrete recommendations for strengthening financial stability but also establishes a solid methodological foundation for future research.

References

Akay, A.C. & E. Ilıman-Yaltagil (2024), "Sağlık Çalışanlarının Beyaz Reform ile Gelen Ek Ödeme Sistemi Hakkında Görüşleri ve Adalet Algıları", *Uluslararası Sosyal Bilimler Akademi Dergisi*, (15), 295-315.

Akgün, A. & A. Ahmadzadab (2022), "COVİD 19 Salgını Döneminde Borsa İstanbul'da İşlem Gören İlaç Firmalarının Finansal Performanslarının Analizi", *Muhasebe ve Finans İncelemeleri Dergisi*, 5(2), 97-114.

Akgün, A.İ. & B. Günay (2021), "Entelektüel Sermaye Etkinliğinin Önceliklendirilmesinde Çok Kriterli Karar Verme Modellerinin Kullanılması: Bir Sağlık Hizmetleri Sektörü Örneği", *Sosyoekonomi*, 29(47), 337-365.

Akın, H. & T. Aktan (2024), "Gri İlişkisel Analiz ve Entropi Yöntemiyle Halka Açık Sağlık Kuruluşlarının Finansal Performanslarının Analizi", *Sosyoekonomi*, 32(62), 293-312.

Al Awadh, M. (2022), "Utilizing Multi-Criteria Decision Making to Evaluate the Quality of Healthcare Services", *Sustainability*, 14(19), 12745.

Altan, İ.M. & C. Akça (2024), "Is There A Relationship Between Financial Performance And Health Services Performance? Evidence From Selected Countries", *Alanya Akademik Bakış*, 8(1), 300-309.

Avcı, K. (2018), "Ankara İl Merkezindeki Bir Eğitim ve Araştırma Hastanesinin Finansal Performansının TOPSIS Yöntemi ile Değerlendirilmesi", *İşletme Bilimi Dergisi*, 6(2), 25-44.

Ayçin, E. (2019), *Çok Kriterli Karar Verme: Bilgisayar Uygulamalı Çözümler*, Ankara: Nobel Yayıncılık.

Aydemir, İ. (2018), "Hastanelerde Finansal Performansın Değerlendirilmesi: Türkiye Cumhuriyeti Merkez Bankası Hastane Hizmetleri Sektör Bilançolarında Bir Uygulama", *Uluslararası Sağlık Yönetimi ve Stratejileri Araştırma Dergisi*, 4(2), 133-149.

Babacan, A. & N. Akca (2024), "Kamu Hastanelerinin Finansal Performansının Oran Analizi ile Değerlendirilmesi: Türkiye Örneği", *Muhasebe ve Finansman Dergisi*, (101), 21-44.

Balcı, N. (2017), "TOPSIS Tekniği ile Finansal Performans Analizi: Türkiye'deki Devlet Üniversitesi Hastanelerinin Örnek Bir İncelemesi", *Yönetim ve Ekonomi Araştırmaları Dergisi*, 15(1), 155-176.

Başaran, G. & M. Özdemir (2022), "Türkiye'de Hastane Hizmetleri Sektöründeki Firmaların Finansal Performanslarının Covid-19 Dönemiyle Birlikte Oran Analizi ve Waspas Yöntemi ile Belirlenmesi", *Social Mentality And Researcher Thinkers Journal*, 8(59), 887-901.

Behzadian, M. et al. (2012), "A State-Of The-Art Survey of TOPSIS Applications", *Expert Systems with Applications*, 39(17), 13051-13069.

Bozdoğan, C. & A. Odabaş (2020), "Analysis of Financial Performances of Hospital Services Subsector by ELECTRE Method", *New Challenges in Accounting and Finance*, 3, 29-39.

Böker, Z. & O. Çetin (2020), "Sağlık Sektöründe ABC-VED AHP ve TOPSIS Yöntemleri Kullanılarak Çok Kriterli Stok Sınıflandırması", *Öneri Dergisi*, 15(53), 178-208.

Chakraborty, S. (2022), "TOPSIS and Modified TOPSIS: A Comparative Analysis", *Decision Analytics Journal*, 2, 100021.

Chen, C.T. (2000), "Extensions of the TOPSIS for Group Decision-Making Under A Fuzzy Environment", *Fuzzy Sets and Systems*, 114(1), 1-9.

Chen, P. (2019), "Effects of Normalization on The Entropy-Based TOPSIS Method", *Expert Systems with Applications*, 136, 33-41.

Chen, P. (2021), "Effects of The Entropy Weight on TOPSIS", *Expert Systems with Applications*, 168, 114186.

Corrente, S. & M. Tasiou (2023), "A Robust TOPSIS Method For Decision Making Problems With Hierarchical and Non-Monotonic Criteria", *Expert Systems with Applications*, 214, 119045.

Çil-Koçyiğit, S. & N. Kocakoç (2021), "Ankara İli Kamu Hastanelerinin 2008-2017 Dönemi Finansal Performans Analizi", *İşletme Araştırmaları Dergisi*, 11(2), 1280-1293.

Dayı, F. & E. Akdemir (2013), "Sağlık İşletmelerinde Finansal Risk Analizi: Kastamonu Kamu Hastaneleri Örneği", *Yönetim ve Eğitim Bilimleri Dergisi*, (3), 41-59.

Değirmenci, N. & T. Yakıcı-Ayan (2020), "OECD Ülkelerinin Sağlık Göstergeleri Açısından Bulanık Kümeleme Analizi ve TOPSIS Yöntemine Göre Değerlendirilmesi", *Hacettepe Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 38(2), 229-241.

Deng, H. et al. (2000), "Inter-Company Comparison Using Modified TOPSIS With Objective Weights", *Computers & Operations Research*, 27(10), 963-973.

Durmuş, A. & E. Durmuş (2023), "Üniversite Hastanesi Finansal Performansının Oran Analiziyle Değerlendirilmesi", *İzmir Yönetim Dergisi*, 4(1), 50-63.

Ekinci, G. & İ. Bakır (2021), "Sağlık Kurumlarında Finansal Performans Analizi A1 Dal Hastanesi Örneği", *Uluslararası Sağlık Yönetimi ve Stratejileri Araştırma Dergisi*, 7(1), 1-18.

Eriçok, R.E. (2023), "Sağlık Sisteminde Mali Sürdürülebilirlik Tartışmaları: Türkiye Örneği", in: U. Selen & A. Gerçek (eds.), *Maliye Araştırmaları - 6* (110-131), Ekin Basım Yayın Dağıtım.

Erkılıç, C.E. (2021), "Hastane Hizmetleri Sektörünün Critic Temelli TOPSIS Yöntemi ile Finansal Performansının Değerlendirilmesi", *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (46), 63-84.

Ersoy, M. (2022). "Entropi Tabanlı TOPSIS Yöntemiyle Finansal Performans Analizi: COVID-19 Etkisinde Borsa İstanbul Kimya, İlaç, Petrol, Lastik ve Plastik Ürünler Sektörü Üzerine Bir Uygulama", *Master's Thesis*, Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü İşletme Ana Bilim Dalı Finans Programı.

Fanaei, S. et al. (2023), "Determining the Key Performance Indicators of Human Resource Management of Military Hospital Managers; A TOPSIS Study", *BMC Primary Care*, 24, 47.

Gapenski, L.C. & G.H. Pink (2015), *Understanding Healthcare Financial Management* (7th ed.), Health Administration Press.

Güler, A. & M. Polatgil (2023), "Critic-TOPSIS Yöntemi ile Üniversite Hastanelerinin Hizmet Yönünden Sıralanması", *Elektronik Sosyal Bilimler Dergisi*, 22(88), 1828-1848.

Işıkçelik, F. & İ. Ağırbaş (2022), "Sağlık Kurumları Finansal Performansının Gri İlişkisel Analiz ile Değerlendirilmesi", *Alanya Academic Review*, 6(3), 2565-2582.

Işıkçelik, F. (2024), "Özel Sağlık Sektöründe Finansal Durum Değerlendirmesi: Tanımlayıcı Araştırma", *Türkiye Klinikleri Sağlık Bilimleri Dergisi*, 9(4), 875-885.

İstanbul Planlama Ajansı (2025), *Sağlıkta Dönüşüm ve Özelleştirmeler: İstanbul'daki Sağlık Hizmetleri Üzerine Bir Değerlendirme, Kent Gündemine Bakış*, İstanbul Büyükşehir Belediyesi Kültür A.Ş. Yayını, ISBN: 978-625-6762-65-7

Kabak, S. & M. Yurttadur (2023), "Türkiye'deki Hastane Alt Sektörünün Finansal Performansının Değerlendirilmesi", *Gümüşhane Üniversitesi Sosyal Bilimler Dergisi*, 14(3), 1076-1085.

Kar, A. et al. (2019), "Türkiye'deki Ağız ve Diş Sağlığı Merkezlerinin Finansal Performans Değerlendirmesi", *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, 60, 87-99.

Karaçadır, V. (2025), "Covid-19 Etkisiyle Türkiye Sağlık Hizmetleri Sektöründeki Karlılık Değişimi: Dupont Analizi ile Finansal Performansın İncelenmesi", *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi*, 14(2), 509-523.

Kayalı, C.A. & İ. Aktaş (2018), "BİST'te Hisse Senetleri İşlem Gören Otomotiv Sektöründeki Firmaların TOPSIS Yöntemine Göre Performans Değerlemesi ve Analizi", *Karabük Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 8(1), 43-59.

Kefe, İ. (2023), "COVID-19 Pandemisinde Dupont Analizi ile Sağlık Sektörünün Finansal Performansının İncelenmesi", *Hacettepe Sağlık İdaresi Dergisi*, 26(2), 461-478.

Kıymık, H. & V. Karaçadır (2024), "Covid-19 Salgınının Finansal Başarı Durumuna Etkileri: BIST Sağlık Sektöründe Listelenen Şirketlerin Altman Z Skoru ile Analizi", *Journal of Current Researches on Business and Economics*, 13(1), 89-108.

Koçyiğit, S.Ç. & N. Kocakoç (2019), "Ankara İli Kamu Hastanelerinin 2008-2017 Dönemi Finansal Performans Analizi", *İşletme Araştırmaları Dergisi*, 11(2), 1280-1293.

Mikhailov, L. (2004), "A Fuzzy Approach to Deriving Priorities From Interval Pairwise Comparison Judgements", *European Journal of Operational Research*, 159(3), 687-704.

Mojtahedi, M. et al. (2021), "Developing Hospital Emergency and Disaster Management Index Using TOPSIS Method", *Sustainability*, 13(9), 5213.

Morovati-Sharifabadi, A. & F. Asadian-Ardakani (2014), "A Model for Health Tourism Development Using Fuzzy TOPSIS and Interpretive Structural Modeling in Yazd Province", *Journal of Health Administration*, 17(55), 73-88.

OECD (2023), *Health at a Glance 2023: OECD Indicators - Full Report*, <https://www.oecd.org/en/publications/2023/11/health-at-a-glance-2023_e04f8239/full-report.html>, 25.05.2025.

Pourmohammadi, K. et al. (2018), "Evaluating The Health System Financing of The Eastern Mediterranean Region (EMR) Countries Using Grey Relation Analysis and Shannon Entropy", *Cost Effectiveness and Resource Allocation*, 16, 31.

Qu, W. et al. (2022), "Entropy-Weight-Method-Based Integrated Models for Short-Term Intersection Traffic Flow Prediction", *MDPI Journal*, 24, 849-864.

Rajak, M. & K. Shaw (2019), "Evaluation and Selection of Mobile Health (mHealth) Applications Using AHP and Fuzzy TOPSIS", *Technology in Society*, 59, 101186.

Shannon, C.E. (1948), "A Mathematical Theory of Communication", *The Bell System Technical Journal*, 27(3), 379-423.

Sonğur, C. et al. (2016), "Türkiye Kamu Hastane Birlikleri Hastanelerinin Finansal Performanslarının Değerlendirilmesi: Finansal Tablo Analizleri", *Sayıştay Dergisi*, (100), 1-26.

Taş, C. et al. (2018), "AHP-TOPSIS Yöntemleri Entegrasyonu ile Poliklinik Değerlendirilmesi: Ankara'da Bir Uygulama", *Sağlık Yönetimi Dergisi*, 2(1), 1-17.

TÜİK Türkiye İstatistik Kurumu (2016), *İstatistiklerle Türkiye 2015*, Ankara: TÜİK Yayınları.

TÜİK Türkiye İstatistik Kurumu (2023), "Sağlık Harcamaları İstatistikleri, 2022", *Haber Bülteni*, Ankara.

Ulutaş, A. (2019), "Entropi Tabanlı Edas Yöntemi ile Lojistik Firmalarının Performans Analizi", *Uluslararası İktisadi ve İdari İncelemeler Dergisi*, (23), 53-66.

World Health Organization (2020), *Global Health Expenditure Report: Rising to the challenge of COVID-19*, WHO Press.

Yang, S. et al. (2013), "Evaluating the Transformation of China's Industrial Development Mode During 2000-2009", *Renewable and Sustainable Energy Reviews*, 20, 585-594.

Yazdani-Chamzini, A. et al. (2013), "Selecting The Optimal Renewable Energy Using Multi Criteria Decision Making", *Journal of Business Economics and Management*, 15(5), 957-972.

Yeşiltaş, A. (2020), "Sağlık Sektöründe Kamu Özel Ortaklığı: Şehir Hastaneleri Üzerine Bir Değerlendirme", *Uluslararası Sağlık Yönetimi ve Stratejileri Araştırma Dergisi*, 6(1), 15-28.

Yiğit, A. (2019), "Türkiye'de Eğitim ve Araştırma Hastaneleri Performansının TOPSIS Yöntemi ile Analizi", *Ankara Sağlık Bilimleri Dergisi*, 8(2), 72-85.

Yiğit, V. (2020), "Hastane Hizmetleri Alt Sektörünün Finansal Performans Analizi", *Uluslararası Sağlık Yönetimi ve Stratejileri Araştırma Dergisi*, 6(3), 609-624.

Yöyen, H.T. (2023), "100. Yılında Türkiye Ekonomisi: Makroekonomik Performans Üzerinden Bir Değerlendirme", *Fiscaoeconomia*, 7(Özel Sayı), 283-309.

Zaidan, A.A. et al. (2015), "Evaluation and Selection of Open-Source EMR Software Packages Based on Integrated AHP and TOPSIS", *Journal of Biomedical Informatics*, 53, 390-404.

Sosyoekonomi

2026, Vol. 34(70), 155-187

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.07
Date Submitted: 23.07.2025
Date Revised: 05.09.2025
Date Accepted: 29.08.2026

Firm-Level Profitability Under Macroeconomic Stress: Evidence from Interest Rate, Exchange Rate, And Pandemic Regime Sensitivities in Indonesia's ILQ45 Firms

Andewi ROKHMAWATI *(https://orcid.org/0000-0003-3713-972X), University of Riau, Indonesia; andewi.rokhmawati@lecturer.unri.ac.id*

Nurhidayah YAHYA *(https://orcid.org/0000-0001-7251-1932), MARA Technological University, Malaysia; nurhidayahyahya@uitm.edu.my*

Yusni MAULIDA *(https://orcid.org/0009-0007-6709-1524), University of Riau, Indonesia; yusni.maulida@lecturer.unri.ac.id*

Aulia Pinto ATAMI *(https://orcid.org/0009-0000-8599-7687), University of Riau, Indonesia; auliapintoatami@lecturer.unri.ac.id*

Makroekonomik Baskı Altında Firma Düzeyinde Karlılık: Endonezya'nın ILQ45 Şirketlerinde Faiz Oranı, Döviz Kuru ve Pandemi Rejimi Duyarlılıklarından Kanıtlar

Abstract

This study looks at what drives company profits during tough economic times by focusing on Indonesia's ILQ45 firms between 2017 and 2023. It examines how interest rates, exchange rates, and economic shifts, especially before, during, and after COVID-19, affect profitability. The findings show that companies more sensitive to interest rate changes tend to perform better, likely because of stronger financial foundations. Exchange rate effects were minimal, possibly due to built-in protections. High debt levels hurt profits, while being a larger firm did not guarantee better results. Some sectors, such as consumer goods and finance, held up well, while others, such as real estate, struggled more.

Keywords : Interest Rate Sensitivity, Exchange Rate Sensitivity, Profitability, Leverage, Total Assets, ILQ45.

JEL Classification Codes : G30, E44, F31, G33, M21.

Öz

Bu çalışma, 2017-2023 yılları arasında Endonezya'daki ILQ45 şirketlerine odaklanarak, zorlu ekonomik dönemlerde şirket kârlarını neyin yönlendirdiğini incelemektedir. Özellikle COVID-19 öncesi, sırası ve sonrasında faiz oranları, döviz kurları ve ekonomik değişimlerin kârlılığı nasıl etkilediği ele alınmaktadır. Bulgular, faiz oranı değişimlerine daha duyarlı olan şirketlerin, muhtemelen daha güçlü finansal yapıları nedeniyle, daha iyi performans gösterdiğini ortaya koymaktadır. Döviz kuru etkileri muhtemelen dahili tedbirler nedeniyle düşük düzeyde kalmaktadır. Yüksek borç seviyeleri kârları olumsuz etkilerken, daha büyük bir şirket olmak daha iyi sonuçları garanti etmemektedir. Tüketim malları ve finans gibi bazı sektörler iyi performans gösterirken, gayrimenkul gibi diğer sektörler daha fazla zorluk yaşamıştır.

Anahtar Sözcükler : Faiz Oranı Duyarlılığı, Döviz Kuru Duyarlılığı, Kârlılık, Kaldıraç, Toplam Varlıklar, ILQ45.

1. Introduction

As one of the largest and most open emerging markets, Indonesia remains structurally exposed to global financial and macroeconomic volatility. Its economic architecture relies heavily on external capital flows, commodity-based exports, and imported intermediate goods, which create systemic sensitivity to external shocks such as interest rate fluctuations, exchange rate movements, and shifts in global investor sentiment. While this openness has enabled integration into global markets, it also increases vulnerability to international financial and trade developments (Bekaert et al., 2023).

The COVID-19 pandemic amplified these structural vulnerabilities. It disrupted global supply chains, trade activity, and capital mobility. At the same time, aggressive monetary tightening in advanced economies, particularly the United States, increased pressure on emerging markets through rising global interest rates and capital outflows. Indonesia was significantly affected: between 2022 and 2023, the U.S. Federal Reserve implemented sharp rate hikes to combat inflation, reverberating globally. These hikes raised borrowing costs, triggered capital flight from emerging economies, weakened the Indonesian Rupiah, and increased debt-servicing burdens for firms across sectors (Bernanke, 2022; Góes et al., 2017).

The resulting exchange-rate volatility and tighter financial conditions posed severe challenges for Indonesian firms, especially those with high foreign-currency exposure or dependence on imported inputs. These firms experienced rising input costs, shrinking margins, and declining investment appetite, consistent with prior research highlighting that emerging-market firms are particularly susceptible to global monetary shocks when structurally dependent on external finance (Madura et al., 2018).

Adding to this complexity, the U.S.-China trade war triggered a realignment of global trade flows. In response to retaliatory tariffs, Chinese exporters redirected shipments to third-country markets, including Indonesia. This heightened competitive pressure across Indonesian manufacturing and consumer sectors is altering pricing dynamics and market structures (Fajgelbaum et al., 2020). These external shocks coincided with domestic economic uncertainty during the COVID-19 period, generating a rare combination of simultaneous demand- and supply-side pressures on firm performance (Albuquerque et al., 2020).

In this high-volatility environment, the Indonesia ILQ45 index, a basket of the most liquid and systemically important firms listed on the Indonesia Stock Exchange, offers a strategic lens for studying corporate vulnerability and resilience. Due to their size, foreign exposure, and sectoral diversity, these firms reflect broader economic dynamics. They also exhibit structural characteristics such as foreign-denominated liabilities and reliance on imported inputs, making them particularly sensitive to external financial shocks (Robiyanto et al., 2019).

Despite these firms' economic importance, empirical studies in the Indonesian context have largely focused on macroeconomic or sectoral aggregates, offering limited insight into firm-level heterogeneity in responses to macro-financial shocks. While some studies have explored exchange rate or interest rate sensitivity in emerging markets (e.g. Bartram et al., 2010), few have investigated how these shocks interact with firm-level financial architecture, such as leverage, firm size, and foreign business activity, in Indonesia specifically. Even fewer have done so using high-frequency equity data, such as ILQ45 data, or by integrating time-based economic segmentation (pre-, during, and post-COVID periods) into their frameworks (Al-Shboul et al., 2021; Graham et al., 2015).

Foreign transaction activity is an especially underexplored factor in this literature, a key indicator of global operational exposure. Firms engaged in international trade or financing may exhibit asymmetric sensitivity to macroeconomic shocks, particularly under heightened global uncertainty (Tai, 2024). Sectoral dynamics further complicate the picture, as firms differ in capital intensity, pricing power, and supply chain configurations across industries (Cheong & Hoang, 2021; Ujkani & Gara, 2023). Additionally, temporal variation in economic regimes may influence firm behaviour and risk exposure, but empirical analyses have rarely captured this.

This study addresses these gaps by examining how exchange rate and interest rate sensitivity affect firm profitability, proxied by return on equity (Nookhwun et al., 2025), among ILQ45-listed companies, alongside firm-level variables such as financial leverage, size, foreign transaction activity, industry classification, and COVID-period segmentation. Unlike previous studies that treat these dimensions in isolation, this research applies an integrated, firm-level regression framework to uncover the interactive effects of external macro-financial shocks and internal corporate structures.

This study makes a twofold contribution. First, it enriches the empirical literature on firm-level sensitivity to macro-financial shocks in emerging markets by accounting for firm-specific, sectoral, and temporal heterogeneity, an approach not yet applied comprehensively in the Indonesian context. Second, the study offers actionable insights for policymakers, investors, and corporate strategists seeking to enhance financial resilience, optimise capital structure, and manage exposure under persistent global uncertainty.

2. Literature Review

2.1. Interest Rates and Profitability

Interest rates remain a central determinant of firm performance by influencing borrowing costs, investment valuations, and capital allocation decisions. According to classical finance theory, rising interest rates increase the discount rates applied to future cash flows, reducing investment projects' net present value (NPV) and making external financing more expensive (Mishkin, 2007; Tandelilin, 2010). These dynamics are particularly

pronounced in capital-intensive sectors where firms rely heavily on debt to fund long-term projects.

Empirical research generally supports this view. Monetary tightening often reduces profitability and equity valuations, especially among highly leveraged firms (Bernanke, 2022). However, recent studies highlight the heterogeneity of firm-level responses. Hussain et al. (2021), using dynamic panel models across Asian markets, show that firms with strong internal financing, such as retained earnings, are more resilient to rising interest rates. In contrast, firms with substantial debt exposure experience sharper declines in profitability, as interest burdens compress operational margins.

Moreover, Kim et al. (2025) find that real interest rates, rather than nominal ones, better predict corporate performance, particularly in inflationary environments. This insight challenges the use of nominal benchmarks in traditional models and reinforces the need to consider firm-specific financial architecture when analysing monetary policy effects.

Despite these developments, much of the literature employs uniform macro-level interest rate variables in firm-level regressions. As Pesaran (2021) and Wooldridge (2010) caution, this approach risks overlooking cross-sectional heterogeneity. It introduces multicollinearity, particularly in datasets such as Indonesia's ILQ45, which includes firms with diverse capital structures and risk profiles.

To overcome this, recent studies advocate for sensitivity-based estimation techniques. By regressing each firm's ROE on policy rate changes, researchers can derive interest rate beta coefficients that capture each firm's unique responsiveness of profitability to monetary conditions. This method not only improves model precision but also enables a more granular understanding of macro-financial transmission at the micro level (Kim et al., 2025).

Beyond statistical refinement, these firm-specific sensitivities have interpretive value under signalling theory. Firms that remain profitable amid tightening cycles may signal financial discipline and strategic robustness, strengthening investor confidence and improving market valuation (Connelly et al., 2025).

This analytical approach is particularly relevant in Indonesia's current context, marked by Bank Indonesia's aggressive post-pandemic rate hikes. The financial architecture of ILQ45 firms, many of which operate in sectors exposed to capital market volatility, warrants differentiated analysis. However, studies applying firm-level interest rate sensitivity frameworks to this group are notably absent. This study addresses that empirical gap by incorporating interest rate betas into the profitability model.

H1: Firm-specific interest rate sensitivity negatively affects firm profitability.

2.2. Exchange Rate Exposure and Profitability

Exchange rate fluctuations in open economies like Indonesia are among the most significant external shocks to firm profitability. Rupiah depreciation increases the cost of imported inputs and servicing foreign-currency liabilities, compressing margins for firms reliant on international trade and offshore financing, particularly in sectors such as manufacturing, infrastructure, and energy (Madura et al., 2018; Obstfeld & Rogoff, 1996). These vulnerabilities are compounded in emerging markets where hedging instruments are limited, and exposure is often structural rather than discretionary (Aizenman et al., 2024).

Despite these well-known risks, many empirical studies continue to model currency effects using uniform nominal exchange rate variables. This macro-level approach overlooks firm-specific heterogeneity in trade intensity, debt composition, and hedging capacity, leading to model misspecification and attenuated effect estimates (Pesaran, 2021; Wooldridge, 2010). Bartram et al. (2010) cautioned that such simplification fails to distinguish between firms with robust financial governance and those acutely vulnerable to currency volatility.

To address this gap, recent literature has embraced a firm-level sensitivity approach. By estimating exchange rate betas through time-series regressions, researchers can quantify each firm's unique elasticity of profitability to currency movements (Du & Schreger, 2016; Kim et al., 2025). This allows for granular risk diagnostics and helps identify firms with superior operational flexibility, effective currency hedging, or diversified international exposure. Within the signalling theory framework, lower beta values may also signal disciplined risk management and adaptive capacity (Husnan, 2015).

Exchange rate shocks extend beyond direct cost impacts. Cheong and Hoang (2021) argue that currency depreciation affects inflation pass-through, alters competitive dynamics, and reshapes consumer demand, even for firms without explicit foreign transactions. These second-order effects are rarely captured in aggregate-level models, further motivating a disaggregated estimation strategy.

Indonesia presents an underexplored case in this context. While firms listed in the ILQ45 index are deeply embedded in global trade and capital markets, few studies have examined how currency fluctuations affect their fundamental profitability. Robiyanto et al. (2019) find that exchange rate volatility significantly impacts the stock returns of blue-chip Indonesian firms, but the link to ROE remains empirically untested. Recent reports by PEFINDO (2023) show that several ILQ45 companies faced equity repricing and credit downgrades amid Rupiah depreciation in 2022-2023, underscoring unresolved currency vulnerabilities.

By incorporating firm-specific exchange rate betas into a profitability model, this study improves understanding of macro-financial transmission in a post-pandemic, high-

volatility regime. It moves beyond aggregated assumptions and responds to calls for more precise modelling of firm-level exposure to currency shocks in emerging markets.

H2: Firm-specific exchange rate sensitivity negatively affects firm profitability.

2.3. Leverage and Profitability

Leverage, proxied by the Debt-to-Equity Ratio (DER), remains a key determinant of firm resilience, particularly under monetary tightening and currency volatility. According to the trade-off theory (Myers, 1984), debt can enhance returns through tax shields, but excessive reliance on debt elevates financial distress risk, especially in emerging markets with bank-centric financial systems like Indonesia (Booth et al., 2006). The adverse effects of high leverage are magnified during macroeconomic stress, when rising interest rates inflate debt-servicing costs and depreciating currencies raise the burden of foreign-denominated liabilities (Graham et al., 2015; Madura et al., 2018).

These dynamics are not merely theoretical. Jermann and Quadrini (2012) show that interest rate shocks disproportionately erode profitability in highly leveraged firms, even without a revenue decline, because of tight margins and limited refinancing flexibility. The Indonesian case is particularly instructive. Many ILQ45 firms operate in capital-intensive sectors such as infrastructure, energy, and property, where external financing is the norm. According to PEFINDO (2023), several of these firms saw sharp increases in debt costs and multiple credit downgrades during the 2022-2023 monetary tightening cycle, coinciding with BI-7DRR hikes and Rupiah depreciation.

Despite its predictive power, DER conveys ambiguous market signals. While signalling theory suggests that high leverage may reflect managerial confidence in future earnings (Ross, 1977), during crisis periods, it is often interpreted as a marker of financial fragility, raising equity risk premiums (Frank & Goyal, 2009). This dual signalling effect underscores the need to contextualise leverage within broader macroeconomic regimes.

Moreover, leverage actively transmits macro-financial shocks. Recent work by Hussain et al. (2021) and Lein et al. (2016) recommends modelling DER not only as a control variable but as a moderator in interaction terms amplifying the impact of monetary or currency shocks on firm performance. This perspective allows researchers to capture leverage-induced asymmetries in profitability responses, particularly in firms with rigid cost structures or limited hedging capabilities.

Firm-specific variation also matters. Larger firms may buffer adverse shocks through better access to credit and hedging instruments (Rajan & Zingales, 1995), while SMEs, even with similar DERs, face tighter liquidity constraints and higher capital costs (Fan et al., 2012). Therefore, treating leverage effects uniformly risks underestimating cross-sectional heterogeneity.

Despite the theoretical clarity and empirical support, the Indonesian literature on firm-level leverage effects remains sparse. Most existing studies stop at correlational analysis and do not explain how DER interacts with interest rates and exchange-rate changes across sectors. This study addresses that empirical gap by explicitly estimating the marginal effect of leverage on ROE in ILQ45 firms. It contributes to a more granular understanding of capital-structure vulnerability under shifting macro-financial conditions.

H3: Leverage (DER) negatively affects firm profitability.

2.4. Firm Size and Profitability

Firm size, typically proxied by the natural logarithm of total assets, plays a paradoxical role in corporate financial performance, serving as both a source of resilience and a potential constraint. From the Resource-Based View (RBV), large firms are expected to enjoy strategic advantages such as access to broader financing channels, economies of scale, and reputational capital that enhance bargaining power with lenders and suppliers (Ayyagari et al., 2021; Barney, 1991). These advantages are especially critical in emerging markets like Indonesia, where larger firms often receive preferential access to credit and regulatory flexibility because of their systemic importance (Rajan & Zingales, 1995).

This size-based resilience becomes especially valuable during periods of macroeconomic stress. Larger firms are typically better equipped to secure long-term financing at lower cost, hedge against currency volatility, and absorb shocks from interest rate hikes. In this sense, total assets function not only as a measure of scale but also as a proxy for financial agility, an important shield in capital-scarce and volatile environments (Beck et al., 2005).

However, this positive narrative is not without qualification. Recent empirical literature cautions that large firms may also suffer from structural rigidities, such as bureaucratic inertia, complex capital structures, and high fixed operating costs, that impair their adaptability during crises (Lin et al., 2022). These issues are particularly salient among Indonesia's ILQ45 firms, many of which operate in capital-intensive sectors like infrastructure, property, and energy, where asset illiquidity and long project timelines heighten exposure to financial tightening.

Moreover, the interaction between firm size and macroeconomic conditions depends on context. During crises, large firms may benefit from implicit state guarantees or favourable refinancing terms (Laeven & Valencia, 2020). However, in post-pandemic regimes characterised by global de-risking and rising interest rates, these firms may face intensified investor scrutiny due to their exposure to global capital markets and foreign currency liabilities (Alfaro & Chen, 2012). Data from PEFINDO (2023) show that Indonesian firms with total assets above IDR 100 trillion experienced a notable rise in borrowing costs during 2022-2023, driven by BI policy rate hikes and Rupiah depreciation, despite their size.

Importantly, firm size also interacts asymmetrically with other firm characteristics. Al-Shboul et al. (2021) found that large firms in ASEAN economies show lower exchange rate sensitivity because of better hedging capabilities and diversified income streams. In contrast, small and mid-sized firms suffer sharper profitability declines during currency or interest shocks. This points to the need to treat size not as a simple linear control, but as a dynamic moderator of macro-financial effects.

Despite its standard inclusion in empirical models, firm size remains under-theorised and often misinterpreted. Many studies assume a uniformly positive effect, ignoring its dual role across macroeconomic regimes. This study advances the literature by explicitly modelling total assets as a key explanatory variable in a sensitivity-based regression framework. This allows us to isolate how size conditions firms' responses to interest rate and exchange rate volatility.

Evidence from recent emerging-market studies reinforces this nuanced view: profitability does not scale monotonically with size. Threshold analysis on Saudi-listed firms shows the leverage-performance link is non-linear and conditioned by firm size. At higher debt loads, larger issuers' returns weaken, consistent with diseconomies of organisational complexity and debt-intensive asset bases. (Alabdulkarim et al., 2024). Complementing this, cross-country research in emerging markets argues that profit is driven more by VRIN-type capabilities than by sheer asset mass, so bigger balance sheets do not automatically translate into superior ROE under macro-financial stress (Zhou & Park, 2024). Related evidence from an emerging-market setting also documents inverted-U dynamics between financing intensity and firm value, implying that aggressive, debt-funded expansion can erode performance beyond a scale threshold, again consistent with size-related frictions during tightening cycles (Karaca et al., 2025).

By adopting this nuanced approach, the research contributes to a growing body of work that questions the oversimplified notion of "bigger is better". It supports the view that firm size can serve as both a strategic buffer and a structural rigidity, depending on external shocks, sectoral positioning, and institutional context.

H4: Total assets positively and significantly affect firm profitability.

2.5. Dummy Variable: Foreign Transaction Exposure

This study constructs a dummy variable to capture firms' exposure to foreign transactions. This binary variable takes the value 1 for firms that engage in international activities, such as cross-border trade, foreign-currency liabilities, or operations abroad, and 0 for firms that operate exclusively in domestic markets. This distinction proxies the firm's structural exposure to global economic and financial dynamics, allowing the model to control for heterogeneity in external vulnerability across firms.

The rationale for including this dummy variable draws from international finance theory and strategic management perspectives. On one hand, foreign exchange exposure theory suggests that firms engaged in international activities face significant risks from exchange rate volatility, which can affect input costs, debt servicing, and ultimately net income (Madura et al., 2018). In contrast, the firm's Resource-Based View (RBV) posits that international engagement can create competitive advantage by enabling access to broader markets and revenue diversification (Gabaix & Maggiori, 2015). Thus, foreign transaction exposure reflects a dual reality: it introduces financial risk while opening strategic opportunities.

This duality is especially relevant in Indonesia, a developing economy characterised by high currency volatility and limited hedging instruments. According to Claessens et al. (2014), firms in emerging markets with foreign-currency liabilities are more vulnerable to earnings contractions during depreciation episodes. According to Robiyanto et al. (2019) and PEFINDO (2023), Indonesian firms with substantial exposure to foreign transactions, especially in the energy, transportation, and manufacturing industries, are more susceptible to pronounced earnings volatility during episodes of global financial turbulence or significant rupiah depreciation.

To evaluate this dimension empirically, the regression model includes a foreign transaction dummy variable. It allows a more accurate estimate of how macroeconomic shocks, such as interest rate changes, inflation, or exchange rate movements, differentially affect firms depending on their level of international exposure. Firms coded as 1 (engaged in foreign transactions) are expected to exhibit different profitability responses than those coded as 0 (domestic-only operations).

> **H5**: Firms engaged in foreign transactions experience a significantly different impact of macroeconomic shocks on profitability than firms without foreign transaction exposure.

2.6. Time-Based Dummy Variables and Profitability

Integrating time-based dummy variables representing pre-COVID (before 2020), COVID (2020-2021), and post-COVID (2022-2023) periods provides a methodologically robust way to account for structural macroeconomic regime shifts in panel regression models. These dummies go beyond simple temporal controls; they reflect significant discontinuities in the macro-financial landscape, aligning with regime-switching theories (Hamilton, 2016) and global crisis transmission frameworks (Claessens et al., 2014).

In the pre-COVID period, Indonesia's macroeconomic environment was characterised by low interest rates, subdued inflation, and stable capital inflows. Such conditions created a conducive environment for profitability across firms, as they benefited from predictable demand, accommodative monetary policy, and accessible long-term financing (Laeven & Valencia, 2020). Profitability in this era, especially for large-cap firms in the ILQ45 index, reflected these supportive external dynamics.

By contrast, the COVID period constituted an abrupt exogenous shock that caused a synchronous collapse in supply and demand. Firms with high fixed costs and limited liquidity, particularly in capital-intensive sectors like construction and infrastructure, experienced acute profitability contractions. Consistent with business cycle theory, pandemic-induced economic freezes forced firms to postpone capital expenditures, reallocate resources, and revise operational strategies, severely weakening financial performance (Carletti et al., 2020; Shen et al., 2020).

The post-COVID period introduced another structural transformation, not a return to pre-crisis normalcy but a fundamentally altered macro-financial context. It is defined by aggressive global monetary tightening, disrupted supply chains, and escalating geopolitical tensions (Banerjee et al., 2020; Hasudungan et al., 2023). These dynamics created a highly uneven recovery landscape. While firms in digitalised, consumer-driven sectors rebounded quickly, others struggled to regain pre-pandemic profitability, especially those with significant foreign liabilities or delayed project pipelines. The divergence underscores the growing importance of firm-specific resilience, strategic agility, and sectoral adaptability (Duchek, 2020; Teece, 2018).

Methodologically, failing to account for such temporal discontinuities violates the assumption of parameter stability in panel regressions. Wooldridge (2010) noted that ignoring regime-specific dynamics can bias coefficient estimates and obscure authentic causal relationships. This study addresses this gap by explicitly modelling macroeconomic regimes through time-based dummy variables, treating them not as statistical artefacts but as critical levers for isolating the differential impact of shocks on firm profitability.

By applying this framework to Indonesia's ILQ45 firms, the study responds to a research gap in emerging market corporate finance, where empirical models often assume macroeconomic continuity despite evidence of profound temporal breaks. The regime-sensitive approach enables a clearer understanding of how firms adapt or fail to adapt across varying crisis phases.

H6a: Firm profitability during COVID-19 is significantly lower than pre-COVID, indicating a negative shock from pandemic-induced disruptions.

H6b: Firm profitability in the post-COVID period significantly differs from the pre-COVID period, reflecting heterogeneous recovery trajectories shaped by sectoral conditions and firm-level characteristics.

2.7. Industry Classification Dummies and Profitability

Incorporating industry classification dummy variables into panel regression models enables a more granular firm profitability analysis by capturing structural differences across sectors. Unlike macroeconomic shocks, which affect all firms to varying degrees, sector-specific dynamics shape firms' exposure to systemic risk, cost structures, and revenue stability. This methodological approach draws on industrial organisation theory, which

argues that profitability is firm-specific and sector-dependent, driven by differences in market structure, capital intensity, and the regulatory environment (Tirole, 1988).

In the context of Indonesia's ILQ45 index, sectoral heterogeneity is pronounced. Firms span industries such as finance, infrastructure, consumer goods, energy, and real estate, each with distinct sensitivity to macro-financial variables like interest rates, exchange rates, and policy shocks; for instance, the financial sector benefits during monetary tightening through improved net interest margins. In contrast, capital-intensive sectors such as construction and property are more vulnerable because of high debt loads and fixed costs (Mishkin, 2007; PEFINDO, 2023).

Moreover, sectoral profitability patterns are not constant over time; they evolve in response to structural breaks such as the COVID-19 pandemic. During this crisis, essential goods producers (e.g., food and pharmaceuticals) demonstrated relative resilience due to inelastic demand, whereas firms in discretionary or investment-driven sectors faced prolonged recovery timelines. This divergence underscores the importance of including industry dummies to differentiate how each sector mediates the relationship between macroeconomic variables and firm-level financial outcomes (Carletti et al., 2020).

Critically, uniform regression models that omit sectoral dummies risk model misspecification by assuming homogeneity in profitability determinants. As Wooldridge (2010) notes, this omission can obscure valid heterogeneity and weaken inference. Therefore, this study applies industry fixed effects to isolate sector-specific influences on profitability and to detect whether some sectors systematically outperform or underperform relative to a baseline group here, agribusiness.

This approach also helps answer a key research question: whether post-crisis profitability recovery is sector-neutral or structurally unequal. Existing literature suggests that recovery trajectories depend not only on firm size or leverage but also on sectoral characteristics such as exposure to global supply chains, access to hedging, and regulatory support (Al-Shboul et al., 2021; Teece, 2018). By incorporating industry dummies, the model can more precisely attribute differences in ROE performance to sectoral structures rather than firm-specific or temporal idiosyncrasies.

Thus, including industry classification dummies enhances the regression model's explanatory power and aligns with best practices in empirical finance, especially for studies in emerging markets where industrial disparity is acute.

> **H7**: Firm profitability significantly varies across industry classifications, with sectoral characteristics moderating the impact of macro-financial shocks on financial performance.

3. Methodology

3.1. Research Design and Sample

This study adopts a quantitative explanatory design to analyse the effects of macroeconomic sensitivities, specifically interest rate and exchange rate exposures, on firm-level profitability, proxied by Return on Equity (Nookhwun et al., 2025). The core empirical model employs Ordinary Least Squares (OLS) regression. Despite its limitations, we retain OLS for interpretability and comparability with the literature (Graham et al., 2015). We test key assumptions (e.g., multicollinearity, heteroskedasticity) using diagnostic tools such as VIF analysis and robust standard errors (White correction). The sample consists of 70 firms listed at least once on the ILQ45 index of the Indonesia Stock Exchange (IDX) between 2017 and 2023. Purposive sampling is applied based on two inclusion criteria:

- Firms must have appeared in the ILQ45 index at least once during the study period, ensuring they meet key liquidity thresholds, market capitalisation, and trading frequency.
- Firms must provide complete quarterly data on ROE, total assets, leverage (DER), and other macroeconomic sensitivity variables.

Unlike prior studies that exclude financial institutions, this research explicitly includes them because of their central role in monetary transmission mechanisms and their heightened sensitivity to interest rate dynamics. Their inclusion is both theoretically and empirically justified (Graham et al., 2015), particularly in emerging markets with bank-centric financing structures.

ILQ45 firms serve as a suitable proxy for Indonesia's systemic corporate landscape. According to Robiyanto et al. (2019), these firms represent the most actively traded, liquid, and economically influential entities, making them ideal for assessing macro-financial vulnerabilities and resilience.

3.2. Period Justification and Economic Context

The 2017-2023 observation period is deliberately chosen to capture critical macroeconomic inflexion points, allowing the analysis to reflect firm responses across different monetary regimes:

- 2018-2019: U.S. FED's interest rate hikes prompted capital outflows from emerging markets;
- 2018: Indonesia's central bank raised the BI-7DRR from 4.25% to 6.00%, triggering tighter domestic liquidity;
- 2020-2021: The COVID-19 pandemic led to supply-chain breakdowns, profit shocks, and temporary rate cuts;

- 2022-2023: A regime of inflationary pressure and global monetary tightening, marked by volatile capital flows and currency fluctuations.

This temporal segmentation enables time-based dummy variables, which improve model robustness by controlling for structural breaks and crisis-induced parameter instability (Banerjee et al., 2020; Carletti et al., 2020). Combining these macro-financial episodes ensures that firm responses are not interpreted statically, but in light of evolving external conditions.

3.3. Variable Measurement

3.3.1. Dependent Variable

The primary dependent variable is Return on Equity, calculated as:

$$ROE_{it} = \frac{Earning\ After\ Tax_{it}}{Total\ Equity_{it}} \quad (1)$$

ROE is widely regarded as a key indicator of financial performance, measuring managerial efficiency and capital productivity (Damodaran, 2012). Return on equity is adopted as the primary profitability metric because it links earnings available to shareholders to the equity base that absorbs macro-financial stress, making it especially informative for leverage and interest-rate transmission in Indonesia's bank-centric setting (Ayyagari et al., 2021). For ILQ45 firms, ROE is consistently disclosed quarterly over 2017-2023, supporting clean comparability and an equity-holder-relevant interpretation. Alternative measures are practical but less aligned with this identification focus: ROA dilutes the leverage channel by scaling profits to total assets; margin indicators are sensitive to accounting and cost pass-through; and market ratios such as Tobin's Q embed valuation swings driven by liquidity and sentiment during crises and tightening episodes (Laeven & Valencia, 2020). Accordingly, ROE offers a parsimonious and policy-relevant lens on how interest- and exchange-rate conditions transmit to firm performance, while remaining amenable to panel estimation with sectoral controls; robustness checks can complement ROE with ROA and Tobin's Q.

3.3.2. Independent Variables

3.3.2.1. Interest Rate Sensitivity

Estimated using firm-level time-series regressions of ROE on the Bank Indonesia 7-Day Reverse Repo Rate (BI7DRR). This coefficient captures how interest rate changes affect firm profitability. (Du & Schreger, 2016; Rokhmawati et al., 2024).

$$Profitability_{it} = \alpha_i + \beta_i^{IR} IR + e_{it} \quad (2)$$

3.3.2.2. Exchange Rate Sensitivity

Calculated by regressing ROE on the IDR/USD exchange rate. The estimated β coefficient reflects each firm's exposure to exchange rate fluctuations (β_i^{ER}) (Bartram et al., 2010; Rokhmawati et al., 2024).

$$Profitability_{it} = \alpha_i + \beta_i^{ER} ER + e_{it} \quad (3)$$

3.3.2.3. Leverage

Defined as the ratio of total debt to total equity:

$$DER_{it} = \frac{Total\ Debt_{it}}{Total\ Equity_{it}} \quad (4)$$

High *DER* implies greater financial risk and exposure to rising borrowing costs (Graham et al., 2015).

3.3.2.4. Firm Size (Size)

Measured by the natural logarithm of total assets:

$$Size_{it} = Ln\ (Total\ Assets)_{it} \quad (5)$$

3.3.2.5. Dummy Variables

This captures scale, access to financial markets, and risk diversification (Ayyagari et al., 2021).

- Foreign Transaction Dummy (FTDummy):
  Binary variable equals one if the firm engages in cross-border trade or holds foreign-currency liabilities. This captures international exposure (Robiyanto et al., 2019).
- Temporal Dummies ($COVIDDummy_{it}$):
  Three dummy variables are constructed for the pre-COVID (reference), COVID period (2020-2021), and post-COVID (2022-2023) periods, following Banerjee et al. (2020).
- Industry Classification Dummies ($INDummy_{ik}$):
  A set of binary variables identifying whether the firm belongs to specific sectors such as manufacturing, property, or infrastructure. This controls for sectoral sensitivity to macroeconomic fluctuations (Cakici & Zaremba, 2021; Claessens et al., 2014).

In line with the framework, the regressors comprise firm-specific interest-rate sensitivity (βIR) and exchange-rate sensitivity (βER), estimated from time-series regressions of ROE on BI-7DRR and IDR/USD to capture heterogeneous monetary and currency

transmission (Du & Schreger, 2016). *βER* is expected to be negative via balance-sheet and cost pass-through channels. In contrast, the sign of *βIR* is theoretically negative under discount-rate logic but can vary with sectoral pricing power and intermediation effects (Bekaert et al., 2023). Leverage (*DER*) should depress profitability through distress costs; firm size (ln-assets) may confer scale and financing advantages yet be offset by organisational rigidities in volatile regimes; a foreign-transactions dummy captures offsetting FX risk and diversification; temporal dummies (pre-COVID, COVID, post-COVID) absorb regime shifts; and industry indicators control sectoral heterogeneity in costs and policy sensitivity (Ayyagari et al., 2021; Laeven & Valencia, 2020).

To aid clarity and traceability between theory and empirical design, Table 1 summarises the variables, measurements, rationales, expected signs (theory), and hypotheses (H1-H7).

Table: 1
The Summary of the Variables, Measurements, Rationales, Expected Signs (Theory), and Hypotheses (H1-H7)

Variable	Measurement	Theoretical Rationale	Expected Sign (Theory)	Hypothesis
ROE (Dependent)	Earnings after tax / Total equity	Equity-holder profitability under macro-financial stress		
Interest-Rate Sensitivity (βIR)	Firm-level coefficient from time-series regression of ROE on BI-7DRR	Discount-rate channel; higher rates raise financing costs and discount future cash flows; sectoral intermediation may offset	Negative (ex-ante)	H1
Exchange-Rate Sensitivity (βER)	Firm-level coefficient from time-series regression of OE on IDR/USD	FX balance-sheet & input-cost pass-through; depreciation raises local-currency costs and FX debt burden; exporters may offset	Negative (ex-ante)	H2
Leverage (DER)	Total Debt / Total Equity	Trade-off theory: distress costs and interest burden rise under tightening	Negative	H3
Firm Size (LnTA)	ln(Total Assets)	Organisational rigidities in volatile regimes may temper scale and financing advantages.	Positive (ex-ante)	H4
Foreign Transactions (Dummy)	1=cross-border trade and/or FX liabilities; 0=otherwise	FX risk (−) versus diversification benefits (+)	Ambiguous/different impact	H5
COVID Period (2020-2021)	1=during COVID; 0=otherwise	Demand/supply shock; operational freezes	Negative	H6a
Post-COVID (2022-2023)	1=post-COVID; 0=otherwise	Heterogeneous recovery across sectors	Different from pre-COVID (ambiguous sign)	H6b
Industry Dummies	Sector indicators	Sectoral heterogeneity in cost structures, policy sensitivity, and exposure	Varies by sector	H7

These expected signs follow standard theory: discount-rate and cost-of-capital channels for *βIR*/*DER*; FX pass-through and balance-sheet channels for *βER*; scale advantages for size with potential rigidities; and regime/sector heterogeneity for time and industry effects, with realised signs and magnitudes reported in Section 4.

3.4. Data Analysis Technique

This study utilises pooled OLS regression with robust standard errors, appropriate for estimating average effects across firms. The model specification is (Gujarati, 2021).

$$ROE_{it} = \beta_0 + \beta_1^{IR} IR + \beta_2^{ER} ER + \beta_3 DER_{it} + \beta_4 Size_{it} + \beta_5 FTDummy_i + \sum_{t=1}^{3} \beta_t COVIDDummy_{it} + \sum_{k=1}^{10} \beta_k INDummy_{ik} + \varepsilon_{it} \quad (6)$$

where:

- β_1^{IR}: interest rate sensitivity,
- β_2^{ER}: exchange rate sensitivity,
- DER_{it}: leverage,
- $Size_{it}$: firm size,
- $FTDummy_i$: foreign transaction dummy,
- $COVIDDummy_{it}$: time dummies,
- $INDummy_{ik}$: industry dummies,
- ε_{it}: error term.

To ensure model validity, standard diagnostic tests are applied:

- Normality: Kolmogorov-Smirnov
- Heteroskedasticity: Glejser Test
- Multicollinearity: Variance Inflation Factor (VIF)
- Autocorrelation: Durbin-Watson statistic

We use fixed effects as a robustness check, especially to control for unobserved firm-level heterogeneity (Wooldridge, 2010).

4. Results and Discussion

Before conducting the regression analysis, we transformed the dataset to improve distributional properties and meet parametric assumptions. We examined variables such as Return on Equity, Debt-to-Equity Ratio (DER), and firm size (total assets) for skewness and outliers. We transformed variables with strictly positive, right-skewed distributions, such as total assets, using the natural logarithm to reduce heteroscedasticity and approximate normality. For variables that may contain zero or negative values, such as ROE or DER during periods of financial stress, we used the inverse hyperbolic sine (IHS) transformation. This approach, as recommended by Burbidge et al. (1988) and reaffirmed by Bellemare and Wichman (2020), transforms all real values while preserving sign and scale interpretability.

In contrast, we retained firm-specific beta coefficients for interest rate and exchange rate sensitivity estimated from prior time-series regressions in their original form. These coefficients represent elasticity-like measures and are not appropriate for logarithmic scaling. Their inclusion as level variables maintains consistency with prior empirical research and preserves analytical clarity.

4.1. Results

4.1.1. Descriptive Statistics

Table 2 presents descriptive statistics for the final processed dataset. Visual inspections and diagnostic tests, including skewness, kurtosis, and histogram plots, confirm that the transformations successfully reduced asymmetry and variance instability across the key financial indicators. These preparations enhance the statistical reliability of subsequent Ordinary Least Squares (OLS) estimation, supporting valid inference on the effects of macroeconomic sensitivity and firm structure on profitability.

Table: 2
Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Dev.
ROE	426	8.46186	8.46216	8.46212	1.70E-05
Interest Rate Sensitivity ($Beta^{IR}$)	426	0	2.91379	2.90212	0.14095
Exchange Rate Sensitivity ($Beta^{ER}$)	426	2.90897	2.90897	2.90897	7.00E-08
Leverage (DER)	426	8.46047	8.46461	8.46245	0.00044
Firm Size (TA)	426	2.90976	2.91025	2.9101	5.00E-05
Foreign Transactions (Dummy)	426	0	1		
During COVID (Dummy)	426	0	1		
Post COVID (Dummy)	426	0	1		
Energy & Mining (Dummy)	426	0	1		
Consumer Goods (Dummy)	426	0	1		
Basic Industry & Chemicals (Dummy)	426	0	1		
Infrastructure (Dummy)	426	0	1		
Financial Sector (Dummy)	426	0	1		
Construction (Dummy)	426	0	1		
Property & Real Estate (Dummy)	426	0	1		
Retail (Dummy)	426	0	1		
Technology & Media (Dummy)	426	0	1		

4.1.2. Classical Assumption Testing

To ensure the robustness of the regression analysis, we conducted four classical assumption tests: normality, heteroskedasticity, multicollinearity, and autocorrelation. Table 3 summarises the results.

Table: 3
The Statistical Test Results of Normality, Heteroskedasticity, Multicollinearity, and Autocorrelation

Test	Method	Key Result	Conclusion
Normality	Kolmogorov-Smirnov	p-value=0.090	Residuals are normally distributed
Heteroskedasticity	Glejser Test	Significant at p<0.05 for: - Ln_TA (0.001) - Foreign_Trans (0.018) - Infrastruct (0.001) - Construct (0.030)	Minor heteroskedasticity present; robust SEs applied
Multicollinearity	Variance Inflation Factor (VIF)	All VIFs<5 (Max=4.461 for Financial Sector)	No serious multicollinearity
Autocorrelation	Durbin-Watson Statistic	DW=1.846	No autocorrelation (within acceptable bounds)

The Kolmogorov-Smirnov test confirmed the residuals' normality, yielding a p-value of 0.090. This exceeds the 0.05 significance threshold, supporting the assumption that residuals are approximately normally distributed.

We evaluated heteroskedasticity using the Glejser test. While most predictors returned non-significant values, a few variables, including firm size (LnTA), foreign transaction dummy, infrastructure, and construction sectors, indicated localised heteroskedasticity (significant at p<0.05). To address this, the study employed heteroskedasticity-robust standard errors, as recommended in applied econometric literature (Wooldridge, 2010).

Multicollinearity was assessed through the Variance Inflation Factor (VIF) values. All predictors showed VIF scores below the conservative threshold of 5, indicating no serious multicollinearity that would compromise coefficient stability or interpretability.

Lastly, the Durbin-Watson statistic tested for autocorrelation. The result (DW=1.846) falls within the acceptable range of 1.75-2.25, indicating that the residuals are not serially correlated. This further supports the reliability of parameter estimates and hypothesis testing.

The diagnostic tests validate the use of Ordinary Least Squares (OLS) regression in this study, affirming that the core assumptions of linear regression are satisfactorily met.

4.1.3. OLS Estimation Results

The Ordinary Least Squares (OLS) regression results, as summarised in Table 4, indicate strong explanatory power, with an R-squared of 0.719 and an adjusted R-squared of 0.708. The F-statistic is significant at the 1% level (p<0.001), confirming that the included variables collectively explain variation in Return on Equity among ILQ45 firms during 2017-2023.

Among the macroeconomic sensitivity variables, firm-specific interest rate sensitivity (β_i^{IR}) shows a strongly significant and positive relationship with ROE (p<0.001), suggesting that firms that respond more efficiently to interest rate fluctuations tend to maintain or improve profitability. In contrast, exchange rate sensitivity (β_i^{ER}) is not statistically significant, although the sign of the coefficient is negative, as theoretically expected.

Leverage (measured by DER) demonstrates a significant adverse effect on profitability (p<0.001), reinforcing the classical trade-off theory that high debt levels increase financial vulnerability and reduce performance under macroeconomic pressure. Firm size shows a marginally significant negative association with ROE (p=0.063), suggesting possible diseconomies of scale or organisational inertia in larger firms.

Table: 4
OLS Regression Results

Model Fit Statistics:					
R=0.848					
R^2=0.719					
Adjusted R^2=0.708					
F-statistic=65.267 (p<0.001)					
Variable	**Unstandardized Coefficient (B)**	**Standard Error**	**Standardized Beta**	**t-value**	**p-value**
Constant	69.319	40.148		1.727	0.085
Interest Rate Sensitivity (β^{IR})	8.15E-05	0	0.676	12.457	0
Exchange Rate Sensitivity (β^{ER})	-20.876	13.8	-0.082	-1.513	0.131
Leverage (DER)	-0.007	0.002	-0.19	-4.424	0
Firm Size (LnTA)	-0.023	0.012	-0.067	-1.865	0.063
Foreign Transaction Dummy	2.37E-06	0	0.067	1.411	0.159
COVID Period Dummy	-4.37E-06	0	-0.117	-4.058	0
Post-COVID Dummy	1.77E-07	0	0.005	0.156	0.876
Energy & Mining	-2.67E-06	0	-0.06	-1.595	0.111
Consumer Goods	8.38E-06	0	0.146	4.297	0
Basic Industry & Chemicals	-3.23E-06	0	-0.06	-1.723	0.086
Infrastructure	1.23E-05	0	0.176	4.928	0
Financial Sector	1.72E-05	0	0.306	5.519	0
Construction	-5.97E-06	0	-0.083	-2.459	0.014
Property & Real Estate	-6.33E-06	0	-0.132	-2.647	0.008
Retail	2.06E-06	0	0.03	0.931	0.352
Technology & Media	-2.07E-06	0	-0.028	-0.884	0.377

Temporal dummy variables show that the COVID-19 crisis significantly suppressed firm profitability (p<0.001), while the post-COVID period did not yield a significant rebound. This indicates persistent profitability challenges even after pandemic restrictions were lifted.

Several sectoral dummies are statistically significant. Consumer goods, infrastructure, and financial sectors report higher ROE than the baseline category. In contrast, the construction and property sectors show significantly lower performance, likely due to debt burden and demand volatility during and after the crisis. Other sectors, including energy, retail, and technology, show no statistically significant deviations.

The regression findings underscore the importance of modelling firm heterogeneity and sectoral effects when analysing macro-financial impacts on profitability. These results provide a more nuanced understanding of how macroeconomic volatility, structural firm factors, and sector-specific characteristics interact in emerging markets.

4.2. Discussion

4.2.1. The Effect of Interest Rate Sensitivity on Firm Profitability

This study finds that firm-specific interest rate sensitivity positively and significantly affects profitability, contradicting conventional expectations from cost of capital theory, which predicts a negative correlation because higher borrowing costs reduce profitability (Mishkin, 2007; Myers, 1984). In classical frameworks, higher interest rates typically depress corporate profitability, especially for debt-reliant firms (Tandelilin, 2010).

Theoretically, such monetary tightening restricts credit access and reduces investment by raising hurdle rates (Graham et al., 2015).

However, this empirical anomaly may reflect model misspecification rather than structural segmentation in firm behaviour under monetary stress, especially in emerging markets. Our findings suggest that firms in the ILQ45 index, typically large, liquid, and systemically relevant, may have adaptive structures that enable them to withstand or benefit from higher interest rates. This supports the original research question: How do firm-specific macro sensitivities influence profitability in periods of macroeconomic volatility?

The explanation lies in both firm characteristics and contextual macroeconomic dynamics. First, ILQ45 firms often belong to interest-sensitive sectors such as banking, infrastructure, and utilities, either through positive links to interest income or through regulated, contract-based pricing mechanisms (e.g., long-term concessions indexed to inflation or rates). This is supported by the significant, positive coefficients of the infrastructure and finance sectoral dummies in our regression model.

Second, from a signalling theory perspective (Connelly et al., 2025), firms that perform well during interest rate hikes may send strong positive signals to investors regarding their liquidity, governance quality, and pricing power. Such firms are likely seen as safe harbours in volatile conditions, enhancing their valuation multiples and access to capital (Bartram et al., 2010).

The relatively narrow standard deviation in β^{IR}>(≈ 0.141) but high average value (≈ 2.902) across the sample supports the notion that ILQ45 firms are not only uniformly sensitive to monetary changes but also strategically positioned to convert shocks into opportunities. This key insight fills our highlighted methodological gap: the need for firm-disaggregated macro-financial models (Kim et al., 2025).

Critically, this finding compels us to re-evaluate generalisations about the negative impact of monetary tightening in emerging markets. As Hussain et al. (2021) note, macro effects are not uniform; they depend on firm structure, industry context, and macro-policy regimes. The result implies that macroprudential assessments and corporate risk models must evolve from average-based to firm-level sensitivity frameworks.

For policymakers, the finding highlights the unintended consequences of rate hikes: while they dampen speculative credit, they may simultaneously benefit stronger firms, leading to market consolidation. For investors, it emphasises the importance of selecting firms with high macro-resilience, especially under tightening cycles.

4.2.2. The Effect of Exchange Rate Sensitivity on Firm Profitability

The regression result shows that exchange rate sensitivity (β^{ER}) has a negative but statistically insignificant relationship with firm profitability. This suggests that, while

exchange rate exposure may erode firm-level profitability in theory, the relationship is not statistically robust for ILQ45 firms in Indonesia over 2017-2023. Although the direction of the coefficient aligns with established macro-financial theory, particularly the balance sheet channel, which predicts that currency depreciation inflates foreign-currency liabilities and compresses profit margins (Madura et al., 2018; Obstfeld & Rogoff, 1996), the lack of significance indicates that the relationship does not hold consistently across the sample.

This finding partially addresses the second research question concerning whether firm-specific exchange rate exposure significantly influences profitability. While the negative sign supports the hypothesis that firms more exposed to exchange rate fluctuations would experience lower ROE, the absence of statistical significance implies that exchange rate movements were not a uniform determinant of profitability during the study period.

Several plausible explanations may account for this statistical insignificance. First, many ILQ45 firms likely deploy financial or operational hedging strategies that cushion the impact of currency volatility. Firms engaged in international operations may also benefit from natural hedges through foreign revenue streams that offset increased input costs. Second, the variation in exchange rate exposure across sectors likely dilutes any uniform effect; for instance, firms in consumer goods or domestic banking may be minimally exposed, whereas exporters or infrastructure firms may face more direct risks. Third, the six-year panel spans periods of stability and turbulence, including the pre-pandemic era, the COVID-19 shock, and the post-pandemic monetary tightening, potentially averaging out exchange rate effects over time and masking short-term sensitivities.

Theoretically, this outcome reflects a growing consensus in the literature that macro-financial shocks affect firms asymmetrically, depending on internal characteristics such as size, leverage, and foreign asset-liability positions (Aizenman et al., 2024; Robiyanto et al., 2019). Importantly, few existing studies in the Indonesian context have linked exchange rate movements directly to ROE; most focus on stock returns or revenue effects. Therefore, this study contributes new empirical insight by applying a firm-specific exchange rate beta to fundamental profitability analysis.

Analytically, this finding supports calls in advanced econometrics for more interaction-based modelling. As Wooldridge (2010: 1-737) and Pesaran (2021: 13-50) argue, uniform regressors in heterogeneous samples often mask true causal pathways. Future research would benefit from integrating exchange rate sensitivity with moderating variables such as debt ratio, import dependence, or firm size (Lein et al., 2016), which may condition the strength and direction of the impact on profitability.

In practical terms, the result suggests that exchange rate risk, while real, is not uniformly critical to firm-level performance among Indonesia's largest listed companies. For financial managers, this underscores the strategic value of hedging, revenue diversification, and managing foreign currency liabilities. For regulators, the finding implies that FX risk

may not pose systemic profitability threats equally across all firms, and policy interventions should be targeted, sector-specific, and sensitive to firm heterogeneity.

4.2.3. The Effect of Leverage and Firm Profitability

In contrast, the relationship between leverage (DER) and profitability is negative and statistically significant, confirming traditional expectations. The result aligns strongly with trade-off theory, where excessive debt increases the likelihood of financial distress, especially under adverse macroeconomic conditions (Graham et al., 2015; Myers, 1984).

This finding is particularly important because of its contextual validity. During 2018-2023, Indonesia experienced both interest rate hikes and exchange rate depreciation, macroeconomic conditions that exacerbate debt-servicing burdens. Firms with high DER saw their profitability erode as interest obligations rose and credit markets tightened. The regression coefficient for DER is both economically and statistically significant, suggesting that even marginal increases in debt among already highly leveraged firms can materially impact profitability.

Moreover, from the lens of signalling theory, high leverage during crisis periods may reflect either financial overreach or operational rigidity, both of which can increase equity risk premiums and undermine investor confidence (Connelly et al., 2025; Frank & Goyal, 2009). This contrasts with interest rate sensitivity, which acts as a positive signal, illustrating how macro sensitivity and leverage play opposing roles in firm valuation dynamics.

The descriptive statistics confirm a consistently high but narrow DER across ILQ45 firms (mean ≈ 8.462; SD ≈ 0.0004). While this suggests a uniform capital structure strategy, likely due to Indonesia's bank-centric financing system, it also exposes systemic fragility. When macro shocks occur (e.g., COVID-19 or rate hikes), debt-heavy firms lack the agility to adapt quickly, confirming prior findings by Almeida et al. (2017) and Vithessonthi and Tongurai (2015).

This result addresses the research gap regarding how structural firm features (leverage) interact with macro sensitivities. Although this study does not model it as an interaction term, the consistent significance of DER suggests it may amplify or constrain the transmission of monetary shocks, a direction future research could explore using moderation models or nonlinear frameworks.

For managers, this reinforces the importance of maintaining conservative debt policies, especially in uncertain macroeconomic regimes. For regulators, the result suggests that macroprudential tools should target leverage heterogeneity, not just average exposure, especially among publicly listed and systemically important firms.

4.2.4. The Effect of Firm Size on Firm Profitability

The regression results show that firm size, proxied by the natural logarithm of total assets (LnTA), has a negative and marginally significant effect on profitability. Although the relationship does not meet the conventional 5% significance threshold, it is close enough to warrant further analysis. The negative coefficient indicates that, on average, larger firms within the ILQ45 index tend to exhibit slightly lower return on equity (Nookhwun et al., 2025). This contradicts the conventional expectation that firm size should enhance profitability through scale-based advantages, prompting a reevaluation of assumptions in post-pandemic emerging markets.

This finding only partially supports the research hypothesis, which posits a positive relationship between size and profitability based on the Resource-Based View (RBV) and firm size theory. While larger firms are theoretically endowed with superior access to capital, operational efficiency, and reputational legitimacy (Ayyagari et al., 2021; Barney, 1991), the empirical result suggests that structural limitations may offset these advantages. In Indonesia's corporate landscape, especially among ILQ45 constituents, firm size does not necessarily function as a strategic buffer. Instead, it may introduce financial and operational frictions that reduce agility, increase bureaucratic inertia, and raise fixed costs.

Empirical research has increasingly highlighted the dual nature of firm size in shaping performance under economic stress. For instance, Rajan and Zingales (1995) and Beck et al. (2005) find that larger firms in emerging markets often enjoy preferential access to credit. However, these benefits can be overshadowed by complexity costs, particularly in volatile macro-financial environments. Lin et al. (2022) found that large firms typically bear more rigid capital structures, which hinder strategic responsiveness. These dynamics appear especially relevant in sectors like infrastructure, property, and basic industries heavily represented in the ILQ45 index, which rely on external debt to fund long-gestation projects and are disproportionately exposed to rising interest rates and currency fluctuations.

In the Indonesian context, recent financial disclosures further validate this ambiguous role of firm size. According to PEFINDO (2023). ILQ45 firms with asset values above IDR 100 trillion faced sharp increases in effective borrowing costs during the 2022-2023 monetary tightening phase. Despite their scale, these firms faced credit rating downgrades and profit margin squeezes because of rising foreign-currency liabilities and capital market volatility. This suggests that firm size can become a liability during macroeconomic shocks without operational flexibility and prudent financial management.

Methodologically, the marginal significance and negative sign of the size coefficient challenge the linear modelling assumptions often used in empirical corporate finance. Rather than treating firm size as a purely beneficial explanatory variable, recent scholarship recommends treating it as a moderating or interacting variable that conditions the impact of other macro-financial indicators such as leverage or exchange rate exposure (Al-Shboul et

al., 2021; Wooldridge, 2010). The observed result may reflect nonlinear or conditional effects, where firm size enhances resilience only under specific financial structures or sectoral conditions.

Analytically, this finding enriches the state-of-the-art literature by exposing the limitations of using size as a simplistic proxy for competitive advantage. Rather than supporting the "too big to fail" narrative, the result underscores the strategic trade-offs that large firms must navigate in emerging markets. It aligns with Teece (2018) and Duchek (2020), who argue that long-term competitiveness is shaped not just by scale but also by adaptive capacity and strategic agility qualities that may be diluted in large bureaucratic organisations.

In practical terms, managers of large firms must critically evaluate the risks embedded in their asset-heavy growth models. Size alone does not guarantee profitability without efficient capital allocation, robust risk management, and flexible cost structures. Likewise, investors should be cautious in equating firm size with financial strength, particularly in volatile macroeconomic environments.

From a policy perspective, these findings indicate that financial regulators should not assume systemic resilience based solely on firm size. Macroprudential tools must differentiate not only across sectors but also by firms' scale-efficiency dynamics. Blanket assumptions about the benefits of scale may overlook hidden vulnerabilities, especially in economies like Indonesia, where external shocks are frequent and capital markets remain shallow.

In conclusion, the marginally negative and statistically borderline result for firm size challenges conventional wisdom and opens important questions about the structural trade-offs of corporate scale. It reinforces the need for more nuanced models that capture how size interacts with sectoral context, financial flexibility, and macroeconomic volatility in shaping firm performance.

4.2.5. The Effect of Foreign Transaction Exposure on Firm Profitability

The regression result for the *foreign transaction dummy* variable does not affect firm profitability. This finding suggests that, on average, firms engaged in foreign transactions (dummy=1) do not show significantly different profitability than domestically focused firms (dummy=0), after controlling for other explanatory variables. Several potential explanations exist.

First, the heterogeneity of international operations may dilute the observable effect. Firms differ widely in the structure and intensity of their foreign engagement, from exporting finished goods and importing inputs to holding foreign currency debt or operating international subsidiaries. Because the dummy variable captures only the presence or

absence of foreign transactions, it may obscure important variation in how these exposures translate into profitability (Bartram et al., 2010).

Second, the result may reflect the effectiveness of risk management practices among the sampled firms. Large publicly listed firms in Indonesia, particularly those in the ILQ45 index, may have adopted financial and operational hedging techniques to mitigate exchange rate volatility. These include using forward contracts, natural hedging (matching revenues and costs in the same currency), and flexible pricing arrangements (Graham et al., 2015). Thus, the expected negative effects of foreign exchange exposure may be neutralised in practice, resulting in statistically insignificant net outcomes.

Third, the finding may reflect the macroeconomic context during the study period; if the analysed period featured relatively stable exchange rates or low external shocks, foreign exposure's impact on profitability would be dampened. Alternatively, if global shocks affected all firms similarly (e.g., during synchronised downturns), the relative impact on foreign-exposed firms may not appear significantly different (Claessens et al., 2014).

Theoretically, both the *foreign exchange exposure theory* (Madura et al., 2018) and the *Resource-Based View (RBV)* (Barney, 1991) suggest that internationalisation can affect firm performance. Exchange rate fluctuations, for example, can significantly influence cost structures and financial obligations. At the same time, foreign operations may serve as strategic assets, enabling firms to diversify revenue streams and access new markets. The insignificant result in this study may indicate that these positive and negative forces are balancing each other out, yielding a net effect close to zero. This result has two implications. For scholars, it highlights the limitations of binary dummy variables in capturing the depth and complexity of international exposure. More nuanced measures such as the proportion of foreign sales, foreign debt ratio, or geographic diversification indices could better reveal the actual impact of global engagement (Chakrabarti & Sen, 2023; Hardy, 2023; Tongurai & Vithessonthi, 2022; Zhang et al., 2024). For practitioners, the finding reminds them that merely entering foreign markets does not inherently improve profitability. Success in international operations depends on how well firms manage associated risks and align foreign strategies with overall corporate objectives.

4.2.6. Temporal Shocks and Profitability Across the COVID-19 Period

The regression analysis introduces temporal dummy variables to capture the effects of macroeconomic regime shifts across three distinct periods: pre-COVID (baseline), during-COVID (2020-2021), and post-COVID (2022-2023). The results show that the COVID-period dummy is negative and statistically significant (*B=-4.37E-06; p<0.001*), while the post-COVID dummy is statistically insignificant (*B=1.77E-07; p=0.876*). These findings reveal a clear asymmetry in profitability outcomes: firm performance within the ILQ45 index declined during the height of the pandemic, yet no statistically significant rebound emerged in the post-COVID period relative to the pre-pandemic baseline.

This result supports Hypothesis H6a, which posited that ROE during the COVID-19 period would be significantly lower due to the crisis's disruptive nature. As an exogenous shock, the pandemic severely curtailed firm operations, disrupted supply chains, and collapsed consumer demand. These dynamics align with empirical literature (Carletti et al., 2020; IMF, 2021) and business cycle theory (Kydland & Prescott, 1982), which emphasises abrupt declines in productivity and output during systemic downturns. Even blue-chip firms, typically seen as financially resilient, could not fully shield themselves. This undercuts the conventional assumption of "large-firm immunity" and supports Duchek's (2020) view that resilience depends not on size but on adaptive learning, responsiveness, and flexibility under stress.

In contrast, the insignificant coefficient of the post-COVID dummy raises more complex questions. On the surface, this suggests a return to pre-pandemic profitability levels. However, a deeper interpretation implies that the recovery was heterogeneous and structurally fragmented, with sectoral divergence obscured in the aggregate model. While firms in consumer goods and digital services likely rebounded due to surges in pent-up demand and online channel expansion, those in infrastructure, construction, and real estate faced ongoing fiscal tightening, stalled projects, and inflation-driven input costs (PEFINDO, 2023; Robiyanto et al., 2019). This divergence reflects that macroeconomic recovery does not guarantee a parallel financial recovery across all sectors.

These findings partially support Hypothesis H6b, which anticipated that post-COVID profitability would differ significantly from pre-COVID performance. While the hypothesis is statistically rejected ($p>0.05$), the economic narrative suggests a non-uniform recovery, highlighting the importance of modelling firm-level and sector-specific sensitivity rather than relying solely on temporal aggregates. This insight contributes to the literature by exposing the limitations of treating economic recovery as temporally symmetric or immediate. Banerjee et al. (2020) and Alfaro and Chen (2012) argue that crisis aftermaths evolve through staggered phases, where adaptation, not merely time, determines firm-level rebound.

Moreover, these results highlight a critical methodological and policy implication: failing to account for firm heterogeneity across macro-financial regimes risks misestimating systemic vulnerability. The flat post-COVID coefficient may reflect temporal averaging, where high-performing sectors offset struggling ones, thus hiding deeper volatility. Methodologically, this supports Wooldridge's (2010) argument about the dangers of assuming parameter constancy in panel regressions spanning structurally divergent economic periods.

In practical terms, the post-pandemic recovery should not be viewed as complete or sufficient based solely on a return to mean profitability. Rather, resilience has become more conditional, shaped by sectoral agility, digital transformation, and the capacity to pivot operations. As Teece (2018) emphasises in the dynamic capability framework, recovery is

not passive but results from firm-level learning, resource reconfiguration, and innovation under uncertainty. ILQ45 firms that demonstrated strategic agility such as digital adoption, product line diversification, and supply chain resilience were better positioned to capitalise on emerging post-pandemic opportunities.

From a policy perspective, this finding warns against overly broad fiscal or monetary responses. Aggregate stabilisation may fail to address sectoral distress points. Instead, targeted support mechanisms such as credit restructuring for construction firms or export incentives for manufacturing may be necessary to address sector-specific lag effects. Macroeconomic normalisation alone is insufficient when firm-level vulnerabilities persist because of legacy pandemic disruptions or exposure to external shocks such as exchange rate volatility and interest rate hikes.

This study confirms that COVID-19 caused a statistically and economically significant contraction in firm profitability, even among Indonesia's most prominent corporations. However, the post-pandemic recovery remains incomplete, uneven, and structurally constrained, revealing that resilience is not automatic but must be strategically cultivated. Using regime-sensitive dummy variables effectively captures this temporal dynamic and deepens understanding of macro-financial transmission in emerging markets.

4.2.7. Dummy Variables for Industry Classification

Including industry classification dummy variables is crucial for capturing structural heterogeneity across sectors, which is particularly important in macro-financial empirical models. Firms operate under diverse sectoral environments that influence their cost structures, capital intensity, risk exposures, and responses to macroeconomic shocks. Without accounting for this variation, econometric analyses risk conflating sector-specific dynamics with broader systemic effects, thereby misestimating the impact of key explanatory variables.

Empirical research consistently finds that the influence of macroeconomic variables, such as interest rates, exchange rates, and inflation, varies across sectors. For instance, Mishkin (2007) highlights how monetary policy changes transmit differently across industries because of varying interest sensitivity. With their long investment horizons and reliance on external debt financing, infrastructure and basic industries are more exposed to interest rate fluctuations. Conversely, consumer goods and retail sectors tend to respond more to changes in household income and inflation expectations.

Bekaert et al. (2023) further elaborate that industry-level financial resilience depends on structural features such as operating leverage, access to international capital markets, and supply chain dependencies. These characteristics affect profitability and firms' ability to adapt to macroeconomic stressors. Cakici and Zaremba (2021) support this view, arguing that incorporating industry dummies significantly improves model robustness by controlling

for sector-specific operational constraints and institutional factors such as regulation, technological innovation, and export orientation.

In the Indonesian context, the ILQ45 index includes firms across industries, including state-owned enterprises (SOEs), financial institutions, consumer conglomerates, and commodity-based firms. These firms differ markedly in their exposure to political risks, capital structure policies, and market orientation. For example, SOEs in the energy and transport sectors may benefit from implicit government guarantees or preferential access to credit, but may also face bureaucratic inefficiencies or politicised investment mandates (Febriaty, 2019; Taufikurahman & Firdaus, 2019). In contrast, private-sector financial firms are more closely linked to monetary policy channels and market interest rate cycles, making them highly sensitive to central bank policy shifts.

Therefore, introducing industry classification dummy variables allows for more accurate attribution of changes in firm performance to macroeconomic variables, rather than confounding sectoral characteristics. These variables help isolate sector-specific responses and enhance the interpretability and policy relevance of the regression results.

In brief, sectoral dummy variables are an essential econometric tool for controlling institutional and operational heterogeneity. Their integration strengthens the model's explanatory power and aligns the analysis with best practices in empirical finance research on firm-level vulnerability to macroeconomic shocks.

5. Conclusion

This study investigates the effect of macro-financial variables interest rate sensitivity, exchange rate sensitivity, leverage, firm size, and temporal regime shifts on firm profitability using firm-level panel data from Indonesia's ILQ45 index from 2017 to 2023. The findings offer a nuanced view of how large-cap firms in emerging markets respond to monetary tightening, currency volatility, and systemic disruptions such as the COVID-19 pandemic. First, interest rate sensitivity is found to have a positive and significant effect on profitability, indicating that some ILQ45 firms exhibit resilience or strategic adaptability to monetary tightening, a result that challenges conventional theory but aligns with signalling and dynamic capability perspectives. Second, leverage (DER) significantly and negatively affects ROE, reaffirming financial fragility under high-debt conditions, especially amid rising interest rates and external shocks. Third, exchange rate sensitivity, while negative, is statistically insignificant, suggesting heterogeneous firm exposures and potential hedging mechanisms that buffer currency risk. Fourth, firm size (LnTA) also shows a negative but marginally insignificant relationship, indicating that scale does not automatically confer profitability advantages under volatile macroeconomic conditions. Lastly, temporal dummy analysis reveals that profitability declined significantly during COVID-19, while the post-COVID effect was insignificant, indicating an uneven and incomplete recovery across sectors.

While our discussion contrasts sectors with stronger or weaker profitability during and after COVID-19, a complementary lens emphasises capability-driven adaptability: differences in risk-management discipline, pricing power, supply-chain optionality, and digital adoption largely explain the divergence we observe, turning comparisons into actionable levers for firms (Duchek, 2020; Teece, 2018).

Despite its contributions, this research has limitations. The study relies on linear panel regression models, which may fail to capture nonlinear dynamics or interaction effects between financial structure and macro shocks, particularly in high-volatility environments. Additionally, firm-level sensitivities derived from rolling regressions assume temporal stationarity within each sub-period, potentially masking intra-period volatility or regime transitions. Sectoral fixed effects were included via dummies, but the analysis stops short of running sector-disaggregated models, which could uncover more granular patterns of macro-financial transmission. Moreover, this research is limited to listed, large-cap firms (ILQ45), restricting generalizability to SMEs or firms outside the formal capital market. Finally, measurement constraints related to firm-specific sensitivity coefficients (β) may contain estimation error or omitted variable bias due to unobserved factors such as management quality or operational agility.

This study advances the theoretical conversation in corporate finance and macroeconomics by reinforcing the need for firm-specific modelling in crisis-sensitive environments. It highlights that the impact of macro-financial variables is heterogeneous, contingent, and often moderated by internal capabilities, thus supporting theories of firm-level dynamic capabilities (Teece, 2018) and financial resilience (Duchek, 2020). Future research should expand by incorporating interaction effects (e.g., leverage × exchange rate sensitivity), applying nonlinear models or regime-switching techniques, and extending the scope to include SMEs, ESG metrics, or digital transformation indicators. The COVID-19 period also underscores the need for multi-phase crisis modelling that moves beyond binary pre-post comparisons. For emerging market studies, the Indonesian context provides a compelling testbed for theories of financial governance, capital structure optimisation, and macro-prudential adaptation in developing economies.

The results imply three priorities for firm policy in a persistently volatile macro-financial environment. First, de-risk balance sheets by setting explicit DER targets with counter-cyclical buffers, staggering maturities, and preserving refinancing headroom; these steps mitigate the amplification of rate and FX shocks through capital structure (Laeven & Valencia, 2020). Second, institutionalise FX and interest-rate risk management by expanding natural hedges (currency matching of revenues and costs), using derivatives within board-approved limits, and embedding index-linked pass-through clauses where bargaining power allows; extensive evidence links disciplined hedging to more stable cash flows and valuation (Gabaix & Maggiori, 2015). Third, improve operational agility through tighter working-capital discipline, diversified supplier networks, and data-driven demand

forecasting, protecting margins as shocks propagate through costs and volumes (Bekaert et al., 2023).

Given heterogeneous recovery paths, these actions should be nuanced by sector. Interest-sensitive businesses such as financials and infrastructure can use pricing and concession mechanisms to sustain ROE during tightening, while construction and property can benefit from deleveraging roadmaps, phased project pipelines, and stronger pre-sale or pre-lease discipline. Consumer-facing firms can protect profitability via product-mix optimisation and calibrated, data-informed price adjustments tied to input-cost indices. Framed through the dynamic-capabilities literature, post-COVID recovery is more robust when conservative leverage is paired with flexible cost structures and real-options-style capex (stage gates, modularity), enabling rapid reconfiguration as conditions shift (Duchek, 2020; Teece, 2018).

References

Aizenman, J. et al. (2024), "International Reserve Management and Firm Investment in Emerging Market Economies", *Open Economies Review*, 36, 503-540.

Alabdulkarim, N. et al. (2024), "The Impact of Firm Size on the Relationship Between Leverage and Firm Performance: Evidence from Saudi Arabia", *Humanities and Social Sciences Communications*, 11, 1664.

Albuquerque, R. et al. (2020), "Resiliency of Environmental and Social Stocks: An Analysis of The Exogenous COVID-19 Market Crash", *The Review of Corporate Finance Studies*, 9(3), 593-621.

Alfaro, L. & M.X. Chen (2012), "Surviving the Global Financial Crisis: Foreign Ownership and Establishment Performance", *American Economic Journal: Economic Policy*, 4(3), 30-55.

Almeida, H. et al. (2017), "The Real Effects of Credit Ratings: The Sovereign Ceiling Channel", *The Journal of Finance*, 72(1), 249-290.

Al-Shboul, M. et al. (2021), "The Moderating Influence of Corporate Debt on the Relationship between Free-Floating Shares and Stock Market Liquidity: Is the Effect Asymmetric?", *SSRN*, 4192984.

Ayyagari, M. et al. (2021), "How Common Are Credit-Less Recoveries? Firm-Level Evidence on the Role of Financial Markets in Crisis Recovery", *Journal of Corporate Finance*, 69, 102016.

Banerjee, R.N. et al. (2020), *COVID-19 and Corporate Sector Liquidity*, BIS Bulletin No. 10.

Barney, J. (1991), "Firm Resources and Sustained Competitive Advantage", *Journal of Management*, 17(1), 99-120.

Bartram, S.M. et al. (2010), "Resolving the Exposure Puzzle: The Many Facets of Exchange Rate Exposure", *Journal of Financial Economics*, 95(2), 148-173.

Beck, T. et al. (2005), "Financial and Legal Constraints to Growth: Does Firm Size Matter?", *The Journal of Finance*, 60(1), 137-177.

Bekaert, G. et al. (2023), "Emerging Equity Markets in A Globalized World", *Emerging Markets Review*, 56, 101034.

Bellemare, M.F. & C.J. Wichman (2020), "Elasticities and the Inverse Hyperbolic Sine Transformation", *Oxford Bulletin of Economics and Statistics*, 82(1), 50-61.

Bernanke, B.S. (2022), *21st Century Monetary Policy: The Federal Reserve from the Great Inflation to COVID-19*, WW Norton & Company.

Booth, L. et al. (2006), "Capital Structures in Developing Countries", *A Reader in International Corporate Finance*, 2, 199-242.

Burbidge, J.B. et al. (1988), "Alternative Transformations to Handle Extreme Values of the Dependent Variable", *Journal of the American Statistical Association*, 83(401), 123-127.

Cakici, N. & A. Zaremba (2021), "Size, Value, Profitability, and Investment Effects in International Stock Returns: Are They Really There?", *The Journal of Investing*, 30(4), 65-86.

Carletti, E. et al. (2020), "The COVID-19 Shock and Equity Shortfall: Firm-Level Evidence from Italy", *The Review of Corporate Finance Studies*, 9(3), 534-568.

Chakrabarti, P. & S. Sen (2023), "Foreign Currency Borrowing and Risk Exposure of Firms: An Emerging Market Economy Viewpoint", *Journal of Policy Modeling*, 45(6), 1246-1261.

Cheong, C. & H.V. Hoang (2021), "Macroeconomic Factors or Firm-Specific Factors? Examining the Impact on Corporate Profitability Before, During, and After the Global Financial Crisis", *Cogent Economics & Finance*, 9(1), 1959703.

Claessens, M.S. et al. (2014), *Financial Crises: Causes, Consequences, and Policy Responses*, International Monetary Fund.

Connelly, B.L. et al. (2025), "Signaling Theory: State of the Theory and Its Future", *Journal of Management*, 51(1), 24-61.

Damodaran, A. (2012), *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, John Wiley & Sons.

Du, W. & J. Schreger (2016), "Local Currency Sovereign Risk", *The Journal of Finance*, 71(3), 1027-1070.

Duchek, S. (2020), "Organizational Resilience: A Capability-Based Conceptualization", *Business Research*, 13(1), 215-246.

Fajgelbaum, P.D. et al. (2020), "The Return to Protectionism", *The Quarterly Journal of Economics*, 135(1), 1-55.

Fan, J.P. et al. (2012), "An International Comparison of Capital Structure and Debt Maturity Choices", *Journal of Financial and Quantitative Analysis*, 47(1), 23-56.

Febriaty, H. (2019), "The Effect of Economic Indicators on the Movement of the Composite Stock Price Index in the Indonesian Stock Exchange", *Journal of International Conference Proceedings*, 2(1), 432-810-2-PB.

Frank, M.Z. & V.K. Goyal (2009), "Capital Structure Decisions: Which Factors Are Reliably Important?", *Financial Management*, 38, 1-37.

Gabaix, X. & M. Maggiori (2015), "International Liquidity and Exchange Rate Dynamics", *The Quarterly Journal of Economics*, 130(3), 1369-1420.

Góes, C. et al. (2017), *Spillovers from US Monetary Policy Normalization on Brazil and Mexico's Sovereign Bond Yields*, International Monetary Fund.

Graham, J.R. et al. (2015), "A Century of Capital Structure: The Leveraging of Corporate America", *Journal of Financial Economics*, 118(3), 658-683.

Gujarati, D.N. (2021), *Basic Econometrics*, Sage Publications.

Hamilton, J.D. (2016), "Macroeconomic Regimes and Regime Shifts", NBER *Working Paper*, 21863.

Hardy, B. (2023), "Foreign Currency Borrowing, Balance Sheet Shocks, and Real Outcomes", *Journal of International Money and Finance*, 139, 102969.

Hasudungan, A. et al. (2023), *Indonesia Economic and Business Outlook 2023*, Prasetiya Mulya Publishing.

Husnan, S. (2015), *Dasar-dasar Teori Portofolio dan Analisis Sekuritas* (3 ed.), UPPN STIM YKPN.

Hussain, S. et al. (2021), "Macroeconomic Factors, Working Capital Management, and Firm Performance - A Static and Dynamic Panel Analysis", *Humanities and Social Sciences Communications*, 8(1), 123.

IMF (2021), *World Economic Outlook (Recovery During A Pandemic)*, October.

Jermann, U. & V. Quadrini (2012), "Macroeconomic Effects of Financial Shocks", *American Economic Review*, 102(1), 238-271.

Karaca, C. et al. (2025), "Inverted U-Shaped Dynamics of Capital Structure and Firm Value: Evidence from Emerging Markets", *Borsa Istanbul Review*, 25(5), 939-952.

Kim, S. et al. (2025), "Interest Rate Sensitivities, Firm Growth Rates, and Stock Returns", *SSRN*, 5251618.

Kydland, F.E. & E.C. Prescott (1982), "Time to Build and Aggregate Fluctuations", *Econometrica*, 50(6), 1345-1370.

Laeven, L. & F. Valencia (2020), "Systemic Banking Crises Database II", *IMF Economic Review*, 68(2), 307-361.

Lein, S.M. et al. (2016), "How Large Is the Financial Accelerator? Some Evidence from Firm-Level Data", *VfS Annual Conference 2016* (Augsburg): Demographic Change 145600, Verein für Socialpolitik / German Economic Association.

Lin, C.-Y. et al. (2022), "Monetary Policy Shocks and Corporate Financing Decisions", *SSRN*, 4054389.

Madura, J. et al. (2018), *International Financial Management*, Cengage.

Mishkin, F. (2007), *Money, Banking, and Financial Markets*, New Horizons.

Myers, S.C. (1984), "The Capital Structure Puzzle", *The Journal of Finance*, 39, 574-592.

Nookhwun, N. et al. (2025), "Exchange Rate Effects on Firm Performance: A NICER Approach", PIER *Discussion Papers* 233, Puey Ungphakorn Institute for Economic Research.

Obstfeld, M. & K. Rogoff (1996), *Foundations of International Macroeconomics*, MIT Press.

PEFINDO (2023), *The Default Study of Corporate and Corporate Debt Securities Rated by Pefindo Period of 2007-2023*, PEFINDO Credit Rating Agency, Economic Research Division.

Pesaran, M.H. (2021), "General Diagnostic Tests for Cross-Sectional Dependence in Panels", *Empirical Economics*, 60(1), 13-50.

Rajan, R.G. & L. Zingales (1995), "What Do We Know about Capital Structure? Some Evidence From International Data", *The Journal of Finance*, 50(5), 1421-1460.

Robiyanto, R. et al. (2019), "The Indonesian Stock Exchange and Its Dynamics: An Analysis of The Effect of Macroeconomic Variables", *Montenegrin Journal of Economics*, 15(4), 59-73.

Rokhmawati, A. et al. (2024), "The Nexus of Interest Rate, Foreign Exchange Rate, Profitability, and Leverage on Stock Returns in the Indonesian LQ45 Companies", in: Z.B. Pambuko et al. (eds.), *Proceedings of 5th Borobudur International Symposium on Humanities and Social Science (BISHSS 2023)* (21-32), Advances in Social Science, Education and Humanities Research 856.

Ross, S.A. (1977), "The Determination of Financial Structure: The Incentive-Signalling Approach", *The Bell Journal of Economics*, 8(1), 23-40.

Shen, H. et al. (2020), "The Impact of the COVID-19 Pandemic on Firm Performance", *Emerging Markets Finance and Trade*, 56(10 - Special Issue: Research on Pandemics), 2213-2230.

Tai, C.-S. (2024), "Is the Exchange Rate Exposure Puzzle Really A Puzzle? International Evidence", *Managerial Finance*, 50(8), 1444-1461.

Tandelilin, E. (2010), *Portofolio dan Investasi: Teori dan Aplikasi*, Kanisius.

Taufikurahman, M.R. & A.H. Firdaus (2019), "The Economic Consequences and Strategies of The US-China Trade War on Indonesia: A GTAP Simulation Analysis", *International Conference on Trade 2019 (ICOT 2019)* (102-107), Advances in Economics, Business and Management Research, Volume 98.

Teece, D.J. (2018), "Business Models and Dynamic Capabilities", *Long Range Planning*, 51(1), 40-49.

Tirole, J. (1988), *The Theory of Industrial Organization*, MIT Press.

Tongurai, J. & C. Vithessonthi (2022), "Learning, Foreign Operations, and Operating Performance", *Global Finance Journal*, 52, 100721.

Ujkani, X. & A. Gara (2023), "Determinants of the Inflation Rate: Evidence from Panel Data", *ECONOMICS - Innovative and Economics Research Journal*, 11(2), 169-182.

Vithessonthi, C. & J. Tongurai (2015), "The Effect of Firm Size on the Leverage-Performance Relationship during the Financial Crisis of 2007-2009", *Journal of Multinational Financial Management*, 29, 1-29.

Wooldridge, J.M. (2010), *Econometric Analysis of Cross-Section and Panel Data*, MIT Press.

Zhang, J. et al. (2024), "The Internationalization-Environmental Performance Relationship: Does It Differ between MNEs in Advanced and Less Advanced Economies?", *Business Strategy and the Environment*, 33(7), 6125-6138.

Zhou, N. & S.H. Park (2024), "Decomposing Firm Performance in Emerging Markets: The Difference between Growth and Profit", *Management and Organization Review*, 20(2), 316-335.

Rokhmawati, A. & N. Yahya & Y. Maulida & A.P. Atami (2026), “Firm-Level Profitability Under Macroeconomic Stress: Evidence from Interest Rate, Exchange Rate, And Pandemic Regime Sensitivities in Indonesia's ILQ45 Firms”, *Sosyoekonomi*, 34(70), 155-187.

Sosyoekonomi

2026, Vol. 34(70), 189-216

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.08
Date Submitted: 25.07.2025
Date Revised: 24.12.2025
Date Accepted: 02.09.2026

Export-Led Growth, Foreign Direct Investment, and Carbon Emissions: CCE-Based Panel ARDL Evidence from Newly Industrialised Countries

Ahmet DEMİRALP *(https://orcid.org/0000-0002-0981-7215), Harran University, Türkiye; ahmetdemiralp@harran.edu.tr*

Ayşe CEBECİ *(https://orcid.org/0000-0003-2973-2021), Harran University, Türkiye; 183171@gmail.com*

İhracat Odaklı Büyüme, Doğrudan Yabancı Yatırım ve Karbon Emisyonu: Yeni Sanayileşmiş Ülkelerden CCE Tabanlı Panel ARDL Kanıtları

Abstract

This study examines the impacts of economic growth, exports, and FDI on per capita CO_2 emissions in NICs (1982-2023). Employing CCE-based Panel ARDL and causality tests, the findings provide no long-run support for the EKC hypothesis. In the linear specification, economic growth increases emissions in the short run, while the causality results identify exports as the most consistent transmission channel to CO_2 emissions. Conversely, FDI exhibits no significant association with carbon emissions, suggesting that pollution is more closely linked to national production structures than foreign capital. These findings highlight the carbon-intensive nature of export-oriented development in NICs and the need for greener export strategies.

Keywords : Foreign Direct Investment, Exports, CO_2 Emissions, EKC hypothesis, CCE-based Panel ARDL.

JEL Classification Codes : C33, F18, O44, Q56.

Öz

Bu çalışma, ekonomik büyüme, ihracat ve doğrudan yabancı yatırımların (FDI) yeni sanayileşmiş ülkelerdeki (NIC) kişi başına CO_2 emisyonları üzerindeki etkilerini incelemektedir (1982-2023). CCE tabanlı Panel ARDL ve nedensellik testleri kullanılarak elde edilen bulgular, EKC hipotezini uzun vadede desteklememektedir. Doğrusal modelde ekonomik büyüme kısa dönemde emisyonları artırırken, nedensellik sonuçları ihracatı CO_2 emisyonuna yönelik en tutarlı aktarım kanalı olarak göstermektedir. Buna karşılık, doğrudan yabancı yatırımların karbon emisyonlarıyla önemli bir ilişkisi bulunmamaktadır; bu da kirliliğin yabancı sermayeden çok ulusal üretim yapılarıyla daha yakından bağlantılı olduğunu göstermektedir. Bu bulgular, yeni sanayileşmiş ülkelerde ihracata dayalı kalkınmanın karbon yoğun niteliğini ve daha yeşil ihracat stratejilerine duyulan ihtiyacı ortaya koymaktadır.

Anahtar Sözcükler : Doğrudan Yabancı Yatırım, İhracat, CO_2 Emisyonu, EKC hipotezi, CCE-tabanlı Panel ARDL.

1. Introduction

Neoliberal policies implemented worldwide in the 1980s expanded the geographical scope of capital accumulation. During this period, many countries opened numerous sectors, including areas of state activity, to capital accumulation through various structural transformation programs. This process, defined as globalisation, aimed to remove barriers to capital movements; mainstream economic thinking considered increasing foreign direct investment, encouraging export-based development models, and internationalising all forms of capital to be fundamental components of economic growth and development. However, this rapid growth and development process has led to the rapid destruction of natural resources and increased environmental pollution. Proponents of these policies have largely ignored the destructive effects of this process on labour markets and ecological systems, prioritising capital expansion over environmental sustainability.

In this context, representing the mainstream perspective, the IMF report takes a more positive view of trade liberalisation. Based on various empirical studies, the report argues that trade liberalization improves environmental conditions rather than harming the environment, and that negative effects stem mainly from the failure to price environmental resources correctly and from the failure of the market and the state in this area (Uimonen et al., 1995: 81). However, those who hold this view often fail to take into account the dynamics of the capitalist system and the structural compulsion of capital accumulation. Export-oriented growth strategies developed for world markets have increased competition among individual capitals producing in the global market, creating pressure on production costs. As a result, regions where production costs can be minimised have become more attractive for investment, and countries that meet capital demands have begun to attract more FDI. However, some countries have criticised this process because environmental standards are being neglected, leading to unfair competition in international trade.

At the international level, the re-regulation of environmental standards and the pricing of nature-related values in the market have also intensified competition between countries. In this process, many studies have pointed out that it is inherently unfair for developed countries, which have historically caused more polluting emissions, to bear the same environmental costs as developing or Least Developed Countries. The United Nations Environment Programme's Emission Gap Report 2023 also highlights this inequality. The report states that developed countries are responsible for a large portion of cumulative carbon emissions between 1850 and 2021. The United States has been the largest emitter during this period, followed by the European Union and China. Together, the US and the EU account for approximately one-third of total emissions during this period (UNEP, 2023: 8).

Roberts & Parks (2007: 146), who contribute to this debate with the concept of "climate debt", reveal that developed countries have contributed significantly to historical carbon emissions. Within this framework, the "polluter pays principle" (PPP), which is becoming increasingly established in international environmental agreements, holds that

countries that cause environmental damage should bear the cost. Indeed, because developed countries have strict environmental regulations and high standards, production has become more costly there, leading some companies to relocate to developing countries with less stringent environmental regulations.

This situation is explained in the literature by two main concepts: the first is the "pollution haven hypothesis", which suggests that pollution-intensive industries migrate to countries with lax regulations, and the second is the phenomenon of "carbon leakage", which is a direct result of climate policies whereby emission reductions in one country lead to an increase in emissions in another (Copeland & Taylor, 2004; Cole, 2004; OECD, 2007). However, low environmental regulations alone are insufficient to drive companies to countries with lax environmental standards because these regulations create cost pressures. The investment climate in these countries must also suit multinational companies.

For this reason, the study focuses on the Newly Industrialised Countries (NIC) group, expecting that potential impacts will be more observable here than in the least developed countries. As these countries occupy a semi-peripheral position in the global value chain, they serve as the primary destination for relocated industrial production. This group of countries has a structure that allows more clearly observed environmental impacts, due to both their high growth performance and increasing openness to the outside world. Additionally, these countries' more flexible environmental regulations and greater capacity to attract foreign investment compared to developed countries provide a meaningful basis for analysing the effects of FDI, exports, and economic growth on CO_2 emissions. In particular, despite the extensive literature on the growth-environment nexus, empirical studies that jointly examine the environmental implications of economic growth, exports, and FDI in NICs within a single analytical framework remain limited. This study's original contribution lies in treating these variables not merely as control factors, but as primary determinants reflecting NICs' structural integration into the global capitalist market.

Within this framework, the study primarily examines the tripartite relationship between foreign direct investment, exports, and economic growth in shaping CO_2 emissions in NICs. To achieve a comprehensive analysis, the research adopts a stepwise empirical strategy. First, the study estimates a linear model to identify the direct effects of these three core variables. Next, the analysis is extended to assess whether the Environmental Kuznets Curve (EKC) hypothesis holds for this country group by examining potential non-linear effects of income growth while keeping FDI and exports as central determinants. The analysis treats exports and FDI as primary channels through which economic growth and international integration influence environmental outcomes, rather than as secondary or merely independent drivers of environmental degradation. This shift from a linear to a nonlinear framework allows an assessment of whether the income-emissions relationship changes at higher income levels while controlling for FDI and exports.

Mainstream studies on the environmental impacts of economic growth in developing countries have addressed the issue within the context of the EKC, arguing that as growth

increases, so do polluting effects, but that this effect decreases over time once a certain threshold is reached. Although Grossman & Krueger (1995: 370-372) suggest that some countries may abandon the production of environmentally polluting products and instead import them from countries with lower environmental protection standards, they argue that this situation is not sustainable in the long term and that the environmental impacts of economic growth will decrease over time.

However, the critical literature does not share such an optimistic view. For example, Jorgenson (2007: 137), whose work can be evaluated within the framework of critical environmental sociology and Marxist world-system theory, has highlighted the negative environmental impacts of foreign direct investment directed toward developing countries. Using panel data from 1980-2000, he has shown that increases in FDI in less developed countries have increased environmental damage.

Against this background, this study jointly examines the effects of economic growth, exports, and FDI on CO_2 emissions in NICs from a critical political economy perspective. By comparing linear and nonlinear income specifications, it assesses whether the income-emissions relationship changes across development levels while accounting for FDI and exports.

The rest of the study is organised as follows: The second section discusses the research's theoretical framework. The third section provides a comprehensive summary of the relevant literature. The fourth section introduces the data set used and explains the model established and the method followed in detail. The fifth section analyses and discusses the empirical findings obtained. The sixth and final section summarises the study's main findings and presents conclusions for policymakers.

2. Theoretical Framework

2.1. Economic Growth and CO_2 Emissions

Since the Industrial Revolution, global carbon emissions have increased steadily, a trend often linked to population growth and expanding economic activity. Early theoretical contributions to this debate include the IPAT model developed by Ehrlich & Holdren (1971), which conceptualises environmental impact as the multiplicative effect of population, affluence, and technology. Dietz & Rosa (1994, 1997) later extended this framework through the STIRPAT model, enabling empirical analysis of how these factors jointly shape environmental degradation.

Meadows et al. (1972) further articulated concerns about the ecological limits of economic expansion in *The Limits to Growth* report, using system dynamics modelling to argue that continuous economic and population growth would eventually exceed planetary boundaries. This perspective emphasises that environmental pressure is driven not only by demographic factors but also by the scale and structure of production systems.

Building on this line of inquiry, Steffen et al. (2015) identify the post-1950s period as the "Great Acceleration," characterised by a rapid intensification of fossil fuel-based production and capital accumulation following World War II. While population growth contributed to this process, expanding production and consumption emerged as the dominant drivers of rising carbon emissions.

In contrast to growth-critical approaches, neoclassical environmental economics introduced the EKC hypothesis (Grossman & Krueger, 1991), which commonly proposes an inverted-U-shaped relationship between income and environmental degradation. According to the EKC, environmental pressure increases in the early stages of economic development but declines beyond a certain income threshold due to technological progress, structural change, and improved environmental regulation. This framework has been widely employed in empirical studies examining the growth-environment nexus.

However, critical environmental sociology and political economy have strongly challenged the EKC hypothesis. Scholars such as Jorgenson (2007) argue that observed environmental improvements in advanced economies often result from relocating pollution-intensive production to countries with lower environmental standards through global trade and foreign direct investment. From this perspective, CO_2 emissions should be analysed not only in relation to income levels but also in terms of countries' positions within the international division of labour.

Critical political economy approaches further locate environmental degradation in capitalism's structural logic. O'Connor (1998) emphasises capitalism's tendency to undermine its own social and ecological foundations, while Foster (1999) conceptualises this process as a "metabolic rift" between human societies and nature. Within this framework, the growth-emissions relationship in NICs is shaped by both domestic growth dynamics and their integration into global production networks. Accordingly, this study examines whether the growth-emissions nexus in NICs follows a linear or non-linear trajectory, while accounting for the roles of exports and FDI.

2.2. Exports and CO_2 Emissions

Since the 1980s, developing countries have shifted away from inward-oriented industrialisation models and adopted outward-oriented, export-based industrialisation strategies. With the removal of state protection on productive capital, local producers have increasingly been compelled to compete in global markets by lowering production costs. Relatively low labour and production costs compared to developed countries have created a competitive advantage for these economies. However, producing for global rather than domestic markets has substantially increased trade volumes and expanded economic activity, thereby intensifying environmental degradation through the scale effect (Antweiler et al., 2001: 5, 11; Managi et al., 2009: 354). Beyond the scale effect, export-oriented development strategies have also altered countries' production structures. In the literature, the composition effect refers to the tendency for increased trade openness to shift production

toward sectors that generate more serious environmental damage. Conversely, the technique effect suggests that trade may reduce environmental pressures by facilitating the diffusion of cleaner production technologies and improving production efficiency (Antweiler et al., 2001: 11). These effects highlight the theoretically ambiguous relationship between exports and environmental outcomes.

Early empirical studies adopting a relatively optimistic perspective argue that outward-oriented growth strategies may contribute to environmental improvement under certain conditions. Birdsall & Wheeler (1993), in their econometric analysis covering the period 1960-1988, find that trade liberalisation in Latin American countries was associated with cleaner industrial production, particularly in the wood pulp sector. Similarly, Wheeler & Martin (1992) report that between 1969 and 1991, 60 developing countries invested in cleaner technologies to reduce industrial pollution, suggesting that export-oriented growth may generate environmentally beneficial outcomes when supported by appropriate policy frameworks and institutional capacity.

Copeland & Taylor (1994) provide a seminal theoretical framework for analysing the trade-environment nexus in a North-South context. They argue that trade liberalisation may initially lead developing countries to specialise in pollution-intensive production due to weaker environmental regulation. At the same time, they emphasise that income gains from openness can increase the demand for environmental quality over time, while showing that in an open economy the composition effect often dominates the scale and technique effects, resulting in higher overall pollution levels.

Despite these conditional optimistic arguments, a growing body of empirical literature indicates that trade liberalisation tends to increase carbon emissions in the short run, especially in developing countries where environmental regulations remain weak. Dean et al. (2009), in their study on China, examine the environmental impacts of foreign trade and foreign direct investment and find that increased trade openness contributes to higher carbon emissions. Similarly, Managi et al. (2009) show that carbon emissions rise with increasing trade volume, particularly in export-oriented economies. Taken together, this literature suggests that export-oriented production strategies tend to increase carbon emissions, particularly in the short run and in developing countries, while the emission-reducing effects of technological progress remain conditional on sectoral composition, policy support, and institutional capacity.

2.3. Foreign Direct Investment and CO_2 Emissions

The environmental impacts of FDI, particularly in developing and newly industrialised countries, have long been debated. One key concept at the centre of these debates is the Pollution Haven Hypothesis (PHH). PHH posits that multinational corporations operating in developed countries with stringent environmental regulations shift their production to developing countries with more lenient environmental standards (Copeland & Taylor, 2004: 9; Cole & Elliott, 2005: 530). In particular, the NIC group, which

follows an export-driven growth strategy, attempts to attract FDI by downplaying environmental protection standards, thereby transforming these countries into potential pollution havens (Jorgenson, 2007: 137; Dean et al., 2009: 1). The aim of closing the investment and foreign exchange-based capital gap required for the development process of these countries through FDI encourages the provision of various facilities to multinational companies. In this context, political authorities seek the favourable investment environments demanded by investor companies (Cebeci, 2012: 280).

However, some studies suggest that foreign direct investment can reduce environmental impacts by increasing efficiency through technology transfer. For instance, one of the earliest and most influential empirical studies challenging the PHH is Eskeland & Harrison (2003). Examining U.S. FDI in four developing countries, the authors compare the pollution intensity of multinational firms with that of domestic firms operating in the same sectors. Their findings indicate that foreign-owned firms are, on average, less pollution-intensive than local firms, providing empirical support for what is later conceptualised as the Pollution Halo Hypothesis. According to this perspective, multinational enterprises may transfer cleaner technologies, superior management practices, and higher environmental standards to host countries, thereby mitigating environmental degradation rather than exacerbating it (Eskeland & Harrison, 2003).

In practice, however, FDI tends to flow to countries with low labour and resource costs and weak environmental regulations and oversight mechanisms (Zarsky, 1999: 1, 2). Therefore, the environmental impacts of FDI may vary depending on both the effectiveness of the host country's environmental policies and the investing companies' ethical production preferences. In this context, the International Monetary Fund (IMF, 2022: 72) considers not only the countries receiving FDI but also the countries of origin as responsible actors. According to the IMF, multinational companies should be encouraged to meet environmental and emission standards not only in their home countries but also in other countries where they operate to reduce global emissions. It is also emphasised that companies should be supported with policies aimed at reducing carbon emissions throughout their supply chains.

The shift of direct foreign investment to countries with low environmental standards to gain a cost advantage is referred to in the literature as carbon leakage. Mechanisms such as carbon pricing, carbon taxes, and emissions trading systems increase costs for multinational companies operating in high-emission sectors. This situation is driving companies to countries where regulation is weak or non-existent (Peters & Hertwich, 2008: 1404; Böhringer et al., 2012: 16). As a result of carbon pricing and the establishment of emissions trading systems in developed countries, some companies have shifted their investments to countries outside this system. Thus, while a global reduction in carbon emissions is expected, in reality, emissions merely shift geographically; total emission levels do not decrease but are transferred to developing countries.

Beken & Cebeci (2024: 115) note that the European Union's Carbon Border Adjustment Mechanism (CBAM) aims to limit this problem, but it also creates new inequalities for developing countries. The authors argue that this process should be viewed as a contentious transformation with environmental, economic, and geopolitical dimensions.

3. Literature Review

Studies examining the determinants of CO_2 emissions have expanded considerably, incorporating a wide range of economic, demographic, and technological factors into empirical analyses. Rather than being confined to a single theoretical framework, this literature encompasses diverse empirical approaches that analyse the roles of economic growth, FDI, trade, and energy-related factors in shaping CO_2 emissions. While some studies explicitly test the EKC hypothesis, many others treat income growth as one of several macroeconomic drivers influencing emissions without adopting an EKC framework. In this context, the present study focuses on the growth-emissions relationship in NICs and incorporates FDI and exports as key macroeconomic factors. To situate this analytical focus within the broader empirical literature, Table 1 summarises selected studies examining the interrelationships among CO_2 emissions, economic growth, FDI, exports, and related factors.

Table: 1
Summary of Empirical Literature

Authors	Country / Period	Variables	Methods	Findings
Selden & Song (1994)	OECD countries / 1973-1984	CO_2, GDP	Panel regression analysis	Evidence of an inverted-U relationship between income and emissions
Moomaw & Unruh (1997)	16 OECD countries / 1950-1992	CO_2, GDP	Panel regression analysis	EKC-type relationships appear in reduced-form models, but CO_2 emission declines are driven by historical shocks and structural transitions rather than income growth.
Pao & Tsai (2011)	BRIC / 1980-2007	CO_2, FDI, EC, GDP	Panel cointegration and causality test	The findings support the EKC hypothesis and the PHH.
Mutafoglu (2012)	Türkiye / 1987Q1-2009Q4	CO_2, FDI, GDP	ARDL, Granger causality	The findings indicate a long-term relationship between the variables and confirm the validity of the PHH.
Lee (2013)	G20 countries / 1971-2009	FDI, clean energy consumption, CO_2 emissions, and GDP	Johansen panel cointegration test, fixed-effects model	The findings suggest that FDI has a limited effect on the increase in CO_2 emissions.
Omri et al. (2014)	Fifty-four countries / 1990-2011	CO_2 emissions, FDI, GDP	Dynamic simultaneous-equation panel data models	For the entire panel, we observe a bidirectional causal relationship between FDI and GDP. Additionally, excluding Europe and North Asia, a bidirectional causal relationship exists between FDI and CO_2 emissions. Additionally, except for the Middle East, North Africa, and Sub-Saharan Africa, the findings support unidirectional causality from CO_2 emissions to GDP.
Sbia et al. (2014)	UAE / 1975:Q1-2011:Q4	FDI, clean energy, TO, CO_2 emissions, GDP	ARDL, VECM, Granger causality	The findings indicate a bidirectional causal relationship between foreign direct investment and CO_2 emissions, as well as between gross domestic product (GDP) and CO_2 emissions. Furthermore, these variables are cointegrated.
Kivyiro & Arminen (2014)	Sub-Saharan African countries / 1971-2009	EC, CO_2 emissions, GDP, FDI	ARDL cointegration, Granger causality	The results indicate that, beyond a cointegration relationship among the variables across the entire panel, unidirectional causality flows from the analysed variables to CO_2 emissions.
Shaari et al. (2014)	Fifteen developing countries / 1992-2012	FDI, GDP, and CO_2 emissions	Johansen cointegration, Granger causality	Although the variables were cointegrated, the study found no causal relationship.
Gökmenoğlu & Taspinar (2016)	Türkiye / 1974-2010	CO_2 emission, FDI, GDP, EC	ARDL, Toda-Yamamoto Causality test	A long-term equilibrium relationship exists between CO_2 emissions and FDI, characterised by bidirectional causality.
Peng et al. (2016)	Sixteen provinces in China / 1985-2012	CO_2 emissions, GDP, FDI	Panel Granger Causality test	The findings reveal unidirectional and bidirectional causality between FDI and GDP across China's regions; in some regions, GDP affects CO_2 emissions through Granger causality, while in others, FDI and CO_2 emissions show either a unidirectional or bidirectional causal relationship.
Abdouli & Hammami (2017)	17 MENA countries / 1990-2012	GDP, CO_2 emissions, FDI, capital stock	Static and dynamic panel data approaches	The findings suggest that GDP negatively affects environmental degradation, while FDI positively influences GDP.
Abdouli et al. (2018)	BRICS-T countries / 1990-2014	GDP, PD, FDI, and CO_2 emissions	OLS, FE, RE, GMM	It shows that FDI decrease CO_2 emissions, while GDP has adverse effects on the environment.
Ben Jebli et al. (2019)	22 Central and South American countries / 1995-2010	REC, tourism, CO_2 emissions, GDP, FDI, trade	Panel cointegration and Granger causality test	The study's findings show that over time, FDI decreases CO_2 emissions, while GDP leads to higher CO_2 emissions. Additionally, FDI and emissions have a two-way causal relationship in the long run.

Ma et al. (2019)	Thirty provinces in China / 2000-2013	FDI, EI, GDP, and CO_2 emissions	Fixed-effect panel quantile regression	The findings indicate that the impacts of GDP, FDI, and EI on CO_2 emissions within manufacturing sectors vary considerably across levels and regions.
Muhammad & Khan (2019)	Asian countries / 2001-2012	Bilateral FDI, EC, CO_2 emissions, capital, and GDP	GMM, OLS, FE, RE	EC, FDI inflows and outflows, CO_2 emissions, and capital have been shown to play a significant role in Asian countries' GDP.
Munir & Ameer (2020)	Pakistan / 1975-2016	FDI, GDP, industrialisation, and CO_2 emissions	NARDL, Granger causality	While increases in FDI and GDP generally contribute to elevated CO_2 emissions over the long term, evidence indicates a unidirectional causal relationship from CO_2 emissions to FDI and GDP in the short term.
Zubair et al. (2020)	Nigeria / 1980-2018	GDP, FDI inflows, GDI, capital, and CO_2 emissions	ARDL, Granger causality	Besides the long-term cointegration relationship between the variables, the study identified two-way causality between CO_2 emissions and GDP. GDP, FDI, and capital increase had a negative impact on CO_2 emissions.
Malik et al. (2020)	Pakistan / 1971-2014	Oil price, FDI, GDP, CO_2 emissions	ARDL, NARDL, Granger causality	The findings suggest a statistically significant and positive impact on both GDP and CO_2 emissions in both the short-term and long-term perspectives.
Mahmood et al. (2020)	North Africa / 1990-2014	EXP, IMP, FDI, GDP, and CO_2 emissions	Spatial Auto-Regressive (SAR) model	GDP and EXP contribute to environmental degradation, but FDI has no statistically significant impact on CO_2 emissions.
Ghazouani (2021)	Tunisia / 1972-2016	FDI, crude oil prices, GDP, and CO_2 emissions	ARDL, NARDL, causality analysis	While long-term GDP is associated with negative environmental impacts, FDI is observed to mitigate CO_2 emissions. Additionally, empirical analysis indicates a bidirectional causal relationship between GDP and CO_2 emissions, whereas FDI exhibits a unidirectional causal influence on CO_2 emissions.
Parveen et al. (2021)	Pakistan / 1975-2018	EC, FDI, GDP, and CO_2 emissions	Canonical cointegrating regression (CCR) method	The study's results indicate that FDI raises CO_2 emissions and positively affects GDP, while CO_2 emissions negatively affect GDP.
Rahman et al. (2021)	NIC / 1979-2017	Human capital, EXP, GDP, EC, and CO_2 emissions	Panel cointegration, FMOLS, DOLS, PMG	The results indicate that GDP has a negative impact on CO_2 emissions, while EXP have a positive impact.
Aghasafari et al. (2021)	MENA countries / 2002-2014	CO_2 emissions, FDI, EXP	Spatial panel simultaneous equations model	A two-way relationship exists between CO_2 emissions and EXP, while a one-way relationship exists between CO_2 emissions and FDI, and between FDI and EXP.
Muhammad & Khan (2021)	170 countries / 1990-2018	CO_2 emission, FDI, GDP, EC, globalisation	GMM and fixed-effects model	While energy use, FDI, and GDP increase CO_2 emissions, other variables decrease CO_2 emissions.
Ren et al. (2021)	Thirty provinces in China / 2000-2015	FDI, GDP, CO_2 emissions	3SLS model	The study found a bidirectional causal relationship between the variables analysed.
Sreenu (2022)	India / 1990-2020	Crude oil, FDI, GDP, CO_2 emissions	ARDL, NARDL	The study shows that increasing GDP reduces CO_2 emissions, while decreasing GDP raises emissions, reflecting an inverted U-shaped EKC relationship; meanwhile, FDI supports the PHH by boosting CO_2 emissions.
Mahmood (2022)	GCC countries / 1990-2019	CCO_2 and TCO_2 emissions, EXP, IMP, FDI	Spatial Durbin model	The results show that EXP increases TCO_2 emissions while lowering CCO_2 emissions at both local and regional levels. Additionally, FDI reduces CCO_2 emissions directly and indirectly, but it increases TCO_2 emissions indirectly.
Ostic et al. (2022)	OPEC countries / 2000-2018	Oil and gas trading, FDI, GDP, CO_2 emissions	FMOLS, GMMs	The findings show statistically significant relationships, indicating that FDI decreases CO_2 emissions, while GDP increases emissions.
Wang & Huang (2022)	East Asian countries / 2011-2020	FDI, CO_2 emissions, GDP, TO	Panel ARDL, Panel VAR	The results indicate that, in the short term, an increase in GDP per capita leads to higher CO_2 emissions, and a rise in FDI also boosts CO_2 emissions.
Yilmazer & Karabiber (2022)	Türkiye / 1974-2019	EXP, FDI, GDP, and CO_2 emissions	ARDL, Toda-Yamamoto causality	The findings indicate that EXP and GDP raise CO_2 emissions, while FDI has no notable impact on CO_2 emissions.
Balli et al. (2023)	APEC countries / 1981:Q1-2021:Q1	CO_2 emissions, FDI, EC, GDP	Westerlund cointegration, panel causality test	The study finds that FDI increases CO_2 emissions, supporting the PHH, while the impact of economic growth on CO_2 emissions varies by country. Additionally, the study observed bidirectional causality between FDI and CO_2 emissions in Japan.
Mahmood et al. (2023)	MENA countries / 1995-2020	FDI, EXP, IMP, and CCO_2 emissions	Spatial autoregressive (SAR) model	The study's findings show that exports reduce CCO_2 emissions in the MENA region, while FDI increases CCO_2 emissions, supporting the PHH.
Özekenci (2023)	Türkiye / 1990-2015	CO_2 emissions, EXP, EC, FDI, GDP	ARDL, VECM	A long-term positive relationship has been identified between CO_2 emissions, FDI, and EC.
Hoa et al. (2023)	Vietnam / 2000-2022	Innovation, REC, FDI, GDP, and CO_2 emissions	Unrestricted fixed effects model	FDI and economic growth significantly increase environmental pollution.
Iqbal et al. (2023)	BRICS countries / 2000-2018	CO_2 emissions, FDI, REC, GDP, EXP	ARDL, Dumitrescu-Hurlin panel causality	CO_2 emissions, REC, EXP, FDI, and savings all positively influence GDP over the long term. Furthermore, GDP and both CO_2 emissions and FDI are causally related in both directions.
Raihan (2024)	Vietnam / 1990-2021	FDI, CO_2 emissions, GDP	ARDL	Both FDI and CO_2 emissions have a statistically significant, positive influence on GDP in both the short and long term.
Ahmad et al. (2024)	Singapore / 1989-2022	EXP, FDI, REC, and GDP	ARDL	The findings suggest that both EXP and FDI have a positive and statistically significant impact on GDP.

Notes: The abbreviations are as follows: CO_2: Carbon dioxide, FDI: Foreign direct investment, GDP: Gross domestic product (Economic growth), EC: Energy consumption, EXP: Exports, REC: Renewable energy consumption, IMP: Imports, CCO_2: Consumption-based CO_2, TCO_2: Territory-based CO_2, TO: Trade openness, GDI: Gross domestic income, EI: Energy intensity, PHH: Pollution haven hypothesis, EKC: Environmental Kuznets Curve.

As summarised in Table 1, the empirical literature reports mixed evidence on the relationship between economic growth and environmental degradation. Several studies find support for the EKC hypothesis, suggesting that CO_2 emissions initially rise with income and decline after a certain development threshold is reached (e.g., Pao & Tsai, 2011; Sreenu,

2022). In contrast, a substantial body of research, particularly focusing on developing and emerging economies, documents a persistent positive relationship between economic growth and emissions, indicating that structural transformation and technological progress may be insufficient to generate the declining segment of the EKC in these contexts (e.g., Yilmazer & Karabiber, 2022; Hoa et al., 2023). Notably, the literature also presents highly divergent and often inconclusive findings regarding the environmental impacts of FDI and exports. While some studies report that FDI and export expansion increase CO_2 emissions, supporting the PHH (e.g., Balli et al., 2023; Mahmood et al., 2023), others find that these variables may have no statistically significant impact or even mitigate degradation through technology transfer (e.g., Lee, 2013; Mahmood et al., 2020; Yilmazer & Karabiber, 2022). This empirical ambiguity suggests that the growth-emission nexus in NICs cannot be fully captured through a simple linear framework. In this context, the present study contributes to the literature by adopting a dual-stage analytical approach. By first examining the linear impacts of FDI and exports and then testing the EKC hypothesis nonlinearly, the study assesses whether the growth-emissions relationship in this group aligns with the EKC framework or reflects alternative patterns shaped by the structural complexities of global economic integration.

4. Data, Model, and Methodology

4.1. Data and Model

The study examines the effects of foreign direct investment, exports, and economic growth on carbon dioxide emissions in NICs, including Brazil, China, India, Indonesia, Malaysia, Mexico, the Philippines, South Africa, Thailand, and Türkiye. The theoretical framework follows the model proposed by Wang & Huang (2022), and its baseline specification is presented in Equation (1):

$$lnCO2 = \beta_0 + \beta_1 lnFDI_{it} + \beta_2 lnEXP_{it} + \beta_3 lnGDP_{it} + u_{it} \quad (1)$$

In the baseline model, the logarithm of CO_2 emissions serves as the dependent variable, while FDI, exports, and real gross domestic product per capita are included as explanatory variables. This initial specification aims to identify the direct, linear environmental impacts of the core variables representing global economic integration and domestic production. The analysis covers 1982 to 2023. All variables are expressed in natural logarithms to stabilise variance and interpret coefficients as elasticities. Table 2 reports detailed definitions, measurement units, and data sources for the variables, while Table 3 presents descriptive statistics.

Table: 2
Variables and Explanations

Variables	Description	Details	Source
CO_2	Carbon dioxide emissions per capita	Carbon dioxide (CO_2) emissions from burning fossil fuels and industrial processes (tonnes per person)	Our World in Data
FDI	Foreign direct investment	Foreign direct investment, net inflows (BoP, current US$)	World Development Indicators Database (WDI)
EXP	Exports	Exports of goods and services (current US$, BoP)	World Development Indicators Database (WDI)
GDP	Gross domestic product per capita	GDP per capita (constant 2015 US$)	World Development Indicators Database (WDI)

Table: 3
Summary Statistics

Country		lnCO₂	lnFDI	lnEXP	lnGDP
Brazil	Mean	0,639	23,336	25,276	8,904
	Median	0,673	23,779	25,046	8,846
	Std. dev.	0,223	1,680	0,936	0,160
China	Mean	1,348	24,370	26,630	7,933
	Median	1,239	24,678	26,529	7,913
	Std. dev.	0,552	1,924	1,749	1,009
India	Mean	0,012	21,949	25,308	6,794
	Median	-0,053	22,366	25,072	6,706
	Std. dev.	0,455	2,570	1,436	0,525
Indonesia	Mean	0,310	22,441	25,053	7,671
	Median	0,381	22,920	24,972	7,622
	Std. dev.	0,419	3,631	0,908	0,396
Malaysia	Mean	1,648	22,035	25,289	8,779
	Median	1,772	22,196	25,472	8,799
	Std. dev.	0,429	1,154	0,987	0,384
Mexico	Mean	1,373	23,270	25,671	9,113
	Median	1,368	23,668	25,918	9,133
	Std. dev.	0,061	1,072	1,125	0,092
Philippines	Mean	-0,171	20,926	24,141	7,669
	Median	-0,171	21,164	24,239	7,547
	Std. dev.	0,254	1,756	0,877	0,278
South Africa	Mean	2,102	20,941	24,677	8,557
	Median	2,110	21,388	24,458	8,545
	Std. dev.	0,099	3,514	0,680	0,131
Thailand	Mean	0,908	22,356	25,179	8,237
	Median	1,087	22,888	25,196	8,269
	Std. dev.	0,510	3,562	1,190	0,426
Türkiye	Mean	1,247	21,503	24,922	8,881
	Median	1,254	21,501	24,853	8,764
	Std. dev.	0,314	1,866	1,182	0,382
Panels	Mean	0,941	22,313	25,215	8,254
	Median	0,983	22,617	25,147	8,471
	Std. dev.	0,789	2,646	1,289	0,828

However, the linear framework may not sufficiently capture the complex and evolving nature of environmental degradation in rapidly developing economies. As mixed findings in the empirical literature suggest, the impact of growth and international capital flows may change as countries reach higher income levels. Therefore, to test the EKC hypothesis, which posits a nonlinear relationship between income and environmental degradation, the squared term of real GDP is incorporated into the model, as shown in Equation (2):

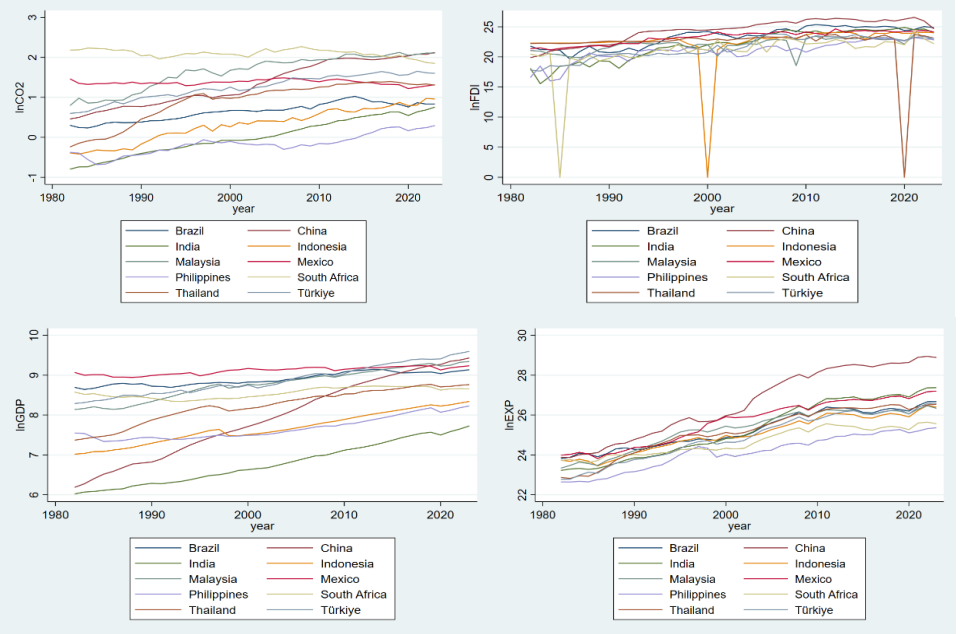
$$lnCO2 = \beta_0 + \beta_1 lnFDI_{it} + \beta_2 lnEXP_{it} + \beta_3 lnGDP_{it} + \beta_4 (lnGDP_{it})^2 + u_{it} \quad (2)$$

By comparing Equation (1) and Equation (2), the study seeks to determine whether the environmental impact of economic expansion is constant or subject to a structural transition. Under the EKC hypothesis, the coefficient of lnGDP is expected to be positive, while the coefficient of the squared income term is expected to be negative, implying that emissions initially increase with income and decline after a certain threshold level is reached. This comparative approach allows for a direct empirical assessment of whether the EKC hypothesis holds for NICs or if the growth-emission nexus remains fundamentally linear. Furthermore, keeping FDI and EXP in both specifications is critical to assess whether the influence of global integration remains robust when income's nonlinear dynamics are accounted for, providing a more rigorous test of the core hypotheses.

The mean $lnCO_2$ emissions for NIC countries are 0,941, with India and the Philippines exhibiting the lowest values and South Africa the highest. Median values closely follow the mean, indicating a balanced distribution of emissions across the sample. The mean lnFDI value is 22,313, showing substantial variation across countries, and the corresponding medians display a similar pattern. China and Brazil record the highest mean lnFDI levels in the sample. The mean lnEXP value is 25,215, with China and Mexico reporting the highest average export levels in the sample. The mean lnGDP is 8,254, with lower values in India and the Philippines and higher values in Mexico, Brazil, and Türkiye.

Figure 1 presents the evolution of CO_2 emissions, foreign direct investment, exports, and economic growth across NICs over the sample period. CO_2 emission trajectories vary across countries, with particularly pronounced increases observed in China and India, while the remaining countries exhibit more moderate changes as well as periods of stability or decline. lnFDI series are characterised by substantial volatility, with sharp fluctuations in some countries, most notably Indonesia and South Africa, while countries such as China, Brazil, and Türkiye show relatively more stable patterns in the post-2000 period. Exports show a broadly increasing trend across all countries, with China and Mexico recording the most pronounced growth, whereas the Philippines exhibits comparatively slower expansion. Finally, real GDP per capita generally increases over the sample period, with China and India experiencing the most pronounced increases, while South Africa and the Philippines display more moderate changes. Overall, the figures highlight common upward trends alongside notable cross-country heterogeneity in levels and volatility.

Figure: 1
Time Plot of Variables by Country



4.2. Methodology

4.2.1. Cross-Sectional Dependence and Slope Homogeneity

In panel data analysis, identifying cross-sectional dependence is paramount for selecting appropriate analytical methodologies. Before estimating the model, assess cross-sectional dependence. Breusch & Pagan (1980) introduced the Lagrange multiplier (LM) statistic as a formal test for detecting such dependence, as illustrated below.

$$CD_{lm} = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^{2} \tag{3}$$

When N is sufficiently large, the LM test produces unreliable results. To address this issue, Pesaran (2004) introduced the following test for cross-sectional dependence when N and T are sufficiently large.

$$CD_{lm} = \sqrt{\frac{1}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\left(T\hat{\rho}_{ij}^{2} - 1\right) \tag{4}$$

However, this test is susceptible to size distortions when the cross-sectional dimension (N) substantially exceeds the time dimension (T). To address this issue, Pesaran

(2004) proposed an alternative cross-sectional dependence test that remains robust in scenarios characterised by large N and comparatively small T.

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right) \tag{5}$$

Furthermore, Pesaran & Yamagata (2008) developed the delta ($\tilde{\Delta}$) and adjusted delta ($\tilde{\Delta}_{adj}$) statistics, building upon Swamy's (1970) test, to assess slope homogeneity within large panel datasets. The $\tilde{\Delta}$ statistic, representing an adaptation of Swamy's original test, is computed as follows:

$$\tilde{S} = \sum_{i=1}^{N}\left(\hat{\beta}_i - \hat{\beta}_{WFE}\right)' \frac{X_i' M_t X_i}{\tilde{\sigma}_i^2}\left(\hat{\beta}_i - \hat{\beta}_{WFE}\right) \tag{6}$$

Under the null hypothesis with $(N,T) \to \infty$, error terms are normally distributed, and $\tilde{\Delta}$ test is written as below:

$$\tilde{\Delta} = \sqrt{N}\left(\frac{N^{-1}\tilde{S}-k}{\sqrt{2k}}\right) \tag{7}$$

The adjusted $\tilde{\Delta}$ test has been developed for small sample sizes.

$$\tilde{\Delta}_{adj} = \sqrt{N}\left(\frac{N^{-1}\tilde{S}-E(\tilde{Z}_{iT})}{\sqrt{Var(\tilde{Z}_{iT})}}\right) \tag{8}$$

where $E\left(\tilde{Z}_{iT}\right) = k$ and $Var\left(\tilde{Z}_{iT}\right) = \frac{2k(T-k-1)}{T+1}$ (Emirmahmutoglu et al., 2016).

4.2.2. Pesaran (2007) CADF Unit Root Test

This research used the cross-sectional augmented Dickey-Fuller (CADF) panel unit root test to rigorously assess the stationarity characteristics of the variables, explicitly accounting for cross-sectional dependence. The underlying regression framework of the CADF test is delineated as follows.

$$\Delta y_{it} = \alpha_i + b_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + \varepsilon_{it} \tag{9}$$

The null hypothesis for the CADF test is H_0: b_i=0, indicating the presence of a unit root, whereas the alternative hypothesis is H_1: b_i<0, indicating stationarity. The CADF test statistic is then formulated as follows.

$$t_i(N,T) = \frac{\Delta y_i' \bar{M}_w y_{i,-1}}{\hat{\sigma}_i\left(y_{i,-1}' \bar{M}_w y_{i,-1}\right)^{1/2}} \tag{10}$$

The CIPS statistic is calculated as the mean of the individual CADF statistics provided by equation (9), according to the following formula:

$$CIPS(N,T) = \frac{1}{N}\sum_{i=1}^{N} t_i(N,T) \tag{11}$$

The term $t_i(N,T)$ denotes CADF statistic for the ith cross-sectional unit. This statistic is represented by the t-ratio of the coefficient of $y_{i,t-1}$ within the CADF regression specified in equation (9) (Pesaran, 2007).

4.2.3. Westerlund(2007) Panel Cointegration

Westerlund (2007) proposes four panel cointegration tests that rely on structural error-correction dynamics rather than residual-based approaches and test the null hypothesis of no cointegration in a panel context. As panel extensions of the time-series procedures introduced by Banerjee et al. (1998), these tests evaluate the null of no long-run relationship by examining whether the adjustment coefficient in a conditional error-correction model equals zero. The error correction representation used in Westerlund's framework can be written as;

$$\Delta y_{it} = \alpha_i + \delta_i t + \phi_i\left(y_{i,t-1} - \beta_i' x_{i,t-1}\right) + \sum_{j=1}^{p_i}\gamma_{ij}\Delta y_{i,t-j} + \sum_{j=0}^{q_i}\theta_{ij}\Delta x_{i,t-j} + \varepsilon_{it} \tag{12}$$

where the null hypothesis of no cointegration corresponds to $\phi_i = 0$.

When the error-correction term is found to be significantly different from zero, the null of no cointegration is rejected, indicating the presence of a long-term equilibrium relationship. The testing framework is flexible, allowing cross-section-specific short-run dynamics, serially correlated disturbances, weak exogeneity of regressors, and heterogeneity across units in both intercepts and slope parameters. Furthermore, provided that the dependent variable is not I(0), the procedure remains applicable even when variables in the system exhibit different orders of integration (Azmi et al., 2023). Among the four statistics proposed by Westerlund, the group mean tests Gt and Ga, and the panel tests Pt and Pa, are defined as follows:

$$Gt = \frac{1}{N}\sum_{i=1}^{N}\frac{\widehat{\phi_i}}{\widehat{\sigma_{\phi_i}}},\ Ga = \frac{1}{N}\sum_{i=1}^{N}\frac{T\widehat{\phi_i}}{\widehat{\sigma_i^2}},\ Pt = \frac{\widehat{\phi}}{\widehat{\sigma_{\phi}}},\ Pa = \frac{T\widehat{\phi}}{\widehat{\sigma^2}} \tag{13}$$

where $\hat{\phi}_i$denotes the individual adjustment coefficient, $\hat{\sigma}_{\phi_i}$its standard error, and $\widehat{\sigma_i^2}$the variance of the residuals. The Gt and Ga statistics test whether at least one cross-sectional unit is cointegrated, while Pt and Pa assess whether the panel as a whole exhibits a common long-run relationship. In the presence of pronounced cross-sectional dependence, where conventional asymptotic theory may yield unreliable inference, Westerlund (2007) also recommends bootstrap procedures, which enhance the robustness of the test outcomes. Consequently, the literature widely regards these tests as a strong second-generation cointegration approach, offering a structurally grounded methodology that accommodates the heterogeneity and cross-sectional dependence frequently observed in panel data settings.

4.2.4. Panel ARDL with Common Correlated Effects (CCE-PMG and CCE-MG)

The empirical analysis uses the Common Correlated Effects (CCE) estimators developed by Pesaran (2006) and extended by Chudik & Pesaran (2015) for dynamic heterogeneous panel models with weakly exogenous regressors. The CCE approach addresses cross-sectional dependence arising from unobserved common factors affecting all panel units. In this context, the error term is assumed to follow a multifactor structure, $u_{it} = \gamma_i' f_t + \varepsilon_{it}$, where f_t represents unobserved global shocks and γ_i denotes unit-specific factor loadings. Neglecting these components may lead to inconsistent and biased parameter estimates. To address this, the CCE framework augments the regression model with cross-sectional averages of both the dependent and independent variables, which serve as proxies for the unobserved factors. The general model can be expressed as:

$$y_{it} = \alpha_i + \phi_i y_{i,t-1} + \beta_i' x_{it} + \sum_{j=0}^{p_T} \delta_{ij}' \bar{z}_{t-j} + e_{it} \quad (14)$$

where $\bar{z}_t = (\bar{y}_t, \bar{x}_t)'$ includes the cross-sectional averages of the dependent and explanatory variables. By incorporating these averages and their lags, the model effectively captures unobserved common components that generate cross-sectional correlation among the units.

In the estimation procedure, the parameters are first obtained separately for each cross-sectional unit and then combined depending on the assumed degree of parameter homogeneity. When coefficients are allowed to differ across units, the model corresponds to the CCE Mean Group (CCE-MG) estimator, which provides consistent estimates under large $N$and Tasymptotics by averaging the unit-specific coefficients. Alternatively, when the short-run dynamics and error variances vary across units, but the long-run coefficients are constrained to be homogeneous, the framework yields the CCE Pooled Mean Group (CCE-PMG) estimator. The dynamic specification of the model can be written in the autoregressive distributed lag (ARDL) form as follows:

$$\Delta y_{it} = \phi_i\left(y_{i,t-1} - \theta' x_{i,t-1}\right) + \sum_{j=1}^{p-1} \lambda_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}' \Delta x_{i,t-j} + \sum_{j=0}^{p_T} \psi_{ij}' \bar{z}_{t-j} + \varepsilon_{it} \quad (15)$$

where θ denotes the long-run coefficients that are assumed to be common across cross-sections in the pooled model. This representation enables decomposition of short-run dynamics and long-run equilibrium relationships while controlling for cross-sectional dependence by including cross-sectional averages. Under weak exogeneity of the regressors, both CCE-MG and CCE-PMG estimators yield consistent estimates of the long-run relationships even with unobserved common factors correlated with the regressors. Consequently, the CCE framework provides a robust and flexible approach for estimating heterogeneous dynamic panel models, ensuring reliable inference on both the short- and long-run dynamics across countries.

4.2.5. Emirmahmutoglu and Kose (2011) Panel Causality Test

Emirmahmutoglu & Kose (2011) introduced a heterogeneous panel causality test based on the causality test by Toda & Yamamoto (1995). The p-variable heterogeneous panel VAR(k_i) model is presented as follows:

$$z_{i,t} = \mu_i + A_{i1} z_{i,t-1} + \cdots + A_{ik_i} z_{i,t-k_i} + u_{i,t}\ i = 1, \dots, N, t = 1, \dots, T \tag{16}$$

where the index i denotes individual cross-sectional units and the index t denotes time periods. μi is a p-dimensional vector of fixed effects. $A_{i1}, \dots, A_{ik_i}$ are fixed $(p \times p)$ parameter matrices that are allowed to vary across units. For each cross-sectional unit $i = 1, \dots, N$, $u_{i,t}$ is a column vector consisting of p error terms, and k_i is the lag structure.

The vector α_i of all VAR coefficients is defined as follows:

$$\alpha_i = vec[\mu_i, A_{i1}, \dots, A_{ik_i}] \text{ for } i = 1, \dots, N \tag{17}$$

Emirmahmutoglu & Kose (2011: 871) explain that in a VAR (Vector Autoregression) framework, the validity of Ordinary Least Squares (OLS) estimators and Wald statistics depends on the stationarity of the variables involved. Specifically, these inferential tools are reliable only when the variables are stationary; without stationarity, the Granger causality test becomes invalid. To address this issue, Toda & Yamamoto (1995) proposed a straightforward approach: overfit the level VAR model with an additional dmax number of lags to accommodate potential non-stationarity.

$$z_{i,t} = \mu_i + A_{i1} z_{i,t-1} + \cdots + A_{ik} z_{i,t-k_i} + \sum_{l=k_i+1}^{k_i+dmax_i} A_{il} z_{i,t-l} + u_{i,t},\ i = 1, \dots, N, t = 1, \dots, T \tag{18}$$

In heterogeneous panel data contexts, the Fisher test statistic is commonly employed to assess the hypothesis of Granger non-causality. Nonetheless, cross-sectional correlations among units compromise the validity of this test statistic. To address this limitation, Emirmahmutoglu & Kose (2011) utilise bootstrap methodologies. They also evaluate the causality test's finite-sample properties via Monte Carlo simulations. The E-K (2011) approach, which mitigates the stringent pre-test assumptions inherent in the traditional Granger non-causality test, requires prior knowledge of the maximum order of integration of the variables (dmax) (Hiçyılmaz, 2022).

5. Empirical Findings

This study examines whether exports, foreign direct investment, and economic growth influence CO_2 emissions. We conducted all empirical analyses using Stata and GAUSS. First, we present the results of the cross-sectional dependence test. Then, the results of the CADF unit root test, CCE-based panel ARDL, and panel causality tests are provided

in sequence. We analysed cross-sectional dependence between the series at both the panel and variable levels, with the results shown in Table 4 and Table 5.

Table: 4
Cross-Sectional Dependence (Panel-level)

Test	**Statistics**	**Probability**
CDlm (Breusch & Pagan, 1980)	316,161	0,000***
CDlm (Pesaran, 2004)	28,583	0,000***
CD (Pesaran, 2004)	9,132	0,000***

*Note: *** indicates the significance level of 1%.*

In Table 4, all test results are statistically significant, according to the cross-sectional dependence results. In this study, the Breusch-Pagan LM test for inter-unit correlation was appropriate, and its results indicated cross-sectional dependence. This indicates interactions between common shocks across countries.

Table: 5
Cross-Sectional Dependence (Variables)

CDlm (Breusch & Pagan, 1980)		
	Statistics	Probability
$lnCO_2$	1090,394	0,000***
lnFDI	679,911	0,000***
lnEXP	1793,671	0,000***
lnGDP	1538,129	0,000***
CDlm (Pesaran, 2004)		
	Statistics	Probability
$lnCO_2$	110,194	0,000***
lnFDI	66,925	0,000***
lnEXP	184,326	0,000***
lnGDP	157,390	0,000***
CD (Pesaran, 2004)		
	Statistics	Probability
$lnCO_2$	143,993	0,000***
lnFDI	133,888	0,000***
lnEXP	274,437	0,000***
lnGDP	253,154	0,000***
Slope Homogeneity Test		
Delta 29,965	Adj Delta 31,926	
p-value 0,000***	p-value 0,000***	

*Note: *** indicates the significance level of 1%.*

Table 5 reports the results of the cross-sectional dependence and slope homogeneity tests. The findings indicate strong cross-sectional dependence across all variables, as all test statistics reject the null hypothesis of cross-sectional independence. In addition, the slope homogeneity test rejects the null hypothesis of homogeneous slopes, confirming parameter heterogeneity across countries. These results justify using second-generation panel methods that explicitly account for cross-sectional dependence and heterogeneity. Accordingly, we employ the CADF unit root test to assess the variables' stationarity, with results reported in Table 6.

Table: 6
Pesaran (2007) CADF Panel Unit Root Test Results

Variables	Level & 1st diff.	t-bar	p-value	Decision
$lnCO_2$	Level	-2,058	0,845	I(1)
	1st diff.	-3,942	0,000**	
lnFDI	Level	-2,902	0,022**	I(0)
lnEXP	Level	-2,335	0,508	I(1)
	1st diff.	-3,786	0,000**	
lnGDP	Level	-1,977	0,904	I(1)
	1st diff.	-3,638	0,000**	

*Notes: ** indicates the significance level of 5%, and 1st diff. refers to the first difference of the variable.*

Table 6 reports the CADF panel unit root test results, which indicate a mixed order of integration: CO_2 emissions, exports, and economic growth are I(1), whereas FDI is I(0). This integration structure is compatible with the Panel ARDL framework. However, before estimating the CCE-based Panel ARDL model, we examine whether a long-run equilibrium relationship exists among the variables. Given cross-sectional dependence, we employ the Westerlund (2007) ECM-based panel cointegration test. Table 7 presents the cointegration results.

Table: 7
Westerlund (2007) Cointegration Test Results

Model	Statistic	Value	z-value	p-value	Robust p-value
Model 1 **$lnCO_2$=f(lnFDI, lnEXP, lnGDP)**	Gt	-2,468	0,858	0,805	0,536
	Ga	-8,778	2,656	0,996	0,936
	Pt	-7,646	0,152	0,560	0,397
	Pa	-8,806	1,396	0,919	0,703
Model 2 **$lnCO_2$=f(lnFDI, lnEXP, lnGDP, $lnGDP^2$)**	Gt	-2,458	1,417	0,922	0,560
	Ga	-6,819	3,857	1,000	0,880
	Pt	-9,392	-1,084	0,139	0,040**
	Pa	-11,335	0,938	0,826	0,270

*Note: ** indicates the significance level of 5%.*

Table 7 reports the Westerlund (2007) panel cointegration results. For Model 1, all test statistics are statistically insignificant (robust p-values > 0,10), indicating no evidence of a long-run equilibrium in a purely linear framework. However, for Model 2, the Pt statistic is significant at the 5% level (robust p-value = 0,040). Although the remaining statistics do not reject the null hypothesis, the significant robust p-value of the Pt statistic provides limited panel-level evidence of cointegration in Model 2.

Table 8 presents the CCE-based estimation results. The Hausman (1978) test results favour the CCE-PMG estimator for both models. In Model 1, economic growth has a positive and significant short-run effect on CO_2 emissions, while the remaining short-run coefficients are statistically insignificant. Since the Westerlund test does not support cointegration and the error-correction term is statistically insignificant, the long-run coefficients of Model 1 are not interpreted. For Model 2, the negative and significant error correction term confirms the adjustment process toward long-run equilibrium. Notably, the long-run coefficients for GDP and its squared term are statistically insignificant, indicating that the EKC hypothesis does not hold for this country group in the long run. In Model 2, the long-run coefficients of

FDI, exports, GDP, and GDP² are statistically insignificant, while the significant short-run coefficients of GDP and GDP² indicate a nonlinear short-run income effect. These findings suggest that environmental degradation in NICs is driven primarily by the scale of economic growth in the short run rather than a predictable nonlinear transition or global integration channels in the long run.

Table: 8
CCE-PMG and CCE-MG Panel ARDL Estimation Results for Model 1 and Model 2

		Model 1				Model 2			
		CCE-PMG		CCE-MG		CCE-PMG		CCE-MG	
Variable		Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Long-run	lnFDI	-0,007	0,254	0,003	0,916	0,002	0,833	-0,011	0,589
	lnEXP	0,182	0,073*	0,214	0,001***	0,121	0,146	0,026	0,793
	lnGDP	0,688	0,043**	0,551	0,001***	0,063	0,963	-1,825	0,722
	lnGDP²	-	-	-	-	0,052	0,509	0,149	0,615
Short-run	D(lnFDI)	-0,002	0,613	-0,001	0,809	0,000	0,979	-0,004	0,575
	D(lnEXP)	0,021	0,678	0,032	0,629	0,059	0,288	0,026	0,676
	D(lnGDP)	0,808	0,003***	0,821	0,036**	-4,642	0,017**	-5,284	0,147
	D(lnGDP²)	-	-	-	-	0,325	0,007***	0,367	0,066*
Error Correction Term		-0,487 (0,116)		-0,562 (0,000)***		-0,600 (0,000)***		-0,716 (0,000)***	
R-squared		0,49		0,37		0,41		0,28	
Adj. R-squared		0,11		-		-0,24		-	
CD statistic (p-value)		-3,29 (0,001)		-2,74 (0,006)		-3,06 (0,002)		-2,24 (0,025)	
Hausman Test(χ^2, p-value)		0,18 (1,000)				5,53 (0,786)			
Preferred estimator		CCE-PMG				CCE-PMG			

*Notes: ***, **, and * indicate the significance levels of 1%, 5%, and 10%, respectively. H_0 (Hausman): no systematic difference → CCE-PMG preferred. CD Statistic = Pesaran (2004) test for cross-sectional dependence.*

Table 9 presents the results of the E-K (2011) panel causality test. At the panel level, no causal relationship is detected between lnFDI and $lnCO_2$ emissions, nor between lnGDP and $lnCO_2$ emissions. Country-specific results for FDI show unidirectional causality only for Mexico. In sharp contrast, the Panel-Fisher statistic for exports exceeds the 1% bootstrap critical value, revealing a robust unidirectional causal relationship from lnEXP to $lnCO_2$ emissions at the panel level and statistically significant country-level relationships across all sampled countries. No evidence of reverse causality is found for any variable. These results identify exports as the primary transmission channel of economic activity to environmental degradation in NICs, while confirming that the lack of significance for FDI and growth in the long-run CCE-based panel ARDL model is mirrored by a lack of causal linkage in this framework.

Table: 9
Emirmahmutoglu and Kose's (2011) Panel Causality Test

	lnFDI does not cause $lnCO_2$			**$lnCO_2$ does not cause lnFDI**		
Country	**Wald**	**p-value**		**Wald**	**p-value**	**Lag**
Brazil	0,798	0,372		0,957	0,328	1
China	0,735	0,391		0,186	0,666	1
India	1,240	0,266		0,158	0,691	1
Indonesia	1,541	0,215		0,008	0,928	1
Malaysia	0,065	0,799		0,745	0,388	1
Mexico	2,738	0,098*		0,298	0,585	1
Philippines	1,945	0,163		0,648	0,421	1
South Africa	0,506	0,477		0,061	0,805	1
Thailand	1,392	0,238		0,537	0,464	1
Türkiye	0,961	0,327		0,168	0,682	1
	Test Statistics			**Test Statistics**		
Panel-Fisher	24,894			11,364		
Critical Values	1%	5%	10%	1%	5%	10%
	41,145	32,710	29,837	40,433	33,814	30,247
	lnEXP does not cause $lnCO_2$			**$lnCO_2$ does not cause lnEXP**		
Country	**Wald**	**p-value**		**Wald**	**p-value**	**Lag**
Brazil	4,890	0,027**		0,700	0,403	1
China	5,067	0,024**		0,458	0,499	1
India	4,690	0,030**		0,092	0,761	1
Indonesia	4,133	0,042**		0,197	0,658	1
Malaysia	16,547	0,000***		0,601	0,741	2
Mexico	4,888	0,027**		0,438	0,508	1
Philippines	4,674	0,031**		0,125	0,723	1
South Africa	4,096	0,043**		0,216	0,642	1
Thailand	4,246	0,039**		0,348	0,555	1
Türkiye	4,880	0,027**		0,489	0,484	1
	Test Statistics			**Test Statistics**		
Panel-Fisher	78,692			10,709		
Critical Values	1%	5%	10%	1%	5%	10%
	40,600	34,231	30,803	40,407	33,024	30,293
	lnGDP does not cause $lnCO_2$			**$lnCO_2$ does not cause lnGDP**		
Country	**Wald**	**p-value**		**Wald**	**p-value**	**Lag**
Brazil	0,324	0,569		0,354	0,552	1
China	0,299	0,585		0,468	0,494	1
India	0,432	0,511		0,339	0,560	1
Indonesia	0,542	0,462		0,550	0,459	1
Malaysia	0,231	0,631		0,153	0,695	1
Mexico	0,541	0,462		0,398	0,528	1
Philippines	0,387	0,534		0,210	0,647	1
South Africa	0,290	0,590		0,216	0,642	1
Thailand	0,142	0,706		0,261	0,609	1
Türkiye	0,298	0,585		0,272	0,602	1
	Test Statistics			**Test Statistics**		
Panel-Fisher	11,634			11,085		
Critical Values	1%	5%	10%	1%	5%	10%
	39,235	32,840	29,801	40,722	32,843	29,458

*Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, and lag orders are selected by minimising the Akaike information criterion.*

6. Conclusion and Policy Recommendations

This study examined the impacts of economic growth, exports, and FDI on CO_2 emissions in NICs over 1982-2023, focusing on the interaction among growth, trade, and investment within these economies' structural context.

The empirical findings provide no robust evidence supporting the EKC hypothesis in the long run. Although the nonlinear income specification provides limited panel-level evidence of cointegration based on the Pt statistic, the estimated long-run coefficients of

income and its squared term remain statistically insignificant. This suggests that economic growth alone does not generate systematic long-run improvements in environmental quality within the NIC group. While this result contrasts with findings for some studies focusing on different country groups (e.g., Pao & Tsai, 2011; Sreenu, 2022), it is consistent with evidence indicating that structural transformation and technological progress may be insufficient to generate the declining segment of the EKC in emerging economies (e.g., Yılmazer & Karabiber, 2022; Özekenci, 2023). Short-run dynamics reveal a meaningful association between growth and emissions. In the linear specification, the CCE-based panel ARDL results indicate that economic growth is associated with a statistically significant short-run increase in CO_2 emissions. This result aligns with studies documenting scale-driven emission increases during periods of rapid industrialisation in emerging economies (e.g., Malik et al., 2020; Raihan, 2024).

Exports appear to be a particularly important channel linking economic integration to environmental outcomes in NICs. While the CCE-based panel ARDL estimates provide only limited evidence of an export effect, the causality analysis consistently indicates a unidirectional relationship from exports to CO_2 emissions. In particular, the causality results point to a unidirectional relationship running from exports to emissions across the panel and for most individual countries. These findings support arguments emphasising the scale and composition effects of export-oriented growth (e.g., Mahmood et al., 2020; Aghasafari et al., 2021), while differing from views that associate trade expansion with environmental benefits (e.g., Mahmood et al., 2023). In contrast, the empirical findings do not support the expectation of a direct environmental impact from foreign investment. FDI does not exhibit a statistically significant long-run or short-run association with CO_2 emissions at the panel level, nor does it display systematic causal linkages. This outcome diverges from studies supporting the PHH (e.g., Pao & Tsai, 2011; Balli et al., 2023), which interpret a positive relationship between foreign direct investment and CO_2 emissions as evidence consistent with the PHH, while remaining consistent with research where FDI is found to have a limited or insignificant effect on CO_2 emissions (e.g., Lee, 2013; Yılmazer & Karabiber, 2022). FDI's statistical insignificance should not be interpreted as evidence of environmental neutrality; rather, it indicates that no systematic direct association between FDI and CO_2 emissions can be identified within the present empirical framework. Taken together, the results indicate that the environmental impacts of economic integration in NICs differ across channels. While export expansion is consistently associated with higher carbon emissions, neither income growth nor foreign investment is linked to stable long-run environmental improvements. The insignificance of the EKC and FDI variables reinforces the argument that growth and investment dynamics in NICs remain structurally embedded in carbon-intensive export-oriented production patterns.

From a policy perspective, the findings suggest caution toward strategies that rely primarily on economic growth, trade liberalisation, and FDI inflows to achieve environmental sustainability. While market-based instruments may reduce emissions in advanced economies, they risk shifting carbon-intensive activities toward semi-peripheral

economies such as NICs unless the structural drivers of export-oriented production are addressed.

Several limitations should be noted. The analysis relies on aggregate national-level data, focuses solely on CO_2 emissions, and cannot fully capture country-specific institutional and political factors shaping environmental outcomes. Despite these limitations, the results reveal a positive short-run growth effect in the linear specification and consistent causal evidence from exports to CO_2 emissions, while providing no robust support for long-run environmental improvements associated with economic growth.

References

Abdouli, M. & S. Hammami (2017), "The Impact of FDI Inflows and Environmental Quality on Economic Growth: An Empirical Study for The MENA Countries", *Journal of the Knowledge Economy*, 8(1), 254-278.

Abdouli, M. et al. (2018), "The Impact of Economic Growth, Population Density, and FDI Inflows on CO_2 Emissions in BRICTS Countries: Does The Kuznets Curve Exist?", *Empirical Economics*, 54(4), 1717-1742.

Aghasafari, H. et al. (2021), "CO_2 Emissions, Export and Foreign Direct Investment: Empirical Evidence from Middle East and North Africa Region", *The Journal of International Trade & Economic Development*, 30(7), 1054-1076.

Ahmad, I. et al. (2024), "Exports, FDI inflows, renewable energy, and economic growth: an empirical evidence from Singapore", *Bulletin of Business and Economics (BBE)*, 13(1), 850-856.

Antweiler, W. et al. (2001), "Is free trade good for the environment?", *American Economic Review*, 91(4), 877-908.

Azmi, S.N. et al. (2023), "A panel cointegration analysis of linkages between international trade and tourism: case of India and South Asian Association for Regional Cooperation (SAARC) countries", *Quality & Quantity*, 57, 5157-5176.

Balli, E. et al. (2023), "The relationship between FDI, CO_2 emissions, and energy consumption in Asia-Pacific economic cooperation countries", *Environmental Science and Pollution Research*, 30(15), 42845-42862.

Banerjee, A. et al. (1998), "Error-correction mechanism tests for cointegration in a single-equation framework", *Journal of Time Series Analysis*, 19(3), 267-283.

Beken, H.G. & A. Cebeci (2024), "Çatışmalı bir Süreç Olarak Sınırda Karbon Düzenleme Mekanizması Uygulaması", *Paradigma: İktisadi ve İdari Araştırmalar Dergisi*, 13(2), 115-128.

Ben Jebli, M. et al. (2019), "The dynamic linkage between renewable energy, tourism, CO_2 emissions, economic growth, foreign direct investment, and trade", *Latin American Economic Review*, 28, 2.

Birdsall, N. & D. Wheeler (1993), "Trade policy and industrial pollution in Latin America: where are the pollution havens?", *The Journal of Environment & Development*, 2(1), 137-149.

Böhringer, C. et al. (2012), "Alternative designs for carbon taxation: A computable general equilibrium analysis for the European Union", *Energy Economics*, 34(1), S16-S28.

Breusch, T.S. & A.R. Pagan (1980), "The Lagrange multiplier test and its applications to model specification in econometrics", *The Review of Economic Studies*, 47(1), 239-253.

Cebeci, A. (2012), *Bilmediğimiz Kapitalizm, Gizli Elin Kurumsallaşması: YOİKK*, İstanbul: SAV Yayınları.

Chudik, A. & M.H. Pesaran (2015), "Common correlated effects estimation of heterogeneous dynamic panel data models with weakly exogenous regressors", *Journal of Econometrics*, 188(2), 393-420.

Cole, M.A. & R.J.R. Elliott (2005), "FDI and the capital intensity of 'dirty' sectors: A missing piece of the pollution haven puzzle", *Review of Development Economics*, 9(4), 530-548.

Cole, M.A. (2004), "Trade, the pollution haven hypothesis and the environmental Kuznets curve: examining the linkages", *Ecological Economics*, 48(1), 71-81.

Copeland, B.R. & M.S. Taylor (1994), "North-South Trade and the Environment", *The Quarterly Journal of Economics*, 109(3), 755-787.

Copeland, B.R. & M.S. Taylor (2004), "Trade, growth, and the environment", *Journal of Economic Literature*, 42(1), 7-71.

Dean, J.M. et al. (2009), "Are foreign investors attracted to weak environmental regulations? Evaluating the evidence from China", *Journal of Development Economics*, 90(1), 1-13.

Dietz, T. & E.A. Rosa (1994), "Rethinking the environmental impacts of population, affluence and technology", *Human Ecology Review*, 1(2), 277-300.

Dietz, T. & E.A. Rosa (1997), "Effects of population and affluence on CO_2 emissions", *Proceedings of the National Academy of Sciences*, 94(1), 175-179.

Ehrlich, P.R. & J.P. Holdren (1971), "Impact of population growth", *Science*, 171(3977), 1212-1217.

Emirmahmutoglu, F. & N. Kose (2011), "Testing for Granger causality in heterogeneous mixed panels", *Economic Modelling*, 28(3), 870-876.

Emirmahmutoglu, F. et al (2016), "Causal relationship between asset prices and output in the United States: evidence from the state-level panel Granger causality test", *Regional Studies*, 50(10), 1728-1741.

Eskeland, G.S. & A.E. Harrison (2003), "Moving to greener pastures? Multinationals and the pollution haven hypothesis", *Journal of Development Economics*, 70(1), 1-23.

Foster, J.B. (1999), "Marx's Theory of Metabolic Rift: Classical Foundations for Environmental Sociology", *American Journal of Sociology*, 105(2), 366-405.

Ghazouani, T. (2021), "Impact of FDI inflow, crude oil prices, and economic growth on CO_2 emission in Tunisia: Symmetric and asymmetric analysis through ARDL and NARDL approach", *Environmental Economics*, 12(1), 1-13.

Gökmenoğlu, K. & N. Taspinar (2016), "The relationship between CO_2 emissions, energy consumption, economic growth and FDI: the case of Turkey", *The Journal of International Trade & Economic Development*, 25(5), 706-723.

Grossman, G.M. & A.B. Krueger (1991), "Environmental impacts of a North American Free Trade Agreement", *Working Paper* 3914, National Bureau of Economic Research, Cambridge, MA.

Grossman, G.M. & A.B. Krueger (1995), "Economic growth and the environment", *The Quarterly Journal of Economics*, 110(2), 353-377.

Hausman, J.A. (1978), "Specification tests in econometrics", *Econometrica*, 46(6), 1251-1271.

Hiçyılmaz, B. (2022), "Exports and Imports Relation: Panel Causality Analysis with Regional Data for Turkey", *Uluslararası Yönetim, İktisat ve İşletme Dergisi*, 18(1), 208-223.

Hoa, P.X. et al. (2023), "Nexus of innovation, renewable consumption, FDI, growth and CO_2 emissions: The case of Vietnam", *Journal of Open Innovation: Technology, Market, and Complexity*, 9(3), 100100.

IMF (2022), *IMF Annual Report 2022: Crisis Upon Crises*, <https://www.imf.org/external/pubs/ft/ar/2022/english/>, 25.05.2025.

Iqbal, A. et al. (2023), "Investigating the nexus between CO_2 emissions, renewable energy consumption, FDI, exports and economic growth: evidence from BRICS countries", *Environment, Development and Sustainability*, 25(3), 2234-2263.

Jorgenson, A.K. (2007), "Does foreign investment harm the air we breathe and the water we drink? A cross-national analysis of carbon dioxide emissions and water pollution in less-developed countries, 1975 to 2000", *Organization & Environment*, 20(2), 137-156.

Kivyiro, P. & H. Arminen (2014), "Carbon dioxide emissions, energy consumption, economic growth, and foreign direct investment: Causality analysis for Sub-Saharan Africa", *Energy*, 74, 595-606.

Lee, J.W. (2013), "The contribution of foreign direct investment to clean energy use, carbon emissions and economic growth", *Energy Policy*, 55, 483-489.

Ma, C.Q. et al. (2019), "The Impact of economic growth, FDI and energy intensity on China's manufacturing industry's CO_2 emissions: An empirical study based on the fixed-effect panel quantile regression model", *Energies*, 12(24), 4800.

Mahmood, H. (2022), "The spatial analyses of consumption-based CO_2 emissions, exports, imports, and FDI nexus in GCC countries", *Environmental Science and Pollution Research*, 29(32), 48301-48311.

Mahmood, H. et al. (2020), "Exports, imports, foreign direct investment and CO_2 emissions in North Africa: Spatial analysis", *Energy Reports*, 6, 2403-2409.

Mahmood, H. et al. (2023), "FDI, exports, imports, and consumption-based CO_2 emissions in the MENA region: spatial analysis", *Environmental Science and Pollution Research*, 30(25), 67634-67646.

Malik, M.Y. et al. (2020), "Symmetric and asymmetric impact of oil price, FDI and economic growth on carbon emission in Pakistan: Evidence from ARDL and non-linear ARDL approach", *Science of the Total Environment*, 726, 138421.

Managi, S. et al. (2009), "Does trade openness improve environmental quality?", *Journal of Environmental Economics and Management*, 58(3), 346-363.

Meadows, D. et al. (1972), *The limits to growth*, New York: Universe Books.

Moomaw, W.R. & G.C. Unruh (1997), "Are environmental Kuznets curves misleading us? The case of CO_2 emissions", *Environment and Development Economics*, 2(4), 451-463.

Muhammad, B. & M.K. Khan (2021), "Foreign direct investment inflow, economic growth, energy consumption, globalization, and carbon dioxide emission around the world", *Environmental Science and Pollution Research*, 28(39), 55643-55654.

Muhammad, B. & S. Khan (2019), "Effect of bilateral FDI, energy consumption, CO_2 emission and capital on economic growth of Asia countries", *Energy Reports*, 5, 1305-1315.

Munir, K. & A. Ameer (2020), "Nonlinear effect of FDI, economic growth, and industrialization on environmental quality: evidence from Pakistan", *Management of Environmental Quality: An International Journal*, 31(1), 223-234.

Mutafoglu, T.H. (2012), "Foreign direct investment, pollution, and economic growth: Evidence from Turkey", *Journal of Developing Societies*, 28(3), 281-297.

O'Connor, J. (1998), *Natural Causes: Essays in Ecological Marxism*, New York: The Guildford Press.

OECD (2007), *Globalisation and the Environment: Preliminary Perspectives*, Paris: Organisation for Economic Co-operation and Development.

Omri, A. et al. (2014), "Causal interactions between CO_2 emissions, FDI, and economic growth: Evidence from dynamic simultaneous-equation models", *Economic Modelling*, 42, 382-389.

Ostic, D. et al. (2022), "Assessing the impact of oil and gas trading, foreign direct investment inflows, and economic growth on carbon emission for OPEC member countries", *Environmental Science and Pollution Research*, 29(28), 43089-43101.

Our World in Data (2025), *CO_2 emissions per capita*, <ourworldindata.org>, 08.01.2025.

Özekenci, E.K. (2023), "Karbondioksit emisyonu (CO_2) ile ihracat, enerji, doğrudan yabancı yatırımlar ve ekonomik büyüme arasındaki ilişki: Türkiye örneği", *Uluslararası İktisadi ve İdari İncelemeler Dergisi*, (40), 83-98.

Pao, H.T. & C.M. Tsai (2011), "Multivariate Granger causality between CO_2 emissions, energy consumption, FDI (foreign direct investment) and GDP (gross domestic product): evidence from a panel of BRIC (Brazil, Russian Federation, India, and China) countries", *Energy*, 36(1), 685-693.

Parveen, S. et al. (2021), "Impact of energy consumption on economic growth, foreign direct investment and environmental degradation: evidence from Pakistan", *Review of Applied Management and Social Sciences*, 4(1), 13-25.

Peng, H. et al. (2016), "Economic growth, foreign direct investment and CO_2 emissions in China: A panel Granger causality analysis", *Sustainability*, 8(3), 233.

Pesaran, M. (2004), "General diagnostic tests for cross section dependence in panels", Cambridge *Working Papers* in Economics 435, and CESifo Working Paper Series 1229.

Pesaran, M.H. & T. Yamagata (2008), "Testing slope homogeneity in large panels", *Journal of Econometrics*, 142(1), 50-93.

Pesaran, M.H. (2006), "Estimation and inference in large heterogeneous panels with a multifactor error structure", *Econometrica*, 74(4), 967-1012.

Pesaran, M.H. (2007), "A simple panel unit root test in the presence of cross-section dependence", *Journal of Applied Econometrics*, 22(2), 265-312.

Peters, G.P. & E.G. Hertwich (2008), "CO_2 embodied in international trade with implications for global climate policy", *Environmental Science & Technology*, 42(5), 1401-1407.

Rahman, M.M. et al. (2021), "Impacts of human capital, exports, economic growth and energy consumption on CO_2 emissions of a cross-sectionally dependent panel: Evidence from the newly industrialized countries (NICs)", *Environmental Science & Policy*, 121, 24-36.

Raihan, A. (2024), "Influences of foreign direct investment and carbon emission on economic growth in Vietnam", *Journal of Environmental Science and Economics*, 3(1), 1-17.

Ren, Y.S. et al. (2021), "FDI, economic growth, and carbon emissions of the Chinese steel industry: new evidence from a 3SLS model", *Environmental Science and Pollution Research*, 28(37), 52547-52564.

Roberts, J.T. & B.C. Parks (2007), *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy*, MIT Press.

Sbia, R. et al. (2014), "A contribution of foreign direct investment, clean energy, trade openness, carbon emissions and economic growth to energy demand in UAE", *Economic Modelling*, 36, 191-197.

Selden, T.M. & D. Song (1994), "Environmental quality and development: is there a Kuznets curve for air pollution emissions?", *Journal of Environmental Economics and Management*, 27(2), 147-162.

Shaari, M.S. et al. (2014), "Relationship among foreign direct investment, economic growth and CO_2 emission: a panel data analysis", *International Journal of Energy Economics and Policy*, 4(4), 706-715.

Sreenu, N. (2022), "Impact of FDI, crude oil price and economic growth on CO_2 emission in India: symmetric and asymmetric analysis through ARDL and non-linear ARDL approach", *Environmental Science and Pollution Research*, 29(28), 42452-42465.

Steffen, W. et al. (2015), "The trajectory of the Anthropocene: The Great Acceleration, *The Anthropocene Review*, 2(1), 81-98.

Swamy, P.A. (1970), "Efficient inference in a random coefficient regression model", *Econometrica*, 38(2), 311-323.

Toda, H.Y. & T. Yamamoto (1995), "Statistical inference in vector autoregressions with possibly integrated processes", *Journal of Econometrics*, 66(1-2), 225-250.

Uimonen, P.P. et al. (1995) *International Trade Policies: Volume II The Uruguay Round and Beyond: Background Papers*, World Economic and Financial Surveys No. 1994/008.

UNEP (2023), *Emissions Gap Report 2023: Broken Record - Temperatures hit new highs, yet world fails to cut emissions (again)*, Nairobi: United Nations Environment Programme.

Wang, Y. & Y. Huang (2022), "Impact of foreign direct investment on the carbon dioxide emissions of East Asian countries based on a panel ARDL method", *Frontiers in Environmental Science*, 10, 937837.

Westerlund, J. (2007), "Testing for error correction in panel data", *Oxford Bulletin of Economics and Statistics*, *69*(6), 709-748.

Wheeler, D., & Martin, P. (1992), Prices, policies and the international diffusion of clean technology: The case of wood pulp production. In P. Low (Ed.), *International trade and the environment* (pp. 197-224), World Bank.

World Bank (2025), *World Development Indicators*, <worldbank.org>, 08.01.2025.

Yilmazer, M. & B. Karabiber (2022), "Türkiye'de ihracat, doğrudan yabancı yatırımlar, ekonomik büyüme ve karbon emisyonu ilişkisi", *Business and Economics Research Journal*, 13(2), 199-220.

Zarsky, L. (1999), "Havens, halos and spaghetti: Untangling the evidence about FDI and the environment", *Paper* presented to OECD conference on Foreign Direct Investment and the Environment.

Zubair, A.O. et al. (2020), "Does gross domestic income, trade integration, FDI inflows, GDP, and capital reduces CO_2 emissions? An empirical evidence from Nigeria", *Current Research in Environmental Sustainability*, 2, 100009.

Sosyoekonomi

2026, Vol. 34(70), 217-229

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.09
Date Submitted: 30.07.2025
Date Revised: 07.01.2026
Date Accepted: 02.09.2026

Common Correlated Effects Estimation of the Relationship between Foreign Direct Investment and Welfare: A Case Study of Tax Havens in Europe[1]

Özge ÖNKAN *(https://orcid.org/0000-0001-5227-7747), Sinop University, Türkiye; ozge.onkan@sinop.edu.tr*
Yağmur SAĞLAM *(https://orcid.org/0000-0001-6465-0297), Sinop University, Türkiye; yagmur.saglam@sinop.edu.tr*

Gelir Eşitsizliği ve Doğrudan Yabancı Yatırım Arasındaki İlişkinin Ortak Korelasyon Etkileri Tahmini: Avrupa'daki Vergi Cennetleri Üzerine Bir Vaka Çalışması[2]

Abstract

This study examines the relationship between FDI, corporate tax revenue, and welfare in six selected European tax havens: Belgium, Ireland, Luxembourg, Malta, the Netherlands, and Switzerland, using annual data from 1995-2023. Employing second-generation econometric methods (Fourier KPSS, ECM bootstrap cointegration, and CCEMG), the analysis finds that FDI in tax-haven economies is largely financialised and disconnected from real economic activity. Short-run results show no welfare gains from FDI or tax revenue. Long-run findings reveal strong heterogeneity: corporate tax revenue significantly improves welfare in Ireland and Switzerland, while FDI has weak or negative effects in Malta, Luxembourg, and the Netherlands, consistent with their role as financial hubs.

Keywords : Foreign Direct Investment, Welfare, Corporate Tax Revenue, Tax Havens, CCEMG.

JEL Classification Codes : C33, F63, H25.

Öz

Bu çalışma, 1995-2023 yıllarına ait yıllık verileri kullanarak, altı Avrupa vergi cenneti ekonomisinde (Belçika, İrlanda, Lüksemburg, Malta, Hollanda ve İsviçre) doğrudan yabancı yatırım (DYY), kurumlar vergisi geliri ve refah (kişi başına GSYİH) arasındaki uzun vadeli ilişkiyi incelemektedir. İkinci nesil ekonometrik yöntemler (Fourier KPSS, ECM bootstrap, koentegrasyon ve CCEMG) kullanılarak yapılan analiz, vergi cenneti ekonomilerindeki DYY'nin büyük ölçüde finansallaştığını ve reel ekonomik faaliyetten kopuk olduğunu ortaya koymaktadır. Kısa vadeli sonuçlar, DYY veya vergi gelirlerinden refah artışı olmadığını göstermektedir. Uzun vadeli bulgular ise güçlü bir heterojenlik ortaya koymaktadır: Kurumlar vergisi gelirleri İrlanda ve İsviçre'de refahı önemli ölçüde artırırken, doğrudan yabancı yatırımlar Malta, Lüksemburg ve Hollanda'da zayıf ya da olumsuz etkiler yaratmaktadır; bu da bu ülkelerin finans merkezleri olarak rolünü teyit etmektedir.

Anahtar Sözcükler : Doğrudan Yabancı Yatırım, Kurumlar Vergisi Geliri, Refah, Vergi Cennetleri, CCEMG.

---

[1] *This study was presented as an abstract at the 51st EBES Conference in Rome, held from April 11 to 13, 2025.*

[2] *Bu çalışma, özet bildiri olarak 11-13 Nisan 2025 tarihinde Roma'da yapılan 51. Roma EBES Konferansı'nda sunulmuştur.*

1. Introduction

Since the deregulation of the international financial system in the early 1980s, income inequality has increased within Europe, particularly in countries such as Ireland, Luxembourg, the Netherlands, Malta, Switzerland, and Belgium. Financial market liberalisation has attracted substantial foreign direct investment (FDI), prompting these nations to compete for FDI by offering incentives, particularly favourable tax policies. As Tørsløv et al. (2018) note, this competition has led to the emergence of a group of countries characterised by low corporate-income tax rates. While taxes play a critical role in attracting foreign capital, excessively low tax rates, coupled with the cross-border effects of tax competition, can result in suboptimal welfare outcomes.

Tax competition has become a significant issue in both developed and developing countries, with governments worldwide reducing corporate income tax rates to attract foreign investment. In the European Union, this phenomenon is particularly pronounced, as governments have pursued lower tax rates to stimulate economic growth by attracting foreign capital. Consequently, the variation in national tax rates has amplified disparities in resource distribution, making it a critical issue for the European Union (Günel, 2022).

This study addresses a specific gap in the literature by examining the long-run relationship between foreign direct investment (FDI), corporate tax revenue, and welfare in the six selected European tax havens, while controlling for key macroeconomic fundamentals. Unlike previous studies that focus primarily on profit shifting or macro-level tax strategies, this paper evaluates whether the long-run interaction among FDI, tax revenues, and welfare persists even under BEPS reforms. Thus, the research question is: How do foreign direct investment and corporate tax revenue affect long-run welfare in the six selected European tax havens?

Following Soto et al. (2024), who document how certain European jurisdictions evolved into major hubs for profit shifting and financialised FDI, this study focuses on six economies: Belgium, Ireland, Luxembourg, Malta, the Netherlands, and Switzerland, where the interaction between tax policy and international capital mobility is structurally distinctive. While prior literature has extensively documented the mechanics of profit shifting in these jurisdictions, the extent to which FDI inflows translate into long-run welfare outcomes remains empirically underexplored. This forms the conceptual motivation for investigating whether FDI contributes to persistent inequality in tax-haven economies.

This study makes three main contributions. First, it applies second-generation panel techniques (Fourier KPSS, ECM bootstrap cointegration, CCEMG) to a group of the six selected European tax havens where cross-sectional dependence and structural breaks are likely. Second, it incorporates both corporate tax revenue and FDI simultaneously, allowing us to evaluate the welfare effects of tax-driven investment strategies. Third, it provides updated evidence on whether the long-run relationships between FDI, corporate tax revenue, and welfare persist in European tax-haven economies during the BEPS era.

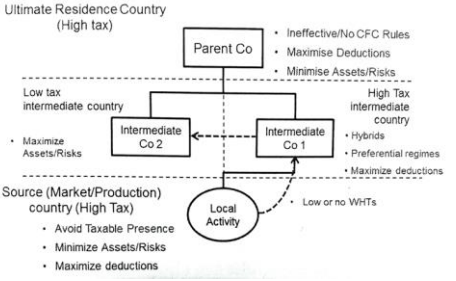
The remainder of the paper is organised as follows. Section 2 describes the formation and development of tax havens in Europe. Section 3 synthesises the theoretical and empirical literature on FDI, inequality, and tax competition. Section 4 presents the data and methodology. Section 5 reports the empirical results, while Section 6 discusses the findings and concludes.

2. Tax Havens, Formation Processes, and Europe

OECD (1998) defines tax havens as jurisdictions that employ tax and non-tax incentives to attract financial and service-sector activities. These jurisdictions typically offer minimal or zero taxation, reduced regulatory and administrative burdens, and strong bank-secrecy provisions that limit information exchange. OECD identifies four key criteria for determining whether a country is a tax haven: (a) no or nominal taxation, (b) lack of effective information exchange, (c) lack of transparency, and (d) the absence of substantial activity requirements (OECD, 1998: 21-23).

A large body of research has attempted to classify tax havens using different methodological approaches. In this study, we focus on European tax havens identified in The Missing Profits of Nations by Tørsløv et al. (2018), whose classification is directly linked to base erosion and profit shifting (BEPS) behaviour by multinational enterprises. To strengthen the empirical selection of countries, we also incorporate the quantitative network-based classification developed by the CORPNET group (Garcia-Bernardo et al., 2017), which distinguishes between conduit and sink offshore financial centres (OFCs).

Figure: 1
Multinational Corporations Transfer Profits to Tax Havens



Source: (Barbantini et al., 2018).

As shown in Figure 1, global multinational enterprises have sought to avoid a high tax burden by establishing subsidiaries in one or more low-tax countries. By transferring profits from parent companies to subsidiaries, multinational enterprises can pay very low taxes or no taxes at all. In this regard, the type of subsidiary companies or conduits is also important. They may be brokerage houses, investment holding companies, etc., or located in coastal financial centres.

Table 1 compares the criteria used in both studies, showing that the Netherlands, Ireland, Luxembourg, and Switzerland consistently appear as core tax-haven jurisdictions, while Belgium, due to its well-documented role as a conduit in corporate ownership chains, is also included in our analysis. We exclude Cyprus because we lack sufficient long-term data. Unlike the micro-level approaches of previous studies, our study evaluates these countries using macroeconomic indicators.

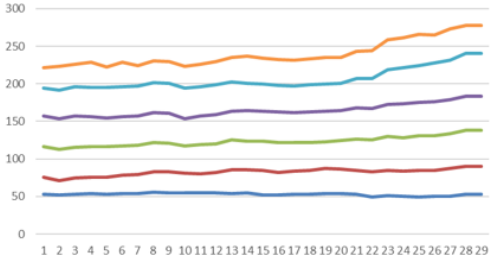
Table: 1
Comparison of Tørsløv et al. (2018) and Garcia-Bernardo et al. (2017)

	Tørsløv et al. (2018)	**Garcia-Bernardo et al. (2017)**
Purpose of the Methodology of the Study	Traditional methods for identifying tax havens analyse tax and legal structures for base erosion and profit shifting (BEPS) tools.	This approach is purely quantitative and ignores taxation and legal concepts. The technique gives both a method of classification and a method of understanding the relative scale - but not the absolute scale - of havens/OFCs.
European Countries Identified as Major Tax Havens in the Study	Belgium, Netherlands, Luxembourg, Malta, Ireland, Switzerland	Netherlands, Ireland, Luxembourg, Switzerland

Sources: Tørsløv et al. (2018) and Garcia-Bernardo et al. (2017).

Multinational corporations (MNCs) use tax havens by structuring their international operations to minimise their effective tax liabilities. This often involves setting up subsidiaries, holding companies, and other intermediary entities in jurisdictions with broad treaty networks and preferential tax regimes. Through transfer pricing adjustments, hybrid entities, and strategic allocation of intangible assets, MNCs can shift profits from high-tax to low-tax locations. Figure 1 illustrates this mechanism, showing how parent companies channel profits through conduit jurisdictions and ultimately into sink OFCs. These structures allow MNCs to reduce or eliminate tax obligations while reporting large volumes of financial flows disconnected from real economic activity.

Figure: 2
Tax Revenues in Europe (1995-2023)



Source: Authors' own calculations and visualisation based on World Bank Tax Revenue (% of GDP) series (1995-2023), plotted in Excel. Series 1: Belgium (blue), Series 2: Malta (orange), Series 3: Netherlands (green), Series 4: Luxembourg (purple), Series 5: Ireland (yellow), Series 6: Switzerland (light blue). The horizontal axis represents the years from 1995 to 2023, showing the evolution of tax revenue trends over time for each jurisdiction. The vertical axis displays tax revenue as a percentage of GDP, indicating the share of national income collected through taxation in each country.

Figure 2, which shows tax revenues in Europe between 1995 and 2023, indicates that the profit-shifting behaviour of the countries included in our study may affect the apparent tax base independent of domestic production. As shown in the figure, all six jurisdictions

display moderate fluctuations in tax revenue over time, with Belgium and Switzerland maintaining relatively stable patterns. Malta and Luxembourg show more noticeable variation, while the Netherlands and Ireland show mild upward movements over the period. These dynamics suggest that changes in reported tax revenue do not necessarily reflect shifts in real economic activity, consistent with the panel results indicating that profit-shifting behaviour can influence the apparent tax base independently of domestic production.

Conduit OFCs such as the Netherlands, Ireland, and Switzerland facilitate profit shifting through advanced legal and tax-planning instruments, while sink OFCs accumulate disproportionately large shares of offshore wealth (Garcia-Bernardo et al., 2017). Belgium, Malta, and Luxembourg also exhibit characteristics of sink jurisdictions. These classifications are directly relevant to our empirical analysis because they help explain why FDI inflows in these countries appear large in official statistics despite being only weakly connected to productive investment.

The mechanisms discussed above profit shifting, conduit companies, and OFC networks- affect how FDI enters tax-haven economies. Since much of the FDI recorded in these jurisdictions reflects financial flows rather than productive investment, its distributional impact may diverge from standard FDI theories. These dynamics create a structural basis for linking FDI with income inequality, forming the theoretical motivation for our empirical model.

3. The Relationship between FDI and Income Inequality

Three theoretical perspectives guide this analysis. First, the race-to-the-bottom hypothesis argues that intensified tax competition limits governments' ability to finance redistributive policies. Second, the capital-mobility inequality hypothesis suggests that FDI disproportionately benefits high-skill labour and capital owners, thereby widening income gaps. Third, the profit-shifting hypothesis posits that FDI into tax havens consists largely of financial flows detached from domestic job creation, reducing FDI's capacity to promote inclusive growth. Together, these perspectives explain why FDI may not generate broad-based welfare improvements in tax-haven economies.

Welfare is typically measured through indicators such as GDP or GDP per capita, which capture changes in economic activity resulting from FDI inflows. However, several studies highlight negative FDI-related externalities. Roy-Mukherjee and Udeogu (2021) show that when FDI reflects profit-shifting rather than productive investment, it may depress household incomes, as inflows inflate GDP mechanically without corresponding gains in wages, employment, or productive capacity.

Income inequality remains a persistent feature of both advanced and developing economies (Mankiw & Taylor, 2020). Soto et al. (2024) argue that the traditional Kuznets Curve does not hold in tax-haven contexts, where institutional structures and tax-based growth models differ from those of democratic, production-oriented economies. While

Kuznets (1955) associates changes in inequality with different stages of development, contemporary research emphasises additional factors including technological change, credit markets, and foreign investment that shape long-run distributional outcomes (Acemoglu & Autor, 2011; Jaumotte et al., 2013).

Intensifying competition for FDI and the progressive lowering of corporate tax rates have raised concerns about the fiscal sustainability of tax-haven models. While preferential tax regimes attract large volumes of FDI, excessive tax competition reduces governments' capacity to fund public services, thereby contributing to widening income disparities. In the European context, financial market deregulation and the rise of OFC-linked investment flows have amplified these dynamics, providing a theoretical basis for investigating how FDI may influence income inequality in tax-haven economies.

4. Data & Methodology

Our model is inspired by Soto et al. (2024: 4), but we use different macroeconomic variables in the control vector for the six selected European tax havens.

$$W = f(FDI, TAX\ R., Z) \quad (1)$$

$$W_{it=} \alpha + \beta FDI_{it} + \delta TAX\ R._{it} + \theta Z_{it} + \varepsilon_{it} \quad (2)$$

The annual economic welfare is measured by GDP per capita, while Z denotes a vector of macroeconomic variables essential for economic development. The control vector Z consists of three macroeconomic indicators commonly associated with development dynamics: (i) the share of the population aged 15-64 (labour force size), (ii) general government final consumption (public expenditure), and (iii) the annual growth rate of gross fixed capital formation (investment). These components follow Kholeka and Sin-Yu (2023) and capture the structural factors affecting welfare in tax-haven economies. The analysis also includes Foreign Direct Investment (FDI) flows and corporate tax revenue as a percentage of GDP (TAX R.). The error term is represented by Ɛ, which acts as a residual variable.

To address potential multicollinearity among development-related variables and to reduce the dimensionality of the control vector Z, we employ Principal Component Analysis (PCA). PCA transforms correlated macroeconomic indicators into a smaller set of orthogonal components that retain most of the common variation across countries. This approach is widely used in macroeconometric studies to construct composite indices that capture structural characteristics of economies while avoiding instability in coefficient estimates (Jolliffe & Cadima, 2016).

In this context, the PCA-derived index does not represent a specific economic variable but rather the shared variation among labour force size, government consumption, and investment dynamics. Therefore, the estimated coefficient on Z should be interpreted as the effect of a general 'developmental pressure factor' rather than any single macroeconomic

indicator. This aligns with the interpretation framework proposed by Stock & Watson (2002), who note that PCA-based factors capture co-movements rather than isolated shocks.

Data were collected from the World Bank Economic Development Indicators for 1995-2023. No further data are available, and the six selected tax havens in the EU are based on Soto et al. (2024).

Table: 2
Second-Generation Validation and Pre-test Results

Delta Test	**T-Statistics**	**Probability**
$\tilde{\Delta}$	1.515	0.065
$\tilde{\Delta}_{adj}$	1.597	0.055
CD_LM Test (for all models)	**T-statistics**	**Probability**
LM (Breusch & Pagan, 1980)	120.247	0.000*
CD LM 1 (Pesaran, 2004)	9.929	0.000*
CD LM 2 (Pesaran, 2004)	-0.112	0.455
Bias-adjusted CD (Pesaran & Yamagata, 2008)	13.526	0.000*

According to Table 2, we obtained and assessed the slope coefficients using the Delta test, developed by Pesaran and Yamagata (2008), to evaluate heterogeneity. The null hypothesis suggests homogeneity, and based on the results in Table 2, we cannot reject this hypothesis at the 5% significance level, indicating that the variables are homogeneous. Next, we investigated cross-sectional dependence using the CD-LM test, developed by Pesaran (2004) and refined by Pesaran and Yamagata (2008). The null hypothesis here states that there is no cross-sectional dependence. According to Table 2, although the Delta test cannot reject the null of homogeneous slopes at the 5% level, the economic diversity across Belgium, Ireland, Luxembourg, Malta, the Netherlands, and Switzerland supports using the CCEMG estimator, which accommodates country-specific long-run relationships.

Table: 3
Fourier KPSS Panel Unit Root Test Results
PANEL A. GDP

Country	**Intercept k=1**	**Trend k=1**	**Intercept k=2**	**Trend k=2**	**Intercept k=3**	**Trend k=3**
Belgium	0.0635	0.0626	0.0523	0.0595	0.2415	0.0686
Malta	0.0737	0.0712	0.0931	0.0952	0.0883	0.0723
Netherlands	0.1050	0.0462	0.7043	0.0372	0.5251	0.0624
Luxembourg	0.0513	0.0440	0.0730	0.0528	0.0872	0.0585
Ireland	0.0884	0.0706	0.5766	0.0867	0.1692	0.0697
Switzerland	0.0500	0.0476	0.0912	0.0462	0.0738	0.0681

Panel F-KPSS Statistic: 0.3893 (k=1), 5.1732 (trend k=1), 3.7394 (k=2), 0.6736 (trend k=2), 0.7327 (k=3), 0.3892 (trend k=3)
5% Critical Values: –4.10 (k=1), –3.57 (k=2), –3.31 (k=3).

PANEL B. FDI

Country	**Intercept k=1**	**Trend k=1**	**Intercept k=2**	**Trend k=2**	**Intercept k=3**	**Trend k=3**
Belgium	0.0471	0.1431	0.0367	0.0641	0.1968	0.0627
Malta	0.0472	0.0562	0.0330	0.0342	0.0521	0.0521
Netherlands	0.1887	0.4344	0.0443	0.1266	0.4859	0.1529
Luxembourg	0.1952	0.2879	0.0294	0.1058	0.2926	0.1276
Ireland	0.1027	0.2649	0.0382	0.0943	0.3266	0.0956
Switzerland	0.1009	0.2768	0.0411	0.0665	0.2775	0.0946

Panel F-KPSS Statistic: 2.1755, 1.8994, 1.4299, 1.8747, 2.0149, 2.2337
Interpretation: Most series exhibit non-stationarity at all frequencies.

PANEL C. TAX REVENUE (TAX R.)

Country	Intercept k=1	Trend k=1	Intercept k=2	Trend k=2	Intercept k=3	Trend k=3
Belgium	0.0824	0.0770	0.1264	0.0999	0.1413	0.1021
Malta	0.2620	0.0326	0.0917	0.0858	0.1059	0.1071
Netherlands	0.2245	0.0774	0.3755	0.1146	0.3941	0.1122
Luxembourg	0.0479	0.0357	0.1247	0.0326	0.1174	0.0476
Ireland	0.0952	0.0784	0.1652	0.1307	0.1434	0.1254
Switzerland	0.1695	0.0337	0.1478	0.0864	0.1552	0.0855

Panel F-KPSS Statistic: 3.6895, 0.0000, 0.5704, 2.4891, 0.3657, 2.1774
Interpretation: The TAX R series is also predominantly non-stationary across tested frequencies.

PANEL D. Z (Development Controls)

Country	Intercept k=1	Trend k=1	Intercept k=2	Trend k=2	Intercept k=3	Trend k=3
Belgium	0.0726	0.0431	0.3425	0.0865	0.3009	0.0936
Malta	0.0744	0.0509	0.0933	0.0937	0.1001	0.0823
Netherlands	0.1470	0.0539	0.1967	0.0878	0.3660	0.0967
Luxembourg	0.0604	0.0472	0.6318	0.0574	0.5645	0.0642
Ireland	0.1212	0.1215	0.1414	0.1247	0.1173	0.1174
Switzerland	0.1137	0.0477	0.0837	0.0696	0.2215	0.0756

Panel F-KPSS Statistic: 1.4750, 5.8659, 1.9796, 2.1702, 2.1265, 0.0465
Interpretation: Development-related indicators are generally non-stationary, supporting the use of cointegration techniques.

The Fourier approximation introduced by Nazlioglu and Karul (2017) uses a common factor model, defining a deterministic term as a function of time, referred to as (Z{it}). They include a component '(k)' that signifies the Fourier frequency and derive its asymptotic distribution. The size of frequency (k) represents the number of components assumed to be homogeneous across units, with the notion that at least one frequency component is present if a structural break exists. Typically, (k) is determined based on the Akaike Information Criterion. Becker et al. (2004) noted that smaller frequency values are effective in capturing structural breaks. Consequently, the selected frequency values (single frequency) are (k = 1, 2, 3), with critical values for these frequencies at the 5% significance level being -4.10 for (k = 1), -3.57 for (k = 2), and -3.31 for (k = 3). These values are sourced from Table 20 in Karul (2016). Furthermore, the implementation section incorporates Gauss code adapted from Karul (2016). Before employing the Fourier approach, we performed second-generation validation and precondition tests. Fourier frequencies are critical for inference; indeed, we generally reject the null hypothesis of stationarity for all countries in the group across all frequencies (k = 1, 2, 3) when both intercept and intercept-with-trend are present. The Fourier KPSS results in Table 3 show that GDP, FDI, Tax Revenue, and the Z indicators are predominantly non-stationary across all countries and frequencies under both intercept and trend specifications. The panel F-KPSS statistics also exceed the relevant critical values, confirming panel-level non-stationarity and indicating that the variables generally behave as I(1) processes. These findings suggest smooth structural breaks and common-factor dynamics across tax-haven economies, justifying cointegration techniques. Consequently, proceeding with ECM bootstrap tests and long-run CCEMG estimation is both methodologically appropriate and empirically necessary.

The Error Correction Mechanism (ECM) co-integration test is a statistical method used to determine whether a long-term relationship exists between variables. This test analyses relationships across time and cross-sectional units and is known for its reliability and accuracy. According to Westerlund (2007), the null hypothesis posits no co-integration

between the variables. Table 4 provides evidence of a long-run cointegrating relationship among the variables across the sample countries. However, the evidence for cointegration is relatively weak, as significance is obtained only at the 10% level. Therefore, interpret the long-run estimates from the CCEMG model with caution, given the modest strength of the cointegration relationship.

Table: 4
ECM Bootstrap Cointegration Test Results

For all models	t-statistics	Bootstrap P. Values
g_τ Group mean	-1.861	0.170
g_α Group mean	-0.581	0.370
p_τ Panel	-2.490	0.160
p_α Panel	-2.657	0.090*

Panel data analysis with heterogeneous coefficients has become standard practice, especially in contexts with numerous observations across both cross-sectional units (N) and periods (T). This approach allows researchers to identify the effects of each cross-section individually. The Common Correlated Effects (CCE) model, introduced by Pesaran in 2006, serves as a long-term coefficient estimator designed to account for unobserved common factors, which is particularly important in macroeconomic studies.

The CCE methodology filters individual regressors through cross-sectional averages, ensuring that as the cross-sectional dimension increases, the effects of unobserved common factors are eliminated (Pesaran, 2006: 967). It uses cross-sectional averages of the dependent and explanatory variables to improve standard panel regressions.

Within this framework, two types of estimators are proposed: the pooled estimator and the mean group estimator, depending on the assumption of slope homogeneity (Pesaran, 2012: 24). Generally, the Common Correlated Effects Pooled (CCEP) estimator outperforms the Common Correlated Effects Mean Group (CCEMG) estimator when the assumption of homogeneity is valid, while the CCEMG is more effective in the presence of heterogeneity (Pesaran, 2006: 992). A significant advantage of this method is its flexibility in calculating long-term coefficients for each cross-sectional unit (Saglam & Egeli, 2017: 220).

Table: 5
CCEMG Estimators for the Short-Term

Dependent Variable: GDP	Coefficients	S.E. (NP)	T (NP)
FDI	-0.00344	0.0000	-1.1673
TAX R.	-0.00000	0.0000	-0.5494
Z	0.00000	0.0195	-0.1762

CCE Mean-Group estimates are reported to account for potential cross-country heterogeneity and cross-sectional dependence. The importance of the standard deviation (SE) and the Newey-West (NW) type t-statistic, calculated for a sample size of N x T = 6 x 29, with a bias of -0.23, RMSE of 11.36, a size of 6.60, and power of 9.80. Rank deficiency is demonstrated in Table 4, experiment 2b of Pesaran (2006) on page 997. The results in this table reveal a positive yet statistically insignificant relationship between welfare and the

control variable (Z, which encompasses macroeconomic indicators) in the short term, indicated by a coefficient value of zero for the selected period. This suggests that economic dynamics do not have a lasting impact on welfare in the short run. Moreover, welfare is definitively negatively related to foreign direct investment (FDI) and corporate tax revenues. Specifically, when FDI rises by 1%, GDP per capita declines by 0.003%. Therefore, no significant short-run welfare effects are observed, even when countries successfully attract foreign direct investment.

Table: 6
Country-Specific Estimations for the Long-Term

ID	Tax R.	se(NW)	Z	se(NW)	FDI	se(NW)	Ti	from	to
Belgium	0.044	0.000	0.000	0.000	0.019	0.014	29	1995	2023
Malta	-0.079	0.110	-0.000	0.000	-0.003	0.006	29	1995	2023
Netherlands	-0.012	0.000	-0.000	0.000	-0.001	0.000	29	1995	2023
Luxembourg	-0.040	0.059	0.000	0.000	-0.001	0.003	29	1995	2023
Ireland	0.212	0.076	-0.000	0.000	0.115	0.049	29	1995	2023
Switzerland	0.168	0.015	0.000	0.000	0.006	0.011	29	1995	2023

The analysis uses Newey-West standard errors (se(NW)) to account for potential heteroscedasticity and autocorrelation, ensuring more reliable and robust coefficient estimates. ID represents the selected group of countries, and Ti represents the period from 1995 to 2023. As shown in Table 6, corporate tax revenue is the most significant determinant of GDP per capita (welfare) within the selected group of countries, followed by foreign direct investment (FDI). Macroeconomic indicators, typically associated with overall economic development, appear to have no substantial effect on welfare from 1995 to 2023, as their coefficient estimates are statistically significant but extremely small in magnitude. This suggests that, over this period, economic development (Z) did not contribute meaningfully to changes in welfare, as measured by GDP per capita. The relationship between corporate tax rates and foreign direct investment (FDI) in the European Union (EU) reflects a complex interplay influenced by economic development. In Belgium, corporate taxes contribute about 5%, while FDI accounts for only about 2% of the total. This suggests that a country's level of economic development strongly affects foreign direct investment dynamics.

Conversely, Malta, despite its relatively smaller economic scale, demonstrates negative outcomes in both tax revenues and FDI. Yet, its coefficients are larger than those of wealthier nations like Luxembourg and the Netherlands. This anomaly prompts a deeper examination of how economic context can shape FDI patterns, even in countries with seemingly less favourable economic conditions.

Ireland and Switzerland stand out as notable exceptions, exhibiting relatively stronger long-run welfare outcomes among the selected European tax-haven economies. This trend indicates a robust positive correlation between higher corporate tax revenues and increased FDI, particularly in these economically advanced nations. These findings challenge the conventional notion of tax competition within the EU, suggesting that tax competition may be more prevalent among countries with stronger economic growth metrics.

5. Results

This section presents empirical findings from the CCEMG long-run estimates and the model's short-run dynamics. Table 5 reports short-run coefficients, while Table 6 provides country-specific long-run estimates. The CCEMG short-run coefficients indicate a negative and statistically insignificant association between FDI and GDP per capita across the panel, suggesting that short-term fluctuations in foreign investment do not immediately translate into welfare gains in tax-haven economies. Similarly, corporate tax revenue exhibits a weak short-run relationship with GDP, while the composite macroeconomic index (Z) shows no meaningful short-run impact. These findings imply that short-run dynamics in tax havens are driven more by financial flows and external shocks than by real economic adjustments. The long-run CCEMG results show substantial cross-country heterogeneity. Corporate tax revenue emerges as the most influential determinant of long-term welfare for several countries, particularly Ireland (0.212) and Switzerland (0.168). A coefficient such as 0.115 for Ireland's FDI implies that a 1% increase in FDI is associated with a 0.115% increase in GDP per capita, not a 115% increase. This elasticity-based interpretation aligns with standard log-linear models. For Belgium and Switzerland, both tax revenues and FDI contribute positively to long-run GDP per capita, while Malta and Luxembourg show negative or near-zero coefficients, indicating weak welfare gains from FDI-driven tax strategies. The Netherlands shows nearly neutral FDI effects, consistent with its role as a conduit jurisdiction where investment flows often bypass the domestic economy.

This study offers three key contributions to the literature. Methodologically, it is among the few applications that combine Fourier-based second-generation unit-root testing, ECM bootstrap cointegration, and CCEMG estimation to capture structural breaks and unobserved common factors in tax-haven economies. Theoretically, it advances the understanding of how profit-shifting-driven FDI differs from productive investment by demonstrating that long-run welfare dynamics in tax havens are shaped more by corporate tax revenue structures than by real economic spillovers. Empirically, the paper provides updated, country-specific evidence for 1995-2023, suggesting that the persistence of tax-motivated FDI flows remained a structural feature of these economies during the BEPS era, despite rising reported investment.

6. Discussion

The empirical results show that FDI behaves differently in the six selected European tax havens than in conventional investment-driven economies. In several countries, particularly Malta and Luxembourg, FDI shows either weak or negative long-run associations with welfare, suggesting that a substantial share of reported inflows does not correspond to productive activity capable of raising household income. Even where FDI coefficients are positive, such as in Ireland and Switzerland, the magnitude is modest, indicating that financial inflows contribute to GDP per capita largely through accounting channels rather than real economic spillovers.

Corporate tax revenue emerges as the most consistent long-run determinant of welfare, which aligns with the structural role these jurisdictions play within global profit-shifting networks. The fact that tax revenue and FDI series are non-stationary across countries further supports the interpretation that these economies experience persistent, structurally embedded financial flows rather than temporary or cyclical shocks. This persistence also helps explain heterogeneity across the panel: jurisdictions with sophisticated conduit structures convert financial inflows into fiscal gains, while others capture limited benefits.

These findings connect directly to ongoing policy debates surrounding the OECD/G20 (2023) BEPS project. Although our model does not estimate BEPS reforms explicitly, the stability of long-run FDI and tax-revenue relationships over the 1995-2023 period suggests that tax-motivated capital flows remained largely intact during the years in which BEPS recommendations were formulated and implemented. The persistence of these mechanisms suggests that the incentives driving multinational enterprises to route profits through low-tax jurisdictions may have remained relevant, particularly prior to the implementation of the Pillar Two global minimum tax.

Taken together, the results indicate that unless international tax reforms meaningfully shift FDI composition toward genuine productive investment, their potential to generate broad-based improvements in economic welfare in tax-haven economies is likely to remain limited. Profit-shifting structures can continue to inflate domestic tax bases and GDP per capita without creating broad-based welfare gains. Therefore, the empirical patterns identified in this study underscore the need for stronger international coordination on effective taxation, beyond disclosure-based or reporting-based measures alone.

References

Acemoglu, D. & D. Autor (2011), "Skills, tasks and technologies: Implications for employment and earnings", in: O. Ashenfelter & D. Card (eds.), *Handbook of Labor Economics Vol. 4*, (1043-1171), Elsevier.

Barbantini, V. et al. (2018), "The changing international tax world: Post-BEPS order or chaos", in: B. Yaltı (ed.), *Cross-border tax challenges in the 21st century* (7-45), Oniki Levha Yayınları.

Becker, R. et al. (2004), A general test for time dependence in parameters. *Journal of Applied Economics*, 19(7), 899-906.

COPRPNET (2025), *Welcome to CORPNET: Uncovering networks of corporate control*, <https://corpnet.uva.nl/about-corpnet/>, 15.05.2025.

Garcia-Bernardo, J. et al. (2017), "Uncovering Offshore Financial Centers: Conduits and Sinks in the Global Corporate Ownership Network", *Scientific Reports*, 7(1), 6246.

Günel, T. (2022), "Tax competition in the European Union: The threshold effect of gross domestic product per capita", *Gazi İktisat ve İşletme Dergisi*, 8(1), 115-123.

Jaumotte, F. et al. (2013), "Rising income inequality: Technology, or trade and financial globalization?", *IMF Economic Review*, 61(2), 271-309.

Jolliffe, I.T. & J. Cadima (2016), "Principal component analysis: A review and recent developments", *Philosophical Transactions of the Royal Society A*, 374(2065), 20150202.

Karul, C. (2016), "Panel unit root tests in the presence of smooth structural shifts", *Doctoral Dissertation*, Dokuz Eylül University.

Kuznets, S. (1955), "Economic growth and income inequality", *American Economic Review*, 45(1), 1-28.

Mankiw, N.G. & M.P. Taylor (2020), *Economics*, Cengage Learning.

Nazlioglu, S. & C. Karul (2017), "A panel stationarity test with gradual structural shifts: Re-investigate the international commodity price shocks", *Economic Modelling*, 61, 181-192.

OECD (1998), *Harmful tax competition: An emerging global issue*, OECD Publishing, <https://www.oecd.org/en/publications/harmful-tax-competition_9789264162945-en.html>, 20.05.2025

OECD (2023), *OECD/G20 Inclusive Framework on BEPS: Progress report 2022-2023*, OECD Publishing, <https://www.oecd.org/en/publications/oecd-g20-inclusive-framework-on-beps-progress-report-september-2022-september-2023_a9ee1aef-en.html>, 20.05.2025.

Pesaran, H.M. & T. Yamagata (2008), "Testing slope homogeneity in large panels", *Journal of Econometrics*, 142(1), 50-93.

Pesaran, H.M. (2004), "General Diagnostic Tests for Cross-Section Dependence in Panels", IZA *Discussion Papers* 1240, Institute of Labor Economics (IZA).

Pesaran, H.M. (2006), "Estimation and inference in large heterogeneous panels with a multifactor error structure", *Econometrica*, 74(4), 967-1012.

Pesaran, H.M. (2012), "Testing weak cross-sectional dependence in large panels", CESifo *Working Paper* No. 3800, Cambridge University Press.

Roy-Mukherjee, S. & E. Udeogu (2021), "Neo-liberal globalization and income inequality: Panel Data Evidence from OECD and Western Balkan Countries", *Journal of Balkan and Near Eastern Studies*, 23(1), 15-39.

Saglam, Y. & H.A. Egeli (2017), "Empirical analysis of export-led vs domestic demand-led growth in East Asia", *Uluslararası İktisadi ve İdari İncelemeler Dergisi*, 19, 211-226.

Soto, G. et al. (2024), "FDI and income inequality in tax-haven countries: The relevance of tax pressure", *Economic Systems*, 48(1), 101172.

Stock, J.H. & M.W. Watson (2002), "Forecasting using principal components from a large number of predictors", *Journal of the American Statistical Association*, 97(460), 1167-1179.

Tørsløv, T. et al. (2018), "The missing profits of nations", *NBER Working Paper*, Cambridge, MA.

Westerlund, J. (2007), "Panel cointegration tests of the Fisher effect", Journal of *Applied Economics*, 23(2), 193-233.

Önkan, Ö. & Y. Sağlam (2026), "Common Correlated Effects Estimation of the Relationship between Foreign Direct Investment and Welfare: A Case Study of Tax Havens in Europe", *Sosyoekonomi*, 34(70), 217-229.

Sosyoekonomi

2026, Vol. 34(70), 231-258

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.10
Date Submitted: 01.08.2025
Date Revised: 22.12.2025
Date Accepted: 04.09.2026

The Impact of Managerial Overconfidence on Financing Decisions: Evidence from Türkiye's Chemical Industry

Öznur Dilara TAŞ *(https://orcid.org/0009-0001-0526-6938), Mersin University, Türkiye; oznurdilaratas@gmail.com*

Turhan KORKMAZ *(https://orcid.org/0000-0001-5468-2279), Mersin University, Türkiye; tkorkmaz@mersin.edu.tr*

Serdar YAMAN *(https://orcid.org/0000-0002-8316-0805), Şırnak University, Türkiye; serdaryaman@sirnak.edu.tr*

Yönetsel Aşırı Güvenin Finansman Kararlarına Etkisi: Türkiye Kimya Sektöründen Bulgular

Abstract

This study examines business managers' behavioural tendencies in financing decision-making, with a particular focus on overconfidence. The analysis developed three models for the chemical sector, using short-term debt ratio (STD), long-term debt ratio (LTD), and leverage ratio (LEV) as dependent variables. The study examined how managers' overconfidence levels affect financing decisions and their relationships with other determinants. The research used panel data analysis of annual data from selected chemical companies traded on Borsa Istanbul (BIST) for 2011-2022. The findings show that business managers' overconfidence has a significant and distinct effect on financing decisions in chemical sector companies.

Keywords : Behavioural Finance, Overconfidence, Financing Decision, Chemicals Industry, Panel Data Analysis.

JEL Classification Codes : G3, G32, G4.

Öz

Bu çalışmada, işletme yöneticilerinin finansman kararları sürecinde sergiledikleri davranışsal eğilimler, özellikle aşırı güven davranışı, incelenmiştir. Analiz kapsamında kimya sektörüne yönelik üç farklı model geliştirilmiş; bağımlı değişkenler olarak kısa vadeli borç oranı (STD), uzun vadeli borç oranı (LTD) ve kaldıraç oranı (LEV) kullanılmıştır. Çalışmada, yöneticilerin aşırı güven düzeylerinin finansman kararları üzerindeki etkisi ile diğer belirleyici faktörlerle olan ilişkileri ortaya konmuştur. Araştırma, Borsa İstanbul'da (BIST) işlem gören seçilmiş kimya şirketlerine ait 2011-2022 dönemi yıllık verileri kullanılarak, panel veri analizi yöntemiyle gerçekleştirilmiştir. Elde edilen bulgular, kimya sektöründe faaliyet gösteren firmalarda yöneticilerin aşırı güven davranışının finansman kararları üzerinde anlamlı ve belirgin bir etkiye sahip olduğunu göstermektedir.

Anahtar Sözcükler : Davranışsal Finans, Aşırı Güven, Finansman Kararları, Kimya Sektörü, Panel Veri Analizi.

1. Introduction

Managerial psychology, which has attracted growing attention in the behavioural finance literature in recent years, has led to studies examining how individual tendencies such as overconfidence affect business decisions. It has been argued that managers' overconfidence levels, shaped by subjective judgments, may have important consequences for enterprises' capital structure, borrowing preferences, and investment strategies by increasing risk-taking in financing decisions (Malmendier & Tate, 2005: 652). Although classical finance theory assumes managers behave rationally and make informed decisions, behavioural approaches show that cognitive biases shape managers' decision-making. In this framework, managers' overconfidence increases the likelihood of making more aggressive, riskier choices in the firm's financial structure.

Behavioural finance, which examines how psychological and cognitive factors affect financial decision-making, seeks to explain irrational behaviour at the intersection of psychology and finance (James, 2023: 2-7). Behavioural finance is an interdisciplinary field developed to understand market behaviours that traditional finance theories fail to explain under the rational investor assumption. In addition, behavioural finance investigates the relationship between financial markets and the cognitive biases, emotional reactions, and irrational behaviours investors exhibit in their decision-making processes (Baker & Nofsinger, 2010: 3).

Behavioural finance has developed alternative approaches to traditional finance models by offering new theoretical frameworks to explain market anomalies, speculative bubbles, and investors' irrational preferences. This new perspective on financial markets provides valuable insights for market practices and institutions. Whether an individual's decision is rational depends not only on the nature of the problem and the information available, but also on the decision-maker's personality traits. Thus, factors such as an individual's education, experience, emotions, time constraints, stress, and the need to make multiple decisions at once also shape managerial decisions. In many instances, decision-making is not rational, but only expedient (Loewenstein, 2007: 557).

Behavioural finance literature argues that some economic problems are easier to solve using a non-rational human model than a rational one. Behavioural finance seeks to uncover the fallacies in the rational human model assumed by traditional financial models and examine what would happen if it were handled more flexibly (Barberis & Thaler, 2003: 1053). Behavioural finance has gained increasing importance in both academic literature and applied finance practice, contributing to a more comprehensive analysis of financial systems. Kahneman addresses risk, one of the main issues in traditional finance, from a different perspective. In this view, risk is not a concept that stands there waiting to be analysed, but rather something shaped by our minds, life experience, and culture. People created this concept to understand and manage the dangers and uncertainty they encounter in the ordinary course of life (Kahneman, 2011: 164). The cumulative effect of behavioural biases that can cause systemic risks can lead to financial instability. Understanding the mechanisms

behind these biases is important to recognise their impact on investor and manager behaviour and to integrate behavioural finance principles into traditional finance theories.

The shift from traditional finance approaches to a behavioural finance perspective stems from a major transformation in assumptions about financial markets and how they function. Traditional financial theories assume that investors behave rationally, have access to all information, and fully reflect it in market prices. In this framework, basic theories such as the Modern Portfolio Theory (Markowitz, 1952), the Capital Asset Pricing Model (Sharpe, 1964) and the Efficient Markets Hypothesis (Fama, 1970) were developed. These theories assume markets are always efficient and that investors make decisions in an environment where they maximise expected returns and minimise risk. However, empirical studies and observations over time have revealed the shortcomings of this rational investor model. In particular, Prospect Theory, developed by Kahneman and Tversky (1979) and a cornerstone of behavioural finance, shows that individuals systematically make decision-making mistakes because of cognitive biases and psychological tendencies. This has created a new perspective on understanding market anomalies that traditional finance theories struggle to explain.

Overconfidence bias, a key behavioural factor and the main focus of this paper, is a common cognitive bias defined as individuals' overconfidence in their own knowledge, abilities, and decision-making capacity. This tendency manifests as individuals overestimating their competence and knowledge and holding overly optimistic expectations about future events or outcomes. Overconfidence can cause significant errors in decision-making processes by widening the gap between one's actual potential and perceived potential. Managerial overconfidence brings about both opportunities and risks for the organisation. Overconfident managers can make quick decisions. This ability is crucial when quick responses to market changes or competitive pressures are required. This decisiveness can position a company to capitalise on opportunities and manage crises effectively, thereby increasing organisational resilience. However, the propensity to take risks can also increase the likelihood of additional risks (Zhang & Song, 2025: 2). Overconfident managers may tend to incur higher debt by overly optimistic forecasts of future cash flows or by pledging assets as collateral. This may put the company's assets at risk. Moreover, overconfident managers may misjudge growth opportunities and make unnecessary risky investments (Heaton, 2002: 33-45).

Related literature shows that managers' overconfidence affects enterprises' financing policies and preferences. Considering the dynamic structure of industrial sectors in Türkiye, examining the effects of managers' psychological tendencies on financing decisions, especially in the chemical sector, which requires high capital and where global competition is intensely felt, has the potential to fill a significant gap in terms of both academic literature and practice. This research strengthens the link between behavioural finance theory and business management by analysing how managers' overconfidence affects financing decisions in the Turkish chemical industry. In this context, the study examines how

managers' overconfidence affects the short-term debt ratio, long-term debt ratio, and leverage ratio of selected chemical sector firms.

The study offers a different perspective on the factors affecting financing decisions within behavioural finance, particularly overconfidence, and aims to fill gaps in existing research. Studies on behavioural finance and overconfidence generally focus on capital market investors. Therefore, this study examines the relationship between these elements by situating behavioural finance within enterprise financing decisions and managerial overconfidence; in this respect, it adds unique value to the literature. Because an enterprise's financing structure matters not only to business managers but also to shareholders, creditors, and researchers, examining managers' overconfidence in financing decisions in detail is expected to strengthen the foundation of existing research. It is also expected to offer a pioneering approach for future research.

The study is divided into chapters. The introduction section expresses the theoretical background and contents. The second section examines the related literature, followed by a presentation of the dataset and variables in the third section. The fourth section presents the econometric framework and methodology. The fifth section presents the panel data analysis findings. Lastly, the conclusion discusses the study's practical and theoretical contributions, evaluates the overall results, and outlines potential contributions to the literature.

2. Literature Review

In recent years, behavioural finance studies on the impact of managers' individual characteristics on financial decision-making have offered an alternative to the traditional finance approach and produced important theoretical and empirical findings. Studies in this framework show that managerial overconfidence, in particular, can significantly affect financial decisions. The following section summarises the literature on the role of managerial overconfidence in firms.

Research on how managerial overconfidence affects debt maturity structure generally shows that this bias plays an important role in financial decision-making and that managers tend to borrow short-term. Purhanudin and Zakaria (2015), in a study of the Malaysian construction industry, find that managerial overconfidence reduces the use of long-term debt, and this effect is more pronounced in small-scale firms. Similarly, Chen and Chen (2009), in their analysis of firms in China, find that overconfident managers prefer short-term borrowing, which increases the firm's liquidity risk. In both studies, overconfidence is associated with less cautious financial management, and the debt maturity structure shifts toward shorter maturities. Supporting this view, Huang et al. (2015), in their panel data study, found that overconfident managers tend to prefer short-term borrowing. Ge et al. (2024), on the other hand, investigate the effects of CEO overconfidence on firms' borrowing strategies and examine how CEOs' borrowing tendencies change when they are overconfident in their abilities and decision-making capacities. The findings suggest that overconfident CEOs generally tend to take higher risks and therefore borrow more. CEOs

tend to pursue growth opportunities aggressively and, in the process, may unevenly increase their firms' debt burden. Ben-David et al. (2007) find a different pattern. They examined the relationship between CEO overconfidence and corporate policies in American firms. The researchers found that companies with overconfident managers keep their debt ratios high, prefer long-term loans, pay fewer dividends, and buy fewer shares. Studies generally reveal that managers tend to use short-term debt.

In the context of capital and leverage structure, Barros and Silveira (2007), in their study conducted in Brazil, showed that overconfident managers use higher leverage. The study also found that indicators related to dividend pay-out, share of fixed assets, profitability, firm size, and corporate governance standards explain capital structure. The results strongly suggest that cognitive biases are an important determinant of capital structure decisions. The analysis found a strong positive relationship between leverage ratio and managers' biases. Similarly, Fairchild (2007) establishes a positive relationship between overconfidence and borrowing with a theoretical model, arguing that managers borrow more to finance growth opportunities and that managerial overconfidence increases leverage. Park and Kim (2009) constructed basic models with leverage as the dependent variable, managerial overconfidence as the explanatory variable and market-to-book ratio, firm size, tangible fixed assets and profitability as control variables. The results show that managerial overconfidence increases the leverage ratio. Studies conducted in Türkiye also reveal similar trends. Yıkılmaz (2022), in his analysis of firms traded in BIST, stated that overconfidence negatively affects firm value but increases the debt ratio. Günay (2023), by contrast, finds that overconfidence positively affects both debt and return on assets; however, he emphasises that managers' overconfidence level is not critical for firms.

Considering overconfidence within a crisis framework, reporting, and social responsibility, Sauerwald and Su (2019) analysed whether a disconnect exists between the social responsibility data presented and actual social responsibility in a sample of S&P 500 companies for the period 2006-2014. The study examines the relationship between this disconnect and managerial cognitive biases, especially overconfidence. The research finds that executive overconfidence positively affects the disconnect between corporate social responsibility reporting and actual social responsibility. Zhao (2021) examines overconfident managers' attitudes in the face of bad news. Zhao's research contributes to the behavioural finance and corporate governance literature by showing how CEO characteristics, especially overconfidence, affect firm performance in adverse scenarios. It highlights the importance of understanding psychological factors in executive decision-making and their broader implications for corporate resilience. In Jory et al. (2025), the authors evaluate how executive overconfidence affects corporate announcements during COVID-19. In 2020, based on executive interviews at the conference where companies presented their quarterly balance sheets, the study found that overconfident executives exhibited a less pessimistic attitude toward COVID-19 than non-overconfident executives.

In the context of investment and acquisition decisions, Klauss (2006) examined managerial overconfidence and regret avoidance bias in terms of capital expenditures. The

study examines project selection and appraisal problems among managers in some businesses in the United Kingdom. The study states that overconfidence is positively related to investment amounts. Regarding benefits and costs, the study states that both managerial overconfidence and regret avoidance negatively affect business value. In contrast, Ferris et al. (2013) used US, Japanese, British, French, and German companies from Fortune magazine's global rankings, excluding financial and public companies, as the sample between 2000 and 2006. They examined the relationship between managerial overconfidence and mergers and acquisitions. The study focuses on how overconfidence shapes managers' acquisition decisions and how these decisions affect companies' growth strategies and financial performance. The study finds that overconfident managers overvalue strategic opportunities and make aggressive, often unsuccessful, acquisitions of corporate resources. They also stated that this situation may negatively affect both company performance and investor confidence in the long run. Can and Dizdarlar (2022) found that managerial overconfidence in firms that have made mergers and acquisitions negatively affects firm value.

When all studies are compared, it is seen that managerial overconfidence has an impact on firms' borrowing structure, investment strategies, reporting behaviour, and digital transformation (Chen & Chen, 2009; Huang et al., 2015; Purhanudin & Zakaria, 2015; Ge et al., 2024; Malmendier & Tate, 2005; Zhang & Song, 2025). These effects generally manifest as short-term risk-taking tendencies, increased borrowing, unrealistic expectations, and deviations in strategic decision-making. However, the direction and severity of these effects vary by country, sector, firm size, manager characteristics, and organisational structure. This shows that managerial overconfidence is a multidimensional phenomenon that decision-making processes must consider.

The literature shows that research on behavioural finance and overconfidence has generally focused on investor behaviour. Our study, which analyses managerial overconfidence in capital structure decisions, addresses this gap by examining managerial overconfidence and using comprehensive control variables. In addition, the literature's lack of sectoral specificity, limited behavioural explanations of debt maturity preferences, few studies on the effects of cognitive bias under crisis conditions, and the traditional finance approach's neglect of psychological dimensions make an important contribution to both theoretical modelling and applied finance analysis. As a result, the study contributes to the theoretical literature and highlights the importance of behavioural awareness in decision-making for practitioners.

By empirically revealing the effects of managerial overconfidence on short-term and long-term borrowing preferences and leverage level in a capital-intensive and technically specialised field such as the chemical industry, the study questions the assumption of sectoral homogeneity in studies based on a general sample. Moreover, decomposing debt maturity preferences allows for more detailed modelling of the effects of managerial biases on capital structure. Moreover, by including the effects of the COVID-19 pandemic as a control variable, the model analyses managers' behavioural reactions in financial decision-

making during crisis periods. Thus, the study makes an original contribution beyond classical finance theories by integrating the psychological and behavioural components of managerial decision-making into the capital structure literature.

3. Data & Variables

This study investigates whether managerial overconfidence exists in financing decisions and examines its effects on capital structure. To examine the relationship between managerial overconfidence behaviour and financing decisions, we use data on chemical enterprises traded on Borsa Istanbul (BIST). The dataset includes 12 chemical sector firms regularly traded on BIST with complete financial statements for 2010-2022. The study period begins in 2011 because many financial indicators in the Turkish chemical sector were structurally affected by the 2008 global crisis and displayed abnormal patterns during the immediate post-crisis years. Using data beginning in 2011 provides a more stable post-crisis environment for measuring managerial overconfidence and its effects accurately. The period ends in 2022 to maximise sample coverage, since data for all selected firms are complete through this year, allowing a consistent and balanced panel structure. In this context, the dataset is a panel with a 12-period time dimension (T) and a 12-firm cross-sectional dimension (N), including annual financial statement data. Financial statement data on chemical firms are obtained from the Public Disclosure Platform (KAP) and Financial Information News Network (FINNET) databases. Appendix 1 lists the firms included in the study sample.

In econometric models, chemical firms' financing decisions are represented by financial structure ratios. In addition to the leverage ratio (LEV), the main proxy for financing decisions, we also use short-term and long-term debt ratios (STD and LTD, respectively) as dependent variables in different models to examine the effects of managerial overconfidence on different debt-maturity preferences. Managerial overconfidence (MOC) is used as an independent variable in the econometric models. To minimize the inconsistencies and deviations in the estimations of the developed econometric models and to increase the significance of the models, the collateral value of assets (CVA), non-debt tax shield (NDT), growth (GR), authenticity (AU), firm size (SZ), volatility (VOL) and profitability (PRF), whose effects on capital structure variables are frequently researched in the literature, are included as control variables in the models. A dummy variable (COV) representing the 2020-2022 period was included to control for the effects of the COVID-19 pandemic, which has significantly affected the chemical industry, like many other sectors. Table 1 presents the variables, their abbreviations, the formulas used to calculate them, and the studies that use the relevant variables in research on managerial overconfidence.

Table: 1
Variables and Calculations

	Acronym	Variable	Calculation	Literature
Dependent Variables	STD	Short-term Debt Ratio	$\frac{\text{Short} - \text{term Debt Ratio}}{\text{Total Liabilities}}$	Titman & Wessels (1988) Huang et al. (2015)
	LTD	Long-Term Debt Ratio	$\frac{\text{Long} - \text{term Dept Ratio}}{\text{Total Liabilities}}$	Titman & Wessels (1988) Huang et al. (2015)
	LEV	Leverage (Debt) Ratio	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	Titman & Wessels (1988) Oliver (2009) Yong-Hai (2010) Azouzi & Jarboui (2012) Ben-David et al. (2013)
Explanatory Variables	MOC	Overconfidence	Dummy variable with value 1 for $X_{i,t}\text{VTD} > \text{Median}_{\text{industry},t}\text{VTD}$ and value 0 otherwise.	Ben-David et al. (2013) Ahmed & Duellman (2013) Duellman et al. (2015) Titman & Wessels (1988)
	CVA	Collateral Value of Assets	$\frac{\text{Inventories} + \text{Tangible Fixed Assets}}{\text{Total Assets}}$	Titman & Wessels (1988) Oliver (2005) Malmendier et al. (2006; 2007; 2009) Barros & Silveira (2007) Yong-Hai (2010)
	NDT	Non-Debt Tax Shield	$\frac{\text{Depreciation}}{\text{Total Assets}}$	Titman & Wessels (1988) Barros & Silveira (2007)
	GR	Growth	$\frac{\text{Total Assets}_t - \text{Total Aassets}_{t-1}}{\text{Total Assets}_{t-1}}$	Titman & Wessels (1988) Oliver (2005) Barros & Silveira (2007) Yong-Hai (2010) Huang et al. (2015)
	AU	Authenticity	$\frac{\text{R\&D}}{\text{Net Sales}}$	Titman & Wessels (1988)
	SZ	Size	LnNet Sales	Titman & Wessels (1988) Oliver (2005) Barros & Silveira (2007) Yong-Hai (2010) Huang et al. (2015)
	VOL	Volatility	$\text{Std.}\frac{\text{Opr. Revenues}_t - \text{Opr Revenues}_{t-1}}{\text{Opr. Revenues}_{t-1}}$	Titman & Wessels (1988)
	PRF	Profitability	$\frac{\text{Operating Revenues}}{\text{Total Assets}}$	Titman & Wessels (1988) Oliver (2005) Yong-Hai (2010) Huang et al. (2015)
Dummy	Cov-19	Covid-19 Pandemic	Dummy variable with value 1 for the period 2020-2022 and value 0 for other periods	Hu et al. (2020) Yaman & Gür (2023) Yaman (2024)

The literature uses various methods to measure managerial overconfidence behaviour. In this study, we follow the method used in Titman and Wessels (1988), Malmendier and Tate (2005), Ben-David et al. (2013), and Duellman et al. (2015) to calculate managerial overconfidence. This method uses the median of the sum of inventories and tangible fixed assets, which represent collateral value, divided by total assets. If the firm's CVA is above the median of the industry's CVA (X_i,CVA>$Median_{industry,t}$CVA), managers are considered to be overly optimistic in their investment decisions, and overconfidence is assumed. In the opposite case (X_i,CVA<$Median_{industry,t}$CVA), it is presumed that there is no manager overconfidence. This study defines manager overconfidence as investment decisions exceeding the sector median. In this context, the

MOC variable is a categorical variable indicating whether the firm's manager is overconfident in each year.

To interpret the analysis findings and observe the impact of a one-unit change in the explanatory variables on the dependent variable, we applied a percentage transformation while including the variables in the model. Table 2 presents descriptive statistics and normality test results for the variables.

Table: 2
Descriptive Statistics and Normality Test

Variables	Mean	Median	Max.	Min.	Std. Dev.	Skew.	Kurtosis	J-B
STD	0.022	0.016	1.145	-0.893	0.306	0.152	4.818	20.387***
LTD	0.248	0.008	14.129	-0.939	1.458	6.689	59.832	20452.800***
LEV	0.013	0.033	0.876	-0.879	0.243	-0.678	5.848	59.698***
MOC	0.486	0.000	1.000	0.000	0.502	0.056	1.003	24.000***
CVA	0.023	0.004	0.687	-0.312	0.175	1.320	5.706	85.769***
NTD	0.004	-0.049	1.765	-0.702	0.368	2.131	10.254	424.784***
GR	0.137	0.089	0.876	-0.242	0.177	1.492	5.988	106.996***
AU	0.340	0.045	2.350	0.000	0.619	2.119	6.207	169.488***
SZ	0.009	0.007	0.048	-0.019	0.010	1.130	5.359	64.018***
VOL	3.177	0.477	98.062	0.045	10.780	6.421	49.805	14133.730***
PRF	0.205	-0.033	28.277	-10.645	3.352	4.825	40.719	9095.123***
COV	0.250	0.000	1.000	0.000	0.435	1.155	2.333	34.667***

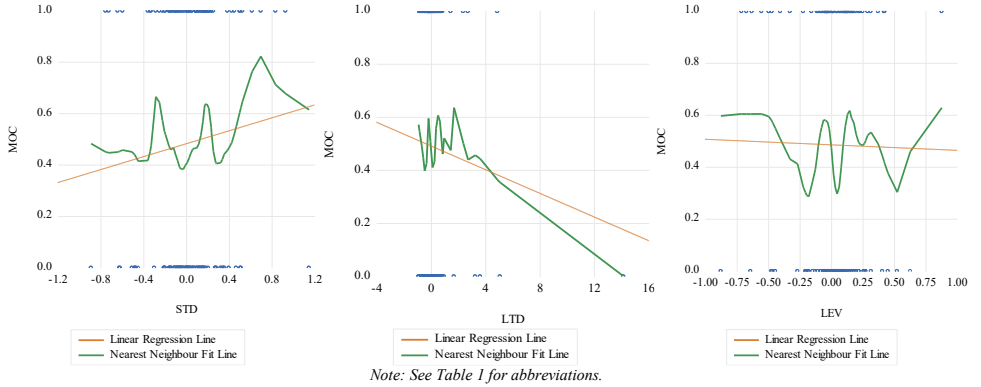
*Notes: Sign *** indicates a 1% significance level. J-B is the Jarque-Bera statistic. See Appendix 2 for nomenclatures and abbreviations.*

When interpreting the descriptive statistics, note that the variables are in percentage-change form. Table 2 shows that the variable with the highest mean value is VOL (3.177) and the variable with the lowest is NDT (0.004). Similarly, the highest median value belongs to VOL (0.477) and the lowest median value belongs to NDT (-0.049). The mean and median values help us understand the dataset's overall trend and centre. The highest and lowest standard deviation values belong to VOL (10.780) and SZ (0.010), respectively. Skewness statistics show that LEV is left-skewed, while the other variables are right-skewed. Kurtosis statistics show that all variables are leptokurtic. LEV, VOL and PRF stand out with high kurtosis values (59.832, 49.805 and 40.719, respectively). J-B statistics show that none of the variables is normally distributed. Kurtosis and skewness values deviating from 0, along with inconsistencies between the mean and median, also support the J-B statistics and suggest non-normal distributions (Çil-Yavuz, 2015: 34-37). Normality findings suggest that the variables behave as classical financial series. Conversely, the scatter diagram and fit lines in Figure 1 indicate that there is a positive slope between MOC and STD, while there is a negative slope between MOC and LTD and LEV. The positive slope between MOC and STD indicates that as MOC increases, companies tend to borrow more short-term debt.

This may be because overconfident managers view short-term debt as more manageable or less costly and do not fully consider the risks. The upward trend in the scatter diagram supports this relationship. In the relationship between long-term borrowing and overconfidence, the negative slope of the regression line indicates that managers move away from long-term borrowing as overconfidence increases. Overconfident managers may think that they do not need long-term debt because they are too optimistic about future cash flows. This may increase risks by favouring short-term financing over financial stability. Again,

the regression line's negative slope indicates that overconfidence leads to lower capital structure indicators. Overconfident managers prefer to rely on internal resources rather than borrowing from external sources.

Figure: 1
Scatter Plots and Fit Lines

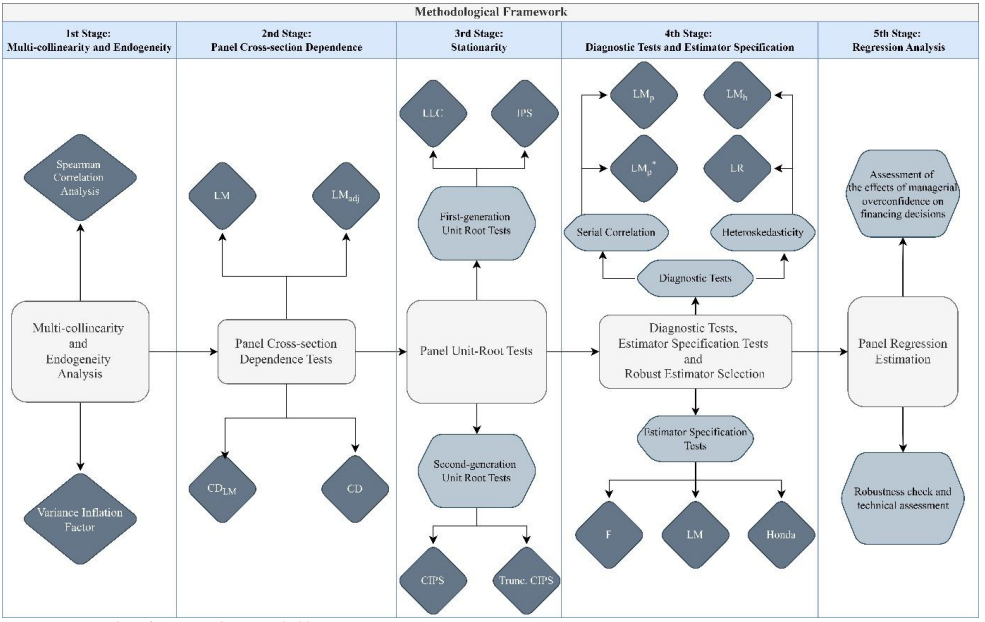


Note: See Table 1 for abbreviations.

4. Econometric Framework and Models

Because the data set is a balanced panel with T=12 and N=12 dimensions, the study examines the relationships between managers' overconfidence behaviour and financing decisions using panel regression analysis. Before proceeding with panel regression analysis, the study examines several assumptions. The study's econometric framework follows a methodological process with 5 basic stages, including pre-tests. In the first stage, the study examined whether the variables cause multicollinearity in the model using two methods commonly used in the literature. In the second stage, the authors performed cross-sectional dependence analyses on a variable basis; in the third stage, they tested variable stationarity using first- and second-generation panel unit root tests, consistent with the second-stage findings. In the fourth stage, the authors tested for autocorrelation and heteroskedasticity using various tests. In the fifth and final stage, the authors estimated panel regressions in line with the findings of the estimator specification tests. The authors used EViews 12 and Stata 24 for the econometric analyses. Figure 2 summarises the study's methodological flow. The econometric tests used in the methodological flow are given below.

Figure: 2
Methodological Design



Note: See Appendix 2 for nomenclature and abbreviations.

4.1. Multicollinearity and Endogeneity

Multicollinearity in regression models is a high correlation between explanatory variables. Endogeneity occurs when an unobservable factor is linked to observable variables. Endogeneity in panel regression arises when explanatory variables are correlated with the model error term. Multicollinearity and endogeneity in regression models may lead to findings that strongly contradict expectations and theory, erroneous interpretations, infinite standard errors, and statistically insignificant explanatory variables (Gujarati, 2004: 341-386; Asteriou & Hall, 2007: 86-91). We used Spearman correlation analysis and VIF analysis to assess whether the explanatory variables cause multicollinearity. We examined endogeneity using Spearman correlation analysis between the error terms and the explanatory variables.

Let x and y be two explanatory variables in the same regression model. Before calculating the correlation coefficient between x and y (ρ) using Equation 3, calculate the sums of squared cross-products (SSCP) and the covariance coefficient using Equation 1 and Equation 2, respectively (Çil-Yavuz, 2018: 40; Kaya, 2021: 29-31).

$$\mathrm{SSCP}(x,y) = \sum_{i=1}^{n}(x_i - \hat{\mu}_x)\left(y_i - \hat{\mu}_y\right) \quad (1)$$

$$COV_{(x,y)} = \frac{\sum_{i=1}^{n}(x_i - \hat{\mu}_x)(y_i - \hat{\mu}_y)}{n-k} \quad (2)$$

$$\rho_{(x,y)} = \frac{COV_{(x,y)}}{(COV_{(x,x)} COV_{(y,y)})^{1/2}} \quad (3)$$

Equations 1-2, $\hat{\mu}_x$ and $\hat{\mu}_y$ denote the mean values of x and y variables, respectively; in Equation 2, COV denotes the covariance coefficient, n denotes the number of observations, and k denotes the degrees of freedom; and in Equation 3, ρ denotes the correlation coefficient. We use a correlation threshold of ρ>0.75 or ρ<-0.75 to indicate multicollinearity, as commonly used in the econometric literature (Gujarati, 2004; Asteriou and Hall, 2007). Therefore, we accept that explanatory variables with correlation ρ>0.75 or ρ<-0.75 cause multicollinearity. VIF, which is another method used in multi-collinearity analysis, is calculated by using the R^2 values obtained as a result of the ordinary least squares (OLS) regression model in which one of the explanatory variables is the dependent variable and the others are independent variables for each explanatory variable with the help of the formula $VIF = \frac{1}{(1-R^2)}$ (Asteriou & Hall, 2007: 90; O'Brien, 2007: 673-675). In this study, we accept that explanatory variables with VIF>4 cause multicollinearity (Açıkgöz et al., 2015: 430). When evaluating endogeneity, it is accepted that independent variables with a correlation coefficient p>0.90 or p<-0.90 with the model error term will cause an endogeneity problem (Tabachnick & Fidell, 2001).

4.2. Panel Cross-Section Dependence

Cross-sectional dependence among units in a panel data set is important for understanding the data's characteristics and choosing the appropriate stationarity test (De Hoyos & Safaridis, 2016: 482-483). Second-generation unit root tests are used when a series is cross-sectionally dependent, and first-generation unit root tests are used when a series is cross-sectionally independent. We use the LM test by Breusch and Pagan (1980), the CD and CD_{LM} tests by Pesaran (2004), and the LM_{adj} test by Pesaran et al. (2008) to test for cross-sectional dependency.

The LM test statistic is calculated as in Equation 4 (Breusch & Pagan, 1980: 247); the CD and CD_{LM} test statistics are calculated as in Equations 5-6 (Pesaran, 2004: 5) and the LM_{adj} test statistic is calculated as in Equation 7 (Pesaran et al., 2008: 108).

$$LM = T \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij}^2 \quad (4)$$

In Equation 4, $\hat{\rho}$ denotes the pairwise correlation coefficient of the error terms obtained from the individual least squares estimation, while T denotes the time dimension and N denotes the cross-sectional dimension. The LM test is appropriate for panels with T>N, i.e. N is constant and T→∞ (Ozcan et al., 2017: 84).

$$CD = \sqrt{\left(\frac{2T}{N(N-1)}\right)} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij}\right) \quad (5)$$

$$CD_{LM} = \sqrt{\left(\frac{1}{N(N-1)}\right)} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} (T\hat{\rho}_{ij}^2 - 1) \quad (6)$$

In Equations 5-6 $\hat{\rho}$, T and N are used in the same sense as in Equation 4. The CD test is appropriate for cross-sectional dependence when N>T. As an alternative to the LM test, the CD_{LM} test developed by Pesaran (2004) is an appropriate cross-sectional dependence test for both $N \to \infty$ and $T \to \infty$. However, when N>T, the CD_{LM} test may yield significant distortions. Pesaran et al. (2008) LM_{adj} test is a modified version of the LM test that uses the full mean and variance of the LM statistic, eliminating the possibility that the correlation sums in the CD test are 0 (Menyah et al., 2014: 390). In Equation 7, μ_{Tij} and ν_{Tij}^2 denote the exact mean and variance of $(T-k)\rho_{ij}^2$', respectively, while k denotes the number of explanatory variables.

$$LM_{adj} = \sqrt{\left(\frac{2}{N(N-1)}\right)} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij} \frac{(T-k)\rho_{ij}^2 - \mu_{Tij}}{\sqrt{\nu_{Tij}^2}} \quad (7)$$

Since the study data have N=12 and T=12 dimensions, we use the LM, CD, CD_{LM}, and LM_{adj} tests together. All four tests test the null hypothesis of no cross-sectional dependence in the series.

4.3. Panel Unit Root Tests

When estimating panel regression models, all variables should be stationarized and included in the model. Stationarity means that the difference between two values of a series depends only on the difference between two time values, and that the mean, variance, and covariance of the series remain constant regardless of the level at which they are measured (Gujarati, 2004: 798). Although the literature offers many methods for testing stationarity, unit root tests are the most commonly used. Unit root tests are labelled first-generation or second-generation depending on whether the series contain cross-sectional dependence. We perform stationarity analyses using the LLC test by Levin et al. (2002) and the IPS test by Im et al. (2003) for cross-sectionally independent series, and the CIPS test by Pesaran (2007) for cross-sectionally dependent series.

The LLC test statistic is calculated as in Equation 8, the IPS test statistic as in Equations 9-10 and the CIPS test statistic as in Equations 11-12 (Levin et al., 2002: 5; Im et al., 2003: 63; Pesaran, 2007: 269-276).

$$\Delta y_{it} = \delta y_{it-1} + \sum_{L=1}^{P_i} \theta_{iL} \Delta y_{it-L} + \alpha_{mi} d_{mt} + \varepsilon_{it} \ (i = 1, \dots, N), (t = 1, \dots, T), (m = 1,2,3.) \quad (8)$$

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \sum_{j=1}^{P_i} \rho_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \ (i = 1, \dots, N), (t = 1, \dots, T) \quad (9)$$

$$IPS = \frac{1}{N} \sum_{i=1}^{N} t_{iT}(p_i, \rho_i) \quad (10)$$

The test statistics calculated for each cross-section using Equation 9 are converted into panel-wise IPS test statistics using Equation 10. Similar to the IPS test, the CIPS test first extends the ADF regression model, as in Equation 11, by using lagged levels and first differences of the series related to the units and the average values of the cross-sections; this is called CADF. In Equation 11, t is the period, ε_{it} is the unit-specific error, a_i, b_i and c_i are the fixed-effect coefficients, $\bar{y}_t$ is the mean of all observations at time t, and y_i is the initial value with a given density function (Demir & Görür, 2020: 23).

$$\Delta y_{it} = a_i + b_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + \varepsilon_{it} \; (i = 1, \dots, N), (t = 1, \dots, T) \tag{11}$$

$$CIPS = N^{-1} \sum_{i=1}^{N} CADF_i \tag{12}$$

Equation 12 shows that the CIPS test statistic is obtained by taking the arithmetic mean of the CADF values obtained for each unit separately and used for panel-wise stationarity test (Pesaran, 2007: 274-281). LLC, IPS and CIPS unit root tests test the null hypothesis of non-stationarity.

4.4. Diagnostic and Estimator Specification Tests

Because panel data include both time and cross-sectional dimensions, researchers should carefully examine autocorrelation and heteroskedasticity. While autocorrelation represents the interdependence of adjacent values of error terms, heteroskedasticity refers to the fact that the variances of the error term are not constant for all cross-sections (Güriş et al., 2013: 199; Tatoğlu, 2013: 167). Autocorrelation and heteroskedasticity problems may lead to biased and inconsistent analysis results (Güriş et al., 2013: 201). We use Baltagi and Li (1991) LM_p and Born and Breitung (2016) LM_p^* tests to test the autocorrelation assumption in the models. We use Breusch and Pagan (1979) LM_h and LR (Likelihood Ratio) tests to test the heteroskedasticity assumption in the models. LM_p, LM_p^*, LM_h and LR test statistics are calculated through Equations 13-16, respectively (Erlat, 2017: 29-30; Breusch & Pagan, 1979: 1293).

$$LM_p = \frac{NT^2}{2(T-1)(T-2)} [E^2 - 4EF + 2TF^2] \tag{13}$$

$$LM_p^* = \frac{(T-1)^3}{(T+1)(T-2)^2} \left(\sqrt{LM_p} + \sqrt{\frac{N}{T-1}} \right)^2 \tag{14}$$

$$LM_h = \frac{1}{2} \left[\frac{N}{n(N-n)} \right] \left[\sum_t^n \left(\frac{\hat{u}_t^2}{\hat{\sigma}^2} \right) - n \right]^2 \tag{15}$$

$$LR = -2(L_r - L_u) \tag{16}$$

In Equation 13, E^2=(2(T-1)/NT)LM_μ and F^2=((T-1)/NT^2)LM_ρ'dir. In Equation 16, L_r and L_u are the maximised values of the (Gaussian) log-likelihood function of the restricted and unrestricted regressions, respectively. Both LM_p and LM_p^* tests test the null hypothesis of no autocorrelation, whereas both $LM_h$and LR tests test the null hypothesis of no

heteroskedasticity. In addition to the diagnostic tests, the F test was applied to assess the variation in fixed parameters within the models, while the Breusch and Pagan (1980) LM and the Honda (1985) test were utilised to detect the presence of random effects.

4.5. Panel Regression Models and Hypothesis

In the last step of the methodological flow, the developed models are estimated using the robust estimators identified in the previous steps. The three panel regression models test MOC's effects on financing decisions. The first model (Equation 17) uses the STD as the dependent variable and examines whether MOC leads to aggressive financing policies. The second model (Equation 18) examines MOC's effects on high-cost long-term borrowing. The third and final model (Equation 19) examines MOC's overall effects on capital structure decisions.

Model: 1

$$STD_{it} = \beta_0 + \beta_1 MOC_{it} + \beta_2 CVA_{it} + \beta_3 NDT_{it} + \beta_4 GR_{it} + \beta_5 AU_{it} + \beta_6 SZ_{it} + \beta_7 VOL_{it} + \beta_8 PRF_{it} + \beta_9 COV_{it} + u_{it} \quad (17)$$

H_1: In the chemical industry, managerial overconfidence affects the short-term debt ratio of the firms.

Model: 2

$$LTD_{it} = \beta_0 + \beta_1 MOC_{it} + \beta_2 CVA_{it} + \beta_3 NDT_{it} + \beta_4 GR_{it} + \beta_5 AU_{it} + \beta_6 SZ_{it} + \beta_7 VOL_{it} + \beta_8 PRF_{it} + \beta_9 COV_{it} + u_{it} \quad (18)$$

H_2: In the chemical industry, managerial overconfidence affects the long-term debt ratio of the firms.

Model: 3

$$LEV_{it} = \beta_0 + \beta_1 MOC_{it} + \beta_2 CVA_{it} + \beta_3 NDT_{it} + \beta_4 GR_{it} + \beta_5 AU_{it} + \beta_6 SZ_{it} + \beta_7 VOL_{it} + \beta_8 PRF_{it} + \beta_9 COV_{it} + u_{it} \quad (19)$$

H_3: Managerial overconfidence in the chemical industry affects the leverage ratio of the firms.

In Equations 17-19, t denotes the time dimension (years) and i denotes the cross-sectional dimension (chemical firms). β_0 is the constant term, β_n is the slope coefficient of the independent variable and u_{it} denotes the error term.

5. Findings and Discussion

Following the methodological flow, this section presents the econometric analysis findings. First, we present findings on multicollinearity and endogeneity, which reflect our choice of explanatory variables. Cross-sectional dependence and slope homogeneity findings follow. Next, we present the first- and second-generation panel unit root analysis

results. After presenting the diagnostic and estimator identification test results, we report and interpret the final panel regression estimation results.

5.1. Multicollinearity and Endogeneity Results

We applied Spearman correlation analysis to determine whether the explanatory variables in Equations 17-19 cause multicollinearity and endogeneity problems in the regression model. We also ran VIF analysis to assess multicollinearity. Panel A in Table 3 presents the Spearman correlation results for multicollinearity, Panel B shows the VIF results, and Panel C shows the Spearman correlation results for endogeneity. The Spearman correlation and VIF analyses presented in Table 3 show that the highest correlation is observed between GR and COV (ρ=0.387) and the lowest correlation is observed between NDT and SZ (ρ=-0.249), while the COV series has the highest VIF value and the lowest 1/VIF values (1.646 and 0.607, respectively). Endogeneity findings show that the correlations of all explanatory variables with the model error term are small and statistically insignificant. The correlation and VIF results in Table 3 show that the variables in the model do not cause multicollinearity or endogeneity problems, and the variable selection is appropriate.

Table: 3
Multicollinearity and Endogeneity Results

Panel A: Correlation matrix									
Variables	MOC	CVA	NDT	GR	AU	SZ	VOL	PRF	COV
MOC	1.000								

CVA	0.066	1.000							
	[0.433]	-----							
NDT	-0.026	0.005	1.000						
	[0.760]	[0.954]	-----						
GR	-0.044	0.136	-0.149*	1.000					
	[0.599]	[0.105]	[0.074]	-----					
AU	0.144*	-0.075	0.053	0.131	1.000				
	[0.085]	[0.369]	[0.532]	[0.117]	-----				
SZ	-0.065	0.072	-0.249***	0.273***	0.072	1.000			
	[0.440]	[0.389]	[0.003]	[0.001]	[0.389]	-----			
VOL	0.061	0.021	0.122	0.037**	0.015	-0.059	1.000		
	[0.471]	[0.801]	[0.145]	[0.659]	[0.856]	[0.482]	-----		
PRF	-0.087	-0.030	0.097	0.239***	-0.039	0.146*	0.164**	1.000	
	[0.298]	[0.724]	[0.246]	[0.004]	[0.642]	[0.082]	[0.050]	-----	
COV	-0.112	0.181**	0.007	0.387***	0.013	0.338***	0.038	0.168**	1.000
	[0.180]	[0.030]	[0.937]	[0.000]	[0.879]	[0.000]	[0.648]	[0.044]	-----
Panel B: Variance inflation factor									
	MOC	CVA	NDT	GR	AU	SZ	VOL	PRF	COV
R^2	0.058	0.065	0.050	0.298	0.041	0.371	0.050	0.078	0.393
VIF	1.061	1.069	1.053	1.425	1.043	1.589	1.052	1.085	1.646
1/VIF	0.942	0.935	0.950	0.702	0.959	0.629	0.950	0.922	0.607
Mean VIF	1.225								
1/Mean VIF	0.816								
Panel C: Endogeneity results									
	MOC	CVA	NDT	GR	AU	SZ	VOL	PRF	COV
$Error_1$	7.14E-17	1.36E-33	3.74E-17	4.16E-17	3.12E-17	1.40E-16	6.54E-17	3.95E-17	6.34E-17
	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]
$Error_2$	4.37E-17	2.51E-17	1.54E-33	5.38E-17	-7.09E-18	2.78E-17	6.51E-18	2.09E-17	-1.89E-17
	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]
$Error_3$	2.19E-17	4.20E-17	7.97E-17	1.57E-16	4.15E-17	1.49E-16	5.45E-18	1.75E-17	-9.29E-17
	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]

*Notes: Signs ***, ** and * indicate 1%, 5% and 10% significance levels, respectively. Values in [ ] are probability values. See Appendix 2 for nomenclature and abbreviations.*

5.2. Panel Cross-Section Dependence Tests Results

Cross-sectional dependence analyses show that the LM, CD, CD_{LM}, and LM_{adj} tests are fully consistent. The results of the horizontal cross-section dependence tests in Table 4 show that all dependent variables are cross-sectionally dependent at the 1% significance level. The findings show that VOL and PRF are cross-sectionally independent according to all four tests, while the other explanatory variables are cross-sectionally dependent.

Table: 4
Cross-Section Dependence Tests Results

Variables	LM		CD_{LM}		LM_{adj}		CD	
	Statistic	p-Value	Statistic	p-Value	Statistic	p-Value	Statistic	p-Value
STD	212.0291***	0.0000	12.7102***	0.0000	12.1647***	0.0000	9.6037***	0.0000
LTD	110.3846***	0.0005	3.8632***	0.0001	3.3177***	0.0009	6.3679***	0.0000
LEV	317.1233***	0.0000	21.8575***	0.0000	21.3120***	0.0000	13.4426***	0.0000
CVA	97.5468***	0.0070	2.7458***	0.0060	2.2003**	0.0278	2.1296**	0.0332
NDT	144.6929***	0.0000	6.8493***	0.0000	6.3039***	0.0000	2.9797***	0.0029
GR	275.4172***	0.0000	18.2274***	0.0000	17.6820***	0.0000	13.3971***	0.0000
SZ	316.3117***	0.0000	21.7868***	0.0000	21.2414***	0.0000	13.7501***	0.0000
VOL	78.6195	0.1373	1.098387	0.2720	0.5529	0.5803	1.2156	0.2242
PRF	65.3342	0.5000	-0.0579	0.9538	-0.6034	0.5462	-0.2572	0.7970
Null Hypothesis for LM, CD, CD_{LM} and LM_{adj} tests			H_0: No cross-sectional dependence.					

*Notes: Signs *** and ** indicate 1% and 5% significance levels, respectively. See Appendix 2 for nomenclature and abbreviations.*

5.3. Panel Unit Root Test Results

Panel A in Table 5 presents the first-generation unit root test results, Panel B presents the second-generation unit root test results, and Panel C presents the critical values for CIPS and T-CIPS tests. Aligned with the findings of cross-sectional dependency tests, the first-generation test results in Panel A are taken into account when evaluating the stationarity of VOL and PRF, whereas the second-generation test results in Panel B are taken into account when evaluating the stationarity of all other variables. Because the slope coefficients can be homogeneous or heterogeneous, we performed the LLC test, which is consistent for homogeneous series, and the IPS test, which is consistent for heterogeneous series, in the first-generation unit root analysis. Because the LLC and IPS tests yield consistent results for VOL and PRF, homogeneity analyses are unnecessary.

The first-generation unit root analysis shows that VOL is non-stationary in the model with constant and trend in both LLC and IPS tests, but stationary in first differences. First-generation unit root analysis findings show that PRF is stationary at level in all models. The second-generation unit root analysis shows that CVA and NDT are non-stationary at level but stationary in first differences in all models. The second-generation unit root analysis shows that the other variables are stationary at level in all models. When estimating the regression model, VOL, CVA, and NDT variables are included in first differences, consistent with the results of the LLC, IPS, and CIPS tests.

Table: 5
Panel Unit Root Tests Results

Panel A: First-generation unit root tests					
Model		With constant		With constant and trend	
Test		LLC	IPS	LLC	IPS
STD		-8.869***	-8.661***	-5.497***	-4.854***
LTD		-8.935***	-5.783***	-9.622***	-5.408***
LEV		-1.397*	-2.151**	-1.778**	-1.719**
CVA		-6.908***	-5.431***	-5.995***	-2.592***
NDT		-3.160***	-4.496***	-7.225***	-4.842***
GR		-8.190***	-4.957***	-8.591***	-3.770***
SZ		-6.257***	-4.421***	-9.409***	-5.721***
VOL		-4.321***	-6.131***	-1.084	-1.020
D(VOL)		-14.016***	-8.703***	-16.421***	-8.233***
PRF		-7.737***	-5.233***	-8.613***	-4.100***
Panel B: Second-generation unit root test					
Model		With constant		With constant and trend	
Test		CIPS	Truncated CIPS	CIPS	Truncated CIPS
STD		-3.280***	-3.280***	-4.180***	-4.180***
LTD		-4.350***	-3.650***	-3.915***	-3.401***
LEV		-2.986***	-2.986***	-4.858***	-3.974***
CVA		-1.812	-2.584**	-2.023	-2.943*
d(CVA)		-2.957***	-3.690***	-3.179**	-3.680***
NDT		-2.054	-2.054	-2.052	-2.052
d(NDT)		-3.504***	-3.387***	-3.682**	-3.649***
GR		-2.716**	-2.716**	-3.412***	-3.103**
SZ		-3.983***	-3.419***	-3.085*	-3.324**
VOL		-2.772**	-2.391*	-5.015***	-3.391***
PRF		-3.564***	-3.244***	-3.110*	-2.862*
Panel C: Critical Values for CIPS and T-CIPS tests					
CV for level	1%	-2.83	-2.74	-3.65	-3.37
	5%	-2.44	-2.4	-3.14	-3.01
	10%	-2.26	-2.24	-2.9	-2.81
CV for 1st difference	1%	-2.89	-2.77	-3.77	-3.43
	5%	-2.47	-2.42	-3.21	-3.05
	10%	-2.27	-2.25	-2.94	-2.83
Null hypothesis for LCC, IPS, CIPS and Truncated CIPS				H_0: No stationarity.	

*Notes: Lag lengths are determined according to the Schwarz Information Criterion. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively. CV is the critical value for CIPS and Truncated CIPS tests. See Appendix 2 for nomenclature and abbreviations.*

5.4. Diagnostic and Estimator Specification Tests Results

Panel A in Table 6 presents the results of LM_p and LM_p^* tests used to test autocorrelation, and LM_h and LR tests used to test heteroskedasticity. Panel B presents the results of the estimator specification tests, and Panel C presents the null hypotheses for all tests in the table.

LM_p and LM_p^* tests indicate that the null hypothesis is rejected at the 1% significance level in Model 1 and Model 2 and that there is an autocorrelation problem in those models. In Model 3, the findings of LM_p test indicate that there is no autocorrelation problem, while the findings of LM_p^*test reject the null hypothesis at the 5% significance level and indicate that there is an autocorrelation problem in the model. The LM_h and LR tests reject the null hypothesis at the 1% significance level for all models and indicate heteroskedasticity. To avoid inconsistencies and bias that may arise from autocorrelation and heteroskedasticity, we use the robust estimator of Period Seemingly Unrelated Regression Panel Corrected Standard Errors (SUR PCSE) proposed by Beck and Katz (1995).

Table: 6
Diagnostic and Estimator Specification Test Results

Panel A: Diagnostic Test Results			
Models	Tests	Statistic	p-Value
Model 1	LM_p	11.3417^{***}	0.0008
	LM_p^*	19.9318^{***}	0.0000
	LM_h	34.1501^{***}	0.0003
	LR for cross-section	95.5201^{***}	0.0000
	LR for period	31.6285^{***}	0.0016
Model 2	LM_p	6.8550^{***}	0.0088
	LM_p^*	13.7350^{***}	0.0002
	LM_h	396.8196^{***}	0.0000
	LR for cross-section	234.9914^{***}	0.0000
	LR for period	212.6245^{***}	0.0000
Model 3	LM_p	1.8299	0.1761
	LM_p^*	5.8835^{**}	0.0153
	LM_h	33.1084^{***}	0.0005
	LR for cross-section	83.2539^{***}	0.0000
	LR for period	160.4389^{***}	0.0000

Panel B: Estimator Specification Tests Results							
Models	Tests	Group Effects		Time Effects		Two-way Effects	
		Statistic	p-Value	Statistic	p-Value	Statistic	p-Value
Model 1	F Test	0.6548	0.7782	6.6395^{***}	0.0000	3.6230^{***}	0.0000
	LM Test	2.3521	0.1251	61.7061^{***}	0.0000	64.0581^{***}	0.0000
	Honda Test	-1.5336	0.9374	7.8553^{***}	0.0000	4.4701^{***}	0.0000
Model 2	F Test	1.0469	0.4103	2.2116^{**}	0.0179	1.6189^{*}	0.0528
	LM Test	0.1190	0.7301	4.7107^{**}	0.0300	4.8297^{*}	0.0894
	Honda Test	-0.3450	0.6350	2.1704^{**}	0.0150	1.2907^{*}	0.0984
Model 3	F Test	0.7745	0.6647	7.0433^{***}	0.0000	3.8845^{***}	0.0000
	LM Test	1.8736	0.1711	74.1061^{***}	0.0000	75.9797^{***}	0.0000
	Honda Test	-1.3688	0.9145	8.6085^{***}	0.0000	5.1192^{***}	0.0000

Panel C: Null Hypothesis	
LM_p and LM_p^*	H_0: No autocorrelation.
LM_h and LR	H_0: No heteroskedasticity.
Group Fixed/Random Effects	H_0: While there is a cross-section effect, there is no time effect.
Time Fixed/Random Effects	H_0: While there is a time effect, there is no cross-section effect.
Two-way Fixed/Random Effects	H_0: No cross-section or time effect.

*Notes: Signs ***, **, and * indicate 1%, 5% and 10% significance levels, respectively. See Appendix 2 for nomenclature and abbreviations.*

The F-test results in Table 6 show that for all models, time fixed effects are statistically significant but group fixed effects are statistically insignificant, indicating that unidirectional time fixed effects are valid in all models. The LM and Honda tests show that time random effects are statistically significant for all models, but group random effects are statistically insignificant, and one-way time random effects are valid in all models. However, the data structure requires a fixed-effects model. According to Baltagi (2014), a fixed-effects model is optimal for panel data analysis when the dataset emphasises a specific country or set of firms, and the results are limited to the behaviour of this group of countries or firms. In line with Baltagi (2014), because the dataset focuses on firms operating in the BIST chemicals sector, model estimations use the one-way time fixed effects estimator, consistent with the F-test findings.

5.5. Panel Regression Results

Panel A in Table 7 summarises the regression analysis findings for Models 1-3. Panel B presents the weighted statistics showing the significance and explanatory levels of the models.

Table: 7
Panel Regression Analysis

Panel A: Regression results						
Models	Model 1		Model 2		Model 3	
Dependent Variables	STD		LTD		LEV	
Explanatory variables	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
MOC	0.03781	4.22456***	-0.26382	-9.59330***	-0.02217	-4.97374***
d(CVA)	0.00080	0.02438	-0.17754	-2.68359***	-0.08635	-5.20725***
d(NDT)	-0.12192	-6.17622***	-0.03498	-1.11331	-0.06580	-7.41323***
GR	-0.00378	-1.04350	-0.02724	-2.59533**	-0.00862	-2.67961***
AU	-0.00621	-0.99568	-0.09235	-2.86548***	-0.01227	-4.80735***
SZ	-4.03177	-8.28882***	-7.29601	-5.83361***	-3.15064	-11.50839***
d(VOL)	0.00167	3.31238***	0.00193	2.48184**	0.00060	1.52670
PRF	0.00852	2.60298**	-0.01880	-7.51567***	-0.00381	-2.19744**
COV	-0.00493	-0.29747	-0.40489	-9.16399***	-0.08242	-6.16669***
C	0.05602	8.56047***	0.61053	13.09941***	0.08776	26.37287***
Panel B: Weighted Statistics						
R^2	0.47958		0.82821		0.81799	
Adjusted R^2	0.44119		0.81554		0.80457	
F-statistic	12.49191***		65.35374***		60.92292***	
Prob(F-statistic)	0.00000		0.00000		0.00000	
Root MSE	0.97646		0.97340		0.96914	
Mean dependent var.	0.28148		-0.31123		-0.60640	
S.D. dependent var.	1.63875		2.40437		4.03649	
Sum squared resid	125.85910		125.07090		123.97760	
Durbin-Watson (D-W) stat.	2.02575		2.04503		2.02441	

*Notes: We use the EGLS method and the Period SUR (PCSE) robust estimator in the estimation. Signs ***, **, and * indicate 1%, 5% and 10% significance levels, respectively. We considered the F-test results in the effects specification and conducted the analyses using the pooled model approach. See Appendix 2 for nomenclature and abbreviations.*

The weighted statistics in Panel B indicate that the F-test p-values, which assess overall model significance, are below 1% across all models. This finding confirms that all models are statistically significant at the 1% significance level. Model 2 has the highest F statistic (65.35), while Model 1 has the lowest (12.49). Model 2 also has the highest explanatory power (R^2) for the dependent variable. The adjusted R^2 values show that the explanatory variables as a whole can explain approximately 44.12% of the changes in short-term borrowing, 81.55% of the changes in long-term borrowing and 80.46% of the changes in leverage ratio.

The coefficient and statistical values of MOC are significant at the 1% significance level in all three models. Accordingly, we accept hypotheses H1, H2, and H3 tested by Equations 17-18-19 for chemical sector firms. In other words, the findings indicate that managerial overconfidence affects short-term borrowing, long-term borrowing, and capital structure decisions in chemical firms. However, the direction and severity of these effects differ. Model 1 findings show that MOC has a statistically significant positive effect on STD, which represents the aggressive financing policy. The regression analysis indicates that a one-unit increase in MOC leads to a 0.038 increase in STD. This finding suggests that overconfident managers tend to borrow more in the short term and prefer to take financial risks to capitalise on short-term opportunities. In other words, an overconfident manager in the chemical industry is more aggressive in short-term financing decisions and takes higher risks than a less overconfident manager. Although the coefficient size for short-term debt (0.038) appears economically modest, it is statistically significant within the behavioural finance framework because even marginal structural shifts in debt maturity preference may

reflect persistent psychological attitudes. In particular, previous studies show that overconfident managers tend to shift borrowing behaviour toward short-term financing, especially when leverage declines (Fairchild, 2007; Huang et al., 2015; Ge et al., 2024). Hence, the combined pattern of higher short-term borrowing and lower leverage supports the interpretation of overconfidence rather than contradicting it. The findings of Model 2-3 show that MOC has statistically significant negative effects on LTD, which represents the high-cost but low-risk long-term financing policy, and on LEV, which represents the capital structure. The results show that a 1-unit increase in MOC decreases LTD by 0.264 and LEV by 0.022. In other words, overconfidence of managers in the chemical sector leads to a decrease in low-risk but high-cost long-term borrowing. This finding suggests that overconfident managers avoid high costs and take risks to concentrate on short-term financing sources. The findings indicate that non-overconfident managers are risk-averse and focus on long-term financing sources.

Model 1 findings also show that increases in NDT and SZ have statistically significant and negative effects on STD, while increases in VOL and PRF have statistically significant and positive effects. Model 2 findings show that increases in CVA, GR, AU, SZ, and PRF have statistically significant negative effects on LTD, while increases in VOL have statistically significant positive effects. In Model 3, increases in CVA, NDT, GR, AU, SZ, and PRF have statistically significant negative effects on LEV. While the COVID-19 pandemic negatively affects financing decisions in all models, these effects are statistically significant only for LTD and LEV.

6. Conclusions, Discussions, Policy Recommendations, Limitations and Future Research

This study evaluates managerial overconfidence in financing decisions in selected chemical enterprises traded on BIST. The study's main purpose is to examine whether corporate managers behave overconfidently in financing decisions, which is an essential element of firms. If managers exhibit overconfidence, the study aims to determine its direction and impact. The study analyses firm-level data covering 2011 to 2022. To establish the link between financing decisions and managers' overconfidence behaviour, the study conducts a panel data regression analysis. The study measures overconfidence using secondary data. It then examines the effect of the identified managerial overconfidence on financing decisions using panel data analysis.

Conclusions

Empirical results show that the impact of managerial overconfidence on financing decisions differs significantly between short- and long-term financing decisions. Findings suggest that managers' overconfidence increases short-term debt and, therefore, the risk of financial distress. This conclusion is consistent with previous studies of Chen and Chen (2009), Ferris et al. (2013), Huang et al. (2015), Zakaria (2015), Yıkılmaz (2022), Günay (2023) and Ge et al. (2024). By contrast, managerial overconfidence negatively affects long-

term debt financing, supporting evidence of risk-taking behaviour by overconfident managers in short-term financing. This finding supports Zakaria (2015) but contradicts Barros and Silveira (2007), Ben-David et al. (2007), and Park and Kim (2009).

The study found that the three models developed for the chemical sector produced different results. In all models, the overconfidence variable had a statistically significant effect on the dependent variables: positive for short-term financing, negative for long-term financing, and overall debt financing. Considering the structure of the chemical industry, when the relationship between the increase in the short-term debt ratio due to excessive confidence of managers and the decrease in the long-term debt ratio and leverage ratio is examined in more detail, the specific characteristics of the chemical industry significantly influence these outcomes. The chemical industry is highly volatile because of fluctuations in raw material prices, competitive conditions, environmental regulations, technology, and innovation. This volatility can lead to unpredictable short-term financing needs. Overconfident managers may underestimate this uncertainty and prefer short-term borrowing. Short-term debt offers a more flexible structure for meeting sudden financial needs. Additionally, short-term debt typically has lower interest rates than long-term debt, which may lead overly confident managers to prefer this type of borrowing. The chemical industry typically requires significant capital investments and long-term research-and-development projects. Overly cautious managers may view the financial obligations associated with long-term investment projects as unnecessary because they believe in future positive scenarios. This may lead them to avoid long-term borrowing and instead opt for shorter-term, more controllable financing sources. However, this approach could leave the company vulnerable to the uncertainties of long-term market dynamics. High risks characterise the chemical industry due to environmental risks, regulations, and sudden changes in market conditions. Although market uncertainties and financial risks may encourage companies to adopt a more balanced and cautious capital structure, overly confident managers may not take these risks seriously enough. Low risk perceptions may lead them to prefer using internal resources over external financing. These managers may consciously keep leverage ratios low to avoid the potential pressures that high debt ratios could bring. In this way, they maintain control of the company while believing that equity-based financing increases the company's financial flexibility. However, this strategy can also result in missed growth opportunities and inefficient use of resources.

Discussions and Implications

The macroeconomic environment in Türkiye provides an important context for assessing the impact of managers' overconfidence. Between 2011 and 2022, Turkish firms operated in a highly volatile financial and inflationary environment characterised by fluctuating credit conditions, monetary policy changes, high inflation, and exchange rate instability. These dynamics may have amplified behavioural tendencies in financing decisions, particularly short-term borrowing driven by expectations of rapid profit recovery or favourable refinancing opportunities. Moreover, the relationship observed in this study complements findings from developed markets by demonstrating that overconfidence

persists even under market imperfections and uncertainty. Therefore, the Turkish context shows that behavioural determinants of capital structure are not unique to stable, mature economies but also present in emerging markets, where information asymmetry, market volatility, and financing constraints are more pronounced.

The findings suggest that managers' overconfidence may lead to more borrowing in the short run, but may encourage a more cautious approach in the long run. Moreover, the findings suggest that managers adopt a more cautious approach towards long-term borrowing as their level of overconfidence increases. This provides an important clue for analysing how these different trends in financial structure affect the firm's strategic financial management. Taken together, the findings of the regression analysis imply that the effects of overconfidence for firms operating in the chemical industry are not limited to financial indicators but also have a substantial effect on strategic management processes, and that overconfidence may weaken the firm's ability to create value in the long run and negatively affect its competitiveness in the market. The differential effects of overconfidence on these financial metrics suggest that firms' financial management policies should account for managers' psychological tendencies in decision-making.

Policy Recommendations

A rise in companies' short-term debt ratio may lead to long-term financial distress for various reasons. Therefore, company owners should monitor and limit managers' short-term borrowing, or monitor short-term debt. This helps companies maintain stable debt levels and support long-term financial sustainability. Another result in the chemical sector is that increased overconfidence among company managers negatively affects companies' long-term borrowing rate, as companies prefer to finance their needs with short-term borrowing. Accordingly, shareholders should monitor managers' long-term borrowing decisions to ensure a balanced borrowing strategy. The fact that overconfidence reduces the leverage ratio indicates that overconfident managers may make the firm's financial structure less risky by borrowing less. An overconfident manager may believe the firm needs less debt because it believes it can maintain strong financial performance. However, this strategy may limit the firm's growth potential, as keeping leverage low might raise capital costs and hinder access to the financing sources needed for growth.

Managerial overconfidence can have multifaceted effects on a firm's financial structure, risk management and market capitalisation. This psychological tendency can directly affect a company's financial structure and market perception; therefore, it is critical to monitor and, where necessary, moderate executives' overconfidence to preserve the company's capacity for sustained expansion and value enhancement. In light of this, overconfidence presents both opportunities and dangers and therefore needs careful consideration in strategic decision-making.

Limitations and Future Research

This study has several limitations that warrant acknowledgement. First, managerial overconfidence was measured using a balance sheet-based proxy derived from collateral value indicators. Although widely used in the literature, this method may not capture all psychological dimensions of overconfidence. Future studies may employ alternative measures such as option-based indicators, textual sentiment analysis, CEO interviews, or survey-based behavioural indices. Secondly, the sample is limited to the Turkish chemical sector, which may restrict the generalizability of the results to other industries and countries. Because prior research in behavioural finance and overconfidence predominantly focuses on investor behaviour, this study, which examines managerial overconfidence within the chemical industry, a key component of the manufacturing sector, helps fill an important gap in the literature. Thus, the findings provide valuable insight for investors, lenders, and company shareholders. Finally, the research period between 2011 and 2022 reflects a specific post-crisis era, and different economic cycles may produce varying behavioural outcomes. Overall, the study's limitations and findings point to several avenues for future research, including sectoral extensions, cross-country comparisons, and alternative measures of overconfidence.

References

Açıkgöz, E. et al. (2015), "Türkiye'de Emeklilik Yatırım Fonlarının Büyümesini Etkileyen Faktörlerin Analizi", *Uluslararası Ekonomi ve Finansal Sorunlar Dergisi*, 5(2), 427-433.

Asteriou, D. & S. Hall (2007), *Applied Econometrics: A Modern Approach*, New York: Palgrave Macmillan.

Azouzi, M.A. & A. Jarboui (2012b), "CEO Emotional Bias and Capital Structure Choice: Bayesian Network Method", *Business Excellence and Management*, 2(2), 47-70.

Baker, H.K. & J.R. Nofsinger (2010), *Behavioral Finance: Investors, Corporations, and Markets*, John Wiley & Sons.

Baltagi, B. & Q. Li (1991), "A Joint Test for Serial Correlation and Random Individual Effects", *Statistics and Probability Letters*, 11, 277-280.

Baltagi, B.H. (2014), *Panel Data and Difference-in-differences Estimation*, in: Encyclopedia of Health Economics, 2, 425-433.

Barberis, N. & R. Thaler (2003), "A Survey of Behavioral Finance", in: G.M. Constantinides et al. (eds.), *Handbook of the Economics of Finance (Vol. 1)* (1053-1128), Elsevier.

Barros, L.A.B.D.C. & A.D.M. Da Silveira (2007), "Overconfidence, Managerial Optimism and the Determinants of Capital Structure", *SSRN*, 953273.

Beck, N. & J.N. Katz (1995), "What To Do (and Not to Do) with Time-Series Cross-Section Data", *American Political Science Review*, 89(3), 634-647.

Ben-David, I. et al. (2007), *Managerial Overconfidence and Corporate Policies* (No. w13711), National Bureau of Economic Research.

Ben-David, I. et al. (2013), "Managerial Miscalibration", *Quarterly Journal of Economics*, 128(4), 1547-1584.

Born, B. & J. Breitung (2016), "Testing for Serial Correlation in Fixed-Effects Panel Data Models", *Econometric Reviews*, 35(7), 1290-1316.

Breusch, T.S. & A.R Pagan (1980), "The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics", *Review of Economic Studies*, 47(1), 239-253.

Breusch, T.S. & A.R. Pagan (1979), "A Simple Test for Heteroskedasticity and Random Coefficient Variation", *Econometrica*, 47(5), 1287-1294.

Can, R. & H.I. Dizdarlar (2022), "The Effect of Managers' Overconfidence who have Made Mergers and Acquisitions on the Firm Value", *Sosyoekonomi*, 30(54), 101-119.

Chen, S. & L.L. Chen (2009), "The Effect of Managerial Overconfidence on Listed Companies Capital Structure and Debt Maturity Structure", in: *16. International Conference on Management Science & Engineering* (1348-1353), Russia: Moscow, September, 14-16.

Çil-Yavuz, N. (2015), *Finansal Ekonometri*, Der Yayınları.

De Hoyos, E.R. & V. Sarafidis (2006), "Testing for Cross-Sectional Dependence in Panel-Data Models", *Stata Journal*, 6(4), 482-496.

Duellman, S. et al. (2015), "Managerial Overconfidence and Audit Fees", *Journal of Accounting and Economics*, 59(2-3), 195-219.

Erlat, H. (2017), *Panel Data: A Selective Survey, 4th Revision*, Department of Economics, Middle East Technical University.

Fairchild, R. (2007), "Managerial Overconfidence, Agency Problems, Financing Decisions and Firm Performance", *Journal of Behavioral Finance*, 8(4), 182-191.

Fama, E.F. (1970), "Efficient Capital Markets: A Review of Theory and Empirical Work", *The Journal of Finance*, 25(2), 383-417.

Ferris, S.P. et al. (2013), "CEO Overconfidence and International Merger and Acquisition Activity", *Journal of Financial and Quantitative Analysis*, 48(1), 137-164.

Gao, Y. & K.S. Han (2022), "Managerial Overconfidence, CSR and Firm Value", *Asia-Pacific Journal of Accounting & Economics*, 29(6), 160-1618.

Ge, L. et al. (2024), "CEO Overconfidence and the Choice of Debt Issuance", *Journal of Finance and Corporate Governance*, 15(3), 45-67.

Graham, J.R. & C.R. Harvey (2001), "The Theory And Practice of Corporate Finance: Evidence From The Field", *Journal of Financial Economics*, 60(2-3), 187-243.

Gujarati, D.N. (2004), *Basic Econometrics, 4th Edition*, New York: McGraw-Hill.

Günay, F. (2023), "Yönetsel Aşırı Güven Davranışı", in: B. Medetoğlu & Y.B. Kavas (3ds.), *Davranışsal Finansta Güncel Yaklaşımlar* (224-248), Ekin Yayınevi.

Güriş, S. et al. (2013), *Eviews ile Temel Ekonometri*, İstanbul: Der Kitabevi Yayınevi.

Heaton, J.B. (2002), "Managerial Optimism and Corporate Finance", *Financial Management*, 31(2), 33-45.

Honda, Y. (1985), "Testing the Error Components Model with Non-Normal Disturbances", *Review of Economic Studies*, 52, 681-690.

Hu, M. et al. (2020), "CEO overconfidence and the COVID-19 pandemic", *SSRN*, https://ssrn.com/abstract=3716618

Huang, R. et al. (2015), "CEO Overconfidence and Corporate Debt Maturity", *Journal of Corporate Finance*, 36, 93-110.

Im, K.S. et al. (2003), "Testing for Unit Roots in Heterogeneous Panels", *Journal of Econometrics*, 115, 53-74.

James, M. (2023), "Psychological Biases and Irrational Behaviors that Influence Financial Decision Making in Behavioral Finance", *SSRN*, https://doi.org/10.2139/ssrn.4628289

Jory, S. et al. (2025), "The Effect of CEO Overconfidence on Corporate Disclosures Amid a Pervasive Shock: Evidence From the COVID-19 Pandemic", *Journal of Business Finance & Accounting*, 52(3), 1431-1462.

Kahneman, D. & A. Tversky (1979), "Prospect Theory: An Analysis of Decision Under Risk", *Econometrica*, 47(2), 263-291.

Kahneman, D. (2011), *Thinking, Fast and Slow*, New York: Farrar, Straus and Giroux.

Kaya, M. (2021), "Finansal Zaman Serilerinin Temel Özellikleri", in: İ. Çelik & S. Bozkuş-Kahyaoğlu (eds.), *Finansal Zaman Serisi Analizleri: Temel Yaklaşımlar* (5-40), Ankara: Gazi Kitabevi.

Klauss, P.C. (2006), "Capital Investment Decisions with Managerial Overconfidence and Regret Aversion", *PhD Thesis*, University of Bath School of Management.

Levin, A.T. et al. (2002) "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties", *Journal of Econometrics*, 108, 1-24.

Loewenstein, G. (2007), "Affective Forecasting and Decision Making", in: *Handbook of Emotion and Cognition* (557-573), Oxford University Press.

Malmendier, U. & G. Tate (2005), "Does Overconfidence Affect Corporate Investment? CEO Overconfidence Measures Revisited", *European Financial Management*, 11(5), 649-659.

Markowitz, H. (1952), "Portfolio Selection", *The Journal of Finance*, 7, 77-91.

Menyah, K. et al. (2014), "Financial Development, Trade Openness and Economic Growth in African Countries: New Insights from a Panel Causality Approach", *Economic Modelling*, 37, 386-394.

O'Brien, R.M. (2007), "A Caution Regarding Rules of Thumb for Variance Inflation Factors", *Quality & Quantity*, 41, 673-690.

Oliver, B.R. (2009), "The Impact of Market Sentiment on Capital Structures in The US", *International Journal of Behavioural Accounting and Finance*, 1(4), 335-348.

Park, H. & Y. Kim (2009), "The effect of Managerial Overconfidence on Leverage", *International Business Economics Research Journal*, 8(12), 115-126.

Pesaran, M.H. (2004), "General Diagnostic Tests for Cross Section Dependence in Panels", Cambridge *Working Papers* in Economics, 435, 1-39.

Pesaran, M.H. (2007), "A Simple Panel Unit Root Test in The Presence of Cross-Section Dependence", *Journal of Applied Econometrics*, 22(2), 265-312.

Pesaran, M.H. et al. (2008), "A Bias Adjusted LM Test of Error Cross Section Independence", *Econometrics Journal*, 11, 105-127.

Purhanudin, N. & Z. Zakaria (2015), "Managerial Overconfidence and Debt Maturity Structure of Malaysian Construction and Material Companies", *Review of Contemporary Business Research*, 4(1), 32-39.

Sauerwald, S. & W. Su (2019), "CEO Overconfidence and CSR Decoupling", *Corporate Governance International Review*, 27, 283-300.

Schrand, C.M. & S.L. Zechman (2012), "Executive Overconfidence and the Slippery Slope to Financial Misreporting", *Journal of Accounting and Economics*, 53(1-2), 311-329.

Sharpe, W.F. (1964), "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk", *Journal of Finance*, 19(3), 425-442.

Tabachnick B.G. & L.S. Fidell (2001), *Using Multivariate Statistics*, 4th ed., MA: Allyn and Bacon.

Titman, S. & R. Wessels (1988), "The Determinants of Capital Structure Choice", *The Journal of Finance*, 43(1), 1-19.

Ünlübulduk, S.N. et al. (2023), "Yatırımcı Önyargılarının İşlem Hacmi Üzerine Etkisi: Borsa İstanbul Sektör Endeksleri Üzerinde Bir Araştırma", *Alanya Akademik Bakış*, 7(2), 671-695.

Yaman, S. & K.E. Gür (2023), "Finansal Risklerin Sürdürülebilir Büyüme ve Karlılık Üzerindeki Etkileri: BIST100 Endeksi Firmaları Üzerine Bir Uygulama", *Uluslararası Ekonomi Siyaset İnsan ve Toplum Bilimleri Dergisi*, 6(2), 64-88.

Yaman, S. (2024), "Financial Decisions and Value-at-Risk: Empirical Evidence from BIST 100 Companies", *Journal of Mehmet Akif Ersoy University Economics and Administrative Sciences Faculty*, 11(1), 366-392.

Yıkılmaz, A. (2022), "Yönetici Aşırı Güveninin Firma Değeri ve Borçlanma Kararları Üzerindeki Etkisi: BIST Gıda Sektörü Üzerine Ampirik Bir Araştırma", *Dicle Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 12(23), 199-211.

Yong-Hai, Y. (2010), "Enterprise Life Cycle Managerial Overconfidence and Capital Structure", *2010 International Conference on E-Product E-Service and E-Entertainment* (1-6), Henan, China, doi: 10.1109/ICEEE.2010.5661449

Zhang, L. & X. Song (2025), "Managerial Overconfidence and Corporate Digital Transformation", *Finance Research Letters*, 75, 106828.

Zhao, D. (2021), "Are Overconfident CEOs Less Resilient to Bad News? Evidence From Negative News Events and Hurricanes", *SSRN*, https://ssrn.com/abstract=4122680 or http://dx.doi.org/10.2139/ssrn.4122680

Appendices

Appendix: 1
Firms Used in the Research

	Chemistry Companies	Codes
1	AKSA AKRİLİK KİMYA SANAYİ A.Ş.	AKSA
2	ALKİM ALKALI KİMYA A.Ş.	ALKIM
3	AYGAZ A.Ş.	AYGAZ
4	BAĞFAŞ BANDIRMA GÜBRE FABRİKALARI A.Ş.	BAGFS
5	DYO BOYA FABRİKALARI SANAYİ A.Ş.	DYOBY
6	EGE GÜBRE SANAYİ A.Ş.	EGGUB
7	GÜBRE FABRİKALARI T.A.Ş.	GUBRF
8	MARSHALL BOYA VE VERNİK SANAYİ A.Ş.	MRSHL
9	PETKİM PETROKİMYA HOLDİNG A.Ş.	PETKM
10	SASA POLYESTER SANAYİ A.Ş.	SASA
11	TÜPRAŞ TÜRKİYE PETROL RAFİNELERİ AŞ	TUPRS
12	HEKTAŞ TİCARET T.A.Ş.	HEKTS

Source: KAP (https://www.kap.org.tr)

Appendix: 2
Nomenclature and Abbreviations

Nomenclature and abbreviations	
AU	Authenticity
BIST	Borsa Istanbul
β	Beta
β_0	Constant term
β_n	Slope coefficient of the independent variable
CADF	Cross-sectional Augmented Dickey-Fuller
CD	Cross-section dependency
CEO	Chief executive officer
CIPS	Cross-sectionally augmented Im-Pesaran-Shin
COV	Covid-19 pandemic
CVA	Collateral value of assets
EGLS	Estimated generalised least squares
FINNET	Financial Information News Network
GR	Growth
H_0	Null hypothesis
IPS	Im, Pesaran and Shin
i	Cross-section dimensions in the models
J-B	Jarque-Bera normality test
KAP	Kamuyu aydınlatma platformu
LEV	Leverage (debt) ratio
LLC	Levin, Lin and Chu
LM	Lagrange multiplier
LM_{adj}	Lagrange multiplier adjusted
LR	Likelihood ratio
LTD	Long-term debt ratio
N	Number of cross-sections
NDT	Non-debt tax shield
MOC	Managerial overconfidence
OLS	Ordinary least squares
PRF	Profitability
ρ	Correlation coefficient
S&P 500	Standard & Poor's 500 Index
SSCP	Sums-of-squared cross-products
STD	Short-term debt ratio
SUR PCSE	Seemingly Unrelated Regression Panel Corrected Standard Errors
SZ	Size
T	Number of periods
t	Time dimensions in the models
u_{it}	Error term
VIF	Variance inflation factor
VOL	Volatility

Sosyoekonomi

2026, Vol. 34(70), 259-288

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.11
Date Submitted: 31.07.2025
Date Revised: 23.03.2026
Date Accepted: 10.09.2026

The Impact of Monetary Policy on Income Inequality in Türkiye: A Structural VAR Approach[1]

Merve CİN *(https://orcid.org/0000-0001-6719-4194), Bartın University, Türkiye; mcin@bartin.edu.tr*

Nagehan KESKİN *(https://orcid.org/0000-0003-3217-2686), Dokuz Eylül University, Türkiye; nagehan.keskin@deu.edu.tr*

Türkiye'de Para Politikasının Gelir Eşitsizliği Üzerindeki Etkisi: Yapısal VAR Yaklaşımı[2]

Abstract

This study investigates the impact of conventional monetary policy on income inequality in Türkiye. Using annual data from 1988 to 2021, we applied the long-run restricted Structural Vector Autoregression (SVAR) method developed by Blanchard and Quah (1989) to estimate the impact of monetary policy shocks on income inequality. The analysis results showed that contractionary monetary policy shocks reduced income inequality. Furthermore, the impact of monetary policy on income inequality is linked to the inflation rate and stock prices.

Keywords : Income Inequality, Monetary Policy, SVAR Analysis.

JEL Classification Codes : C32, D31, E52.

Öz

Bu çalışma, Türkiye'de geleneksel para politikasının gelir eşitsizliği üzerindeki etkisini incelemektedir. 1988 ile 2021 yılları arasındaki yıllık veriler kullanılarak, para politikası şoklarının gelir eşitsizliği üzerindeki etkisini tahmin etmek için, Blanchard ve Quah (1989) tarafından geliştirilen uzun dönem kısıtlamalı Yapısal Vektör Otoregresyon (SVAR) yöntemi uygulanmıştır. Analiz sonuçları, daraltıcı para politikası şoklarının gelir eşitsizliğini azalttığını göstermiştir. Ayrıca para politikasının gelir eşitsizliği üzerindeki etkisinin enflasyon oranı ve hisse senedi fiyatlarıyla bağlantılı olduğu tespit edilmiştir.

Anahtar Sözcükler : Gelir Eşitsizliği, Para Politikası, SVAR Analizi.

---

[1] *This study is derived from the master's thesis entitled "The Impact of Monetary Policy on Income Inequality: The Case of Turkey", completed in 2023 by Merve Cin under the supervision of Nagehan Keskin at the Department of Economics, Institute of Social Sciences, Dokuz Eylül University.*

[2] *Bu çalışma, Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü İktisat Anabilim Dalı'nda Nagehan Keskin'in danışmanlığında Merve Cin tarafından 2023 yılında tamamlanan "Para Politikasının Gelir Eşitsizliği Üzerindeki Etkisi: Türkiye Örneği" başlıklı yüksek lisans tezinden üretilmiştir.*

1. Introduction

Over the last two decades, growing inequality has become a key topic in public debate, largely driven by long-term trends in technological change and globalisation (Dolado et al., 2021: 292). Monetary policy has been largely ignored as a source of rising income inequality until the 2008 Global Financial Crisis (GFC). One reason is that monetary policy is believed to be neutral in the long run, whereas rising inequality is a long-run phenomenon. Another reason is that the traditional view holds that elected officials should address distribution problems through fiscal policy rather than unelected central bankers (Bernanke, 2015; Park, 2021; Altunbaş & Thornton, 2022). Following the GFC, many central banks significantly lowered interest rates and implemented unconventional expansionary monetary policies, such as large-scale asset purchase programs, to stimulate the economy. Such measures have fueled concerns that monetary policy, by boosting asset prices, has benefited mostly the rich, shining the spotlight on the distributional effects of monetary policy (BIS, 2021: 39; Colgiago, 2019: 1200; O'Farrell et al., 2016: 6). As a result of these developments, a growing body of literature has developed that tries to assess the impact of monetary policy on income distribution and how monetary policy design might take account of distributional issues (Altunbaş & Thornton, 2022: 559).

Monetary policy implementation can affect income inequality primarily through its impact on inflation, asset prices, and unemployment. The interaction of these effects with certain dimensions of household heterogeneity creates monetary policy transmission channels that can, in turn, affect inequality. Monetary policy's distributional effects are closely linked to household heterogeneity. Household heterogeneity primarily stems from differences in households' income sources and the composition of assets and liabilities on their balance sheets. As a result, different households can be affected differently by a given monetary policy action. Therefore, the theoretical effects of monetary policy on income inequality remain unclear (Colgiago et al., 2019: 1202; Bonifacio et al., 2021: 5-10). As explained in detail in the next section, many transmission channels operate in opposite directions. Therefore, empirical analysis is needed to determine the precise impact of monetary policy on income inequality.

The empirical literature on the distributional effects of monetary policy has produced mixed evidence. Moreover, most of the studies have focused on developed countries. Some studies have concluded that expansionary monetary policy increases inequality (e.g., Inui et al., 2017 for Japan; Andersen et al., 2021 for Denmark) or that contractionary monetary policy reduces inequality (e.g., Villareal, 2014 for Mexico; Davtyan, 2017 for the US). Other studies have found that expansionary monetary policy reduces inequality (Samarina & Nguyen, 2019 for Europe) or that contractionary monetary policy increases inequality (e.g., Coibion et al., 2012 for the US; Mumtaz & Theophilopoulo, 2017 for the UK).

Investigating the impact of monetary policy on income inequality is important for informing policies to address it. As a developing country, Türkiye has high income inequality. According to TurkStat data, the Gini coefficient in Türkiye fell from 0.428 in

2006 to 0.391 in 2014, indicating a limited improvement in income inequality. However, the Gini coefficient has risen again since 2014. According to TurkStat's 2023 Income Distribution Statistics, the Gini coefficient rose from 0.401 in 2021 to 0.415 in 2022 and 0.420 in 2023. Compared to other OECD countries, Türkiye has one of the largest income gaps. According to OECD income distribution data, as of 2022, Türkiye ranks 3rd among the 38 OECD member countries in income inequality, after Costa Rica and Chile (OECD, 2025). According to data from the European Union (EU) Statistical Office, Eurostat, the EU's Gini coefficient was 30.2 in 2021, while Türkiye's was 42.6. With this value, Türkiye has the highest income inequality in Europe (Eurostat, 2025). Despite the significant income inequality in Türkiye, we did not come across any published studies investigating this issue specifically for Türkiye while preparing this research. Uncertain evidence in the literature on the impact of monetary policy on inequality, along with the lack of published studies on Türkiye, motivates this study. In this context, this study aims to contribute new findings by investigating the impact of monetary policy shocks on income inequality in Türkiye.

This study is organised as follows. Section 2 presents the theoretical and empirical literature on the relationship between monetary policy and income inequality. Section 3 introduces the dataset used in the empirical analysis and describes the methodological framework and model. Section 4 presents and interprets the empirical findings. Section 5 evaluates the key findings, presents policy recommendations, and summarises the study's main limitations.

2. Literature Review

2.1. Theoretical Literature

The literature classifies the distributional effects of monetary policy into different transmission channels. Most of these classifications follow Coibion et al. (2012), a pioneering study that analysed the impact of monetary policy shocks on inequality in detail. Coibion et al. (2012) identified five channels through which monetary policy affects income inequality: income composition, financial segmentation, portfolio, savings redistribution, and earnings heterogeneity[3]. The transmission channels of monetary policy can be summarised as follows:

The income composition channel suggests that asset prices, and accordingly income inequality, are expected to rise following expansionary monetary policy implementation (Bernanke, 2015). Households differ in their primary sources of income. Low- and middle-income households generally derive their income from wages and salaries, while high-income households derive a significant portion of their income from business income and capital (financial) gains. Business income and capital gains are generally more sensitive to changes in monetary policy than labour income (Coibion et al., 2012: 2; Bonifacio et al., 2021: 10). As a result of expansionary monetary policy, lower interest rates increase asset

[3] *For more details on the different channels between monetary policy and inequality, see Coibion et al. (2012); Colciago et al. (2019); and Bonifacio et al. (2021).*

prices and business profits. Assuming no change in wages in the short term, an expansionary monetary policy could benefit high-income households more by increasing asset prices more than labour incomes (Deutsche Bundesbank, 2016: 22).

The earnings heterogeneity channel focuses on how labour earnings respond differently across income groups to monetary policy shocks. Generally, less skilled and lower-income workers are more likely to lose their jobs during a recession. Therefore, low-income households' wage and employment expectations are generally more sensitive to monetary policy changes. In this case, expansionary monetary policy could better benefit low-income people by stimulating economic activity and increasing employment opportunities (Coibion et al., 2012; Bonifacio et al., 2021).

The financial segmentation channel assumes that economic decision units that participate actively in financial markets generally have higher income than those who do not. Monetary policy implementations take time to affect the real economy. During this period, those who transact in financial markets more frequently can anticipate the potential positive and negative impacts of monetary policy decisions (Coibion et al., 2012: 2; Deutsche Bundesbank, 2016: 21-22; Williamson, 2008: 1039). Money injected into the economy by an expansionary monetary policy raises asset prices and is initially used only by economic units connected to financial markets. Thus, the incomes of economic units unconnected to financial markets remain constant, while those of connected economic units increase (Williamson, 2008: 1039).

Households vary by their asset portfolios. Low-income households tend to have more cash and fewer financial assets, while high-income households tend to have less cash and more financial assets. Through the portfolio channel, an increase in inflation from expansionary monetary policy reduces the real value of cash, further harming low-income households (Erosa & Ventura, 2002; Albanesi, 2007: 1089; Coibion et al., 2012: 3).

The savings redistribution channel focuses on differences in household wealth levels. Some households borrow with negative net worth, while others save with positive net worth. An unexpected drop in interest rates from expansionary monetary policy improves borrowers' positions by reducing interest payments, while worsening savers' positions by reducing returns. Assuming borrowers are relatively low-income and savers are relatively high-income, expansionary monetary policy will reduce income inequality (Doepke & Schneider, 2006: 1070; Bonifacio et al., 2021:11).

These transmission channels have been explained in the context of implementing an expansionary monetary policy. In summary, implementing an expansionary monetary policy increases income inequality through the income composition channel, the financial segmentation channel, and the portfolio channel, while decreasing it through the savings redistribution channel and the earnings heterogeneity channel. If a contractionary monetary policy is implemented, the mechanisms described above will operate in the opposite direction.

2.2. Empirical Literature

As in the theoretical literature, the empirical literature has no consensus on the impact of monetary policy on income inequality. Some studies find that expansionary (contractionary) monetary policy increases (decreases) income inequality, while others find that expansionary (contractionary) monetary policy decreases (increases) income inequality.

Romer and Romer (1998) conducted the earliest study on this topic. The authors estimated the impact of monetary policy on poverty and income inequality using a linear regression model. The study included a short-term analysis for the USA and a long-term analysis for a sample of 76 countries. The results showed that expansionary monetary policy improved the poor's well-being in the short term. Furthermore, monetary policy aimed at low inflation and stable aggregate demand growth was associated with increased well-being for low-income people in the long run. Coibion et al. (2012) conducted the first empirical study estimating the impact of monetary policy shocks on income inequality. The authors examined the impact of monetary policy shocks implemented in the USA on income, consumption, wages, and expenditure inequality for the 1980-2008 period. Impulse response analysis using a VAR (Vector Autoregression) model showed that contractionary monetary policy shocks increased income, consumption, wage, and expenditure inequality in the USA. Among the channels through which monetary policy affected income inequality, the income composition channel was reported to be relatively more effective. Saiki and Frost (2014) investigated the relationship between unconventional monetary policy and income inequality in Japan from 2008 to 2014 using a VAR method. The analysis results showed that an unconventional expansionary monetary policy increased income inequality. Villarreal (2014) analysed the impact of monetary policy shocks in Mexico on income inequality from 1995Q1 to 2012Q4. This study used VAR analysis and found that contractionary monetary policy shocks decreased income inequality in Mexico. Furceri et al. (2018), in their study covering the period 1990-2013, used the local projection method for a panel of 32 developed and developing countries and found that unexpected contractionary monetary policy shocks increased income inequality. Mumtaz and Theophilopoulou (2017) examined the impact of monetary policy shocks in the UK on income, consumption, and income inequality from 1969-2012. Results obtained from the SVAR method with sign restrictions showed that contractionary monetary policy shocks increased income, consumption, and income inequality.

Davtyan (2017) investigated the impact of monetary policy shocks on income inequality in the USA. In the study, covering 1983-2012, the author identified monetary policy shocks using both the SVAR method with contemporaneous restrictions and the SVAR method with long-run restrictions. Both methods showed that contractionary monetary policy shocks reduced income inequality. Inui et al. (2017) investigated the impact of monetary policy on income inequality in Japan, covering 1981-2008. The study used a local projection method. The analysis showed that an expansionary monetary policy shock increased income inequality in the period leading up to the 2000s. Including data after 2000 in the sampling period caused the effect to lose significance. Lenza and Slacalek (2018)

examined the effects of monetary expansion during 1999-2016 on household income and welfare in Europe using a Bayesian VAR method. The analysis found that income inequality decreased because quantitative easing increased employment. Samarina and Nguyen (2019) analysed 10 European countries between 1999 and 2014. Using a panel VAR method, the study identified two channels to capture monetary policy's distributional effects: the macroeconomic channel (wages and employment) and the financial channel (asset prices and stock returns). The analysis found that expansionary monetary policy shocks decreased income inequality through the macroeconomic channel. Park (2021) found evidence that contractionary monetary policy shocks increased income inequality in South Korea after one year. Using a block-exogeneity SVAR model, the study concluded that the earnings heterogeneity channel was the most significant for South Korea. Andersen et al. (2021) analysed the impacts of shocks to the policy interest rate on income, wealth, and consumption in Denmark using a local projection method. Findings from the 1987-2014 analysis indicated that expansionary monetary policy increases income inequality. Meried (2025) investigated the effect of monetary policy shocks on income inequality for Brazil using the SVAR method. The results showed that contractionary monetary policy increased income inequality.

3. Data & Methodology

3.1. Data

One of the biggest challenges in analysing income inequality is the availability of high-frequency, regular data. The fact that income inequality data are available only annually significantly constrains time-series analysis. The most common indicator of income inequality in the literature is the Gini coefficient, which combines all income groups into a single measure. In this study, as in many studies in the literature, instead of relying solely on the Gini coefficient as a measure of income inequality, multiple measures of inequality have been used: Gini coefficient (GINI), the share of national income held by the top 10% (P10), and the share of national income held by the bottom 50% (P50). In this study, we use the income shares of the top 10% and bottom 50% (P10 and P50) in addition to the Gini coefficient for two reasons. First, we check whether the estimation results vary with the inequality indicator used. For example, if the GINI coefficient increases after implementing a contractionary monetary policy, this indicates that the policy increases income inequality. When the P10 and P50 variables are used as income inequality indicators, an increase in P10, a decrease in P50, or a decrease in P50 during an increase in P10 resulting from a contractionary monetary policy indicates that such a policy raises income inequality. The second reason is that, as previously explained, household heterogeneity plays a key role in the transmission of monetary policy (Bonifacio et al. 2021), meaning high-income and low-income households are affected differently by a monetary policy.

Monetary policy implemented by central banks affects prices and output through various channels. Interest rates, exchange rates, and asset prices are classic monetary transmission channels (Mishkin, 1996). Short-term, or policy, interest rates typically

measure conventional monetary policy. Therefore, this analysis uses the policy interest rate (INT) of the Central Bank of the Republic of Türkiye (CBRT) as a proxy for monetary policy (Coibion et al., 2012; Mumtaz & Theophilopolou, 2017; Furceri et al., 2018). The other variables used in the analysis represent typical monetary transmission channels and were selected based on the relevant literature. As an indicator of output, the real GDP growth rate (GDP) (Coibion et al., 2012; Saiki & Frost, 2014; Davtyan, 2017), and as an indicator of inflation, the percentage change in the consumer price index (CPI) (Mumtaz & Theophilopoulou, 2017; Davtyan, 2017), the percentage change in the Borsa Istanbul BIST100 index as an indicator of stock prices (BIST) (Saiki & Frost, 2014; Lenza & Slacalek, 2018), and the percentage change in the USD/TRY nominal exchange rate (EXR) as an indicator of the exchange rate (Mumtaz & Theophilopoulou, 2017; Park, 2021) were used. All variables are included in the models in their raw form.

For Türkiye, regular and continuous data on the shares of high- and low-income groups in national income are available only for the P10 and P50 indicators. These indicators are only available in the World Inequality Database (WID). Therefore, we obtained all income inequality indicators (GINI, P10, and P50) from the WID. The INT variable was obtained from the International Monetary Fund (IMF) International Financial Statistics (IFS) database; the CPI and GDP variables were obtained from the World Bank's World Development Indicators (WDI) database, and the EXR and BIST variables were obtained from the CBRT's Electronic Data Delivery System (EVDS). The Appendix (Table A1) presents descriptive statistics for the variables. The dataset used in this study consists of annual data for Türkiye covering the period 1988-2021. Because regular and reliable data on income inequality for Türkiye became available after 1987, the analysis period was determined by data availability.

3.2. Methodology and Model

Sims (1980) developed the VAR method, and researchers have used it in multivariate time-series analysis. A standard (unrestricted) VAR model is based solely on empirical analysis and disregards economic theory. Sims (1986) and Bernanke (1986) addressed this issue in standard VAR analysis with SVAR methods. An SVAR method allows the economic theory disregarded in an unrestricted VAR analysis to be considered, and its results to inform policy recommendations. In this respect, SVAR models extend the unrestricted VAR approach and combine economic theory with time-series analysis (McCoy, 1997; Sims, 1986). In SVAR models, researchers apply simultaneous restrictions to the structural coefficient matrix, based on economic theory, to decompose structural shocks. Blanchard and Quah (1989) imposed long-run restrictions on the variance and covariance matrices of structural shocks and contributed to long-run analysis. Later, researchers developed SVAR models using both short- and long-run restrictions (Gali, 1992), as well as those using sign restrictions (Uhlig, 2005; Keskin, 2021).

SVAR models have become one of the most widely used methods for examining how macroeconomic shocks transmit and for testing economic theories (Gambetti, 2020).

Because monetary policy shocks cannot be directly observed and must be defined using economic restrictions, the SVAR framework is well suited to this task. SVAR models identify and quantify interest rate shocks, enabling examination of how structural monetary policy shocks dynamically transmit to macroeconomic variables through impulse response functions. These features have made SVAR-based approaches a standard method in the monetary policy literature (Anobile et al., 2025). Another advantage of the SVAR approach is that it does not require constructing a detailed structural model of the economy and requires only a minimum number of restrictions for identifying shocks (Şen & Kaya, 2015). Furthermore, correlation alone is insufficient to determine the direction of the relationship between variables because most macroeconomic variables are endogenously determined. Therefore, the SVAR approach allows for a more appropriate assessment of the effects of monetary shocks on macroeconomic variables by controlling for interactions among variables and provides a more robust methodology for analysing such relationships (Sousa & Zaghini, 2007).

Colgiago (2019), Raczyński (2022), and Kappes (2023) reviewed studies in the literature on the distributional effects of monetary policy and found that the most commonly used empirical methods in these studies were VAR and its variants (SVAR, Bayesian VAR, Panel VAR, etc.) and the local projections method. The SVAR approach is more suitable for small open economies like Türkiye than other identification methods because it captures more distinctive features of such economies (Elbourne & de Haan, 2006). The most commonly used empirical methods in studies investigating the impact of monetary policy on income inequality are VAR and its variants, such as SVAR, Bayesian VAR, Panel VAR, etc., as well as the local projections method (Colgiago et al., 2019; Raczyński, 2022; Kappes, 2023). In this study, following previous literature (e.g., Mumtaz & Theophilopoulou, 2017; Davtyan, 2017; Park, 2021; Meried, 2025), we use the SVAR approach to investigate the impact of monetary policy shocks on income inequality in Türkiye. Because increases or decreases in income inequality largely result from long-run structural changes in the economy, we used the long-run restriction SVAR method.

Blanchard and Quah (1989) assume that demand shocks do not have permanent effects on output, while supply shocks can have long-run effects (Lütkepohl & Velinov, 2016). Following Blanchard and Quah (1989), the widespread use of long-run restrictions stems from the existing consensus among economists about long-term relationships in macroeconomic theory and policy implications (Neaime & Gaysset, 2022). A key advantage of long-run restrictions is that economic theory provides more guidance on long-term relationships than on short-term dynamics in most cases (Şen & Kaya, 2015).

In the approach of Blanchard and Quah (1989), long-term constraints are applied to the long-term multiples derived from the moving-average representation of the VAR model (Blanchard & Quah, 1989; Keskin, 2021: 36). The SVAR model with long-run restrictions is indicated in Equation (1):

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} C_{11}(L) & C_{12}(L) \\ C_{21}(L) & C_{22}(L) \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (1)$$

Here, y_t and z_t represent endogenous variables, $C_{ij}(L)$ represents long-run impact multipliers, ε_{1t} and ε_{2t} represent independent structural shocks with constant variance and a white-noise process. Based on this, the decomposed versions of the shocks are shown in Equation (2):

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} A_{11}(L) & A_{12}(L) \\ A_{21}(L) & A_{22}(L) \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} \quad (2)$$

Equation (2) is given with a shorter representation as follows:

$$X_t = A(L)X_{t-1} + e_t \quad (3)$$

In Equation (3), X_t refers to the vector column of y_t and z_t, e_t refers to the vector column of e_{1t} and e_{2t}, and A(L) refers to the 2 x 2 matrix with elements equal to the $A_{ij}(L)$ polynomials (Enders, 2004).

The SVAR model, estimated under long-run restrictions, reveals the long-term impacts of the relationship sought by imposing zero restrictions on the A(L) term, consistent with the existing theoretical framework. Our reference SVAR model is defined as in Equation (3) to estimate the impact of monetary policy shocks on income inequality. The vector of endogenous variables, Xt, is defined for our reference SVAR model as follows:

$$X_t = GDP_t, CPI_t, INT_t, EXR_t, Income\ Inequality_t \quad (4)$$

In the SVAR model, the restrictions imposed on the elements of A(L) define the shock of interest. We use long-term restrictions to identify monetary policy shocks. This approach assumes that some shocks do not have a lasting effect on certain macroeconomic variables.

We created two models to investigate the impact of monetary policy on income inequality. First, we developed Model 1 to determine whether monetary policy affected income inequality. Model 1 included the variables (GDP, CPI, INT, and EXR) representing typical monetary transmission channels in the literature, along with the income inequality variable. This model tests the channels through which monetary policy operated via inflation, namely the portfolio channel and the savings redistribution channel. A major limitation of empirical studies on the distributional effects of monetary policy is their inability to simultaneously identify all the transmission channels described in the theoretical literature because of data limitations (Colgiago et al., 2019: 1224). Estimating the effects of each channel separately requires detailed data on high- and low-income groups. However, it is impossible to obtain these data for Türkiye in a length sufficient for time-series analysis. Therefore, available data limit our ability to test which channel(s) realise monetary policy's potential impact on income inequality. In this context, Model 2 examines whether monetary policy affects income inequality through the asset-prices channel. The financial

segmentation and income composition channels link monetary policy's impact on income inequality to changes in asset prices. Therefore, we added the BIST variable to Model 2 as a proxy for asset prices to test the impact of these two channels. Housing prices are another asset-price variable, in addition to the BIST variable. However, because house price index data have been published only since 2010, we could not include this variable in the analysis. Because of this data restriction, the study used only the BIST variable to represent asset prices. As three alternative indicators, including GINI, P10, and P50, were used in the study as a representation of income inequality, Model 1 and Model 2 were divided into three submodels to cover these indicators. Within this scope, the study formed six models, shown in Tables 1 and 2. Moreover, dummy variables representing the Crises of 1994, 2001, and 2008, and the COVID-19 outbreak that emerged in Türkiye in 2020, were added exogenously to the models.

Table: 1
Model 1

GDP, CPI, INT, EXR, GINI	Model 1.1
GDP, CPI, INT, EXR, P10	Model 1.2
GDP, CPI, INT, EXR, P50	Model 1.3

Table: 2
Model 2

GDP, CPI, INT, BIST, EXR, GINI	Model 2.1
GDP, CPI, INT, BIST, EXR, P10	Model 2.2
GDP, CPI, INT, BIST, EXR, P50	Model 2.3

Equations (5) and (6) present the SVAR models with long-run restrictions for Model 1 and Model 2, respectively, based on Blanchard and Quah (1989). We determined the restrictions in these SVAR models by drawing on relevant economic theory and prior empirical studies, consistent with the long-run restriction logic of Blanchard and Quah (1989).

$$\begin{bmatrix} \mathrm{GDP} \\ \mathrm{CPI} \\ \mathrm{INT} \\ \mathrm{EXR} \\ \mathrm{GINI} \end{bmatrix}_t = \begin{bmatrix} A_{11}(L) & 0 & 0 & 0 & 0 \\ A_{21}(L) & A_{22}(L) & 0 & 0 & 0 \\ A_{31}(L) & A_{32}(L) & A_{33}(L) & 0 & 0 \\ A_{41}(L) & A_{42}(L) & A_{43}(L) & A_{44}(L) & 0 \\ A_{51}(L) & A_{52}(L) & A_{53}(L) & A_{54}(L) & A_{55}(L) \end{bmatrix} \begin{bmatrix} \epsilon_{\mathrm{GDP}} \\ \epsilon_{\mathrm{CPI}} \\ \epsilon_{\mathrm{INT}} \\ \epsilon_{\mathrm{EXR}} \\ \epsilon_{\mathrm{GINI}} \end{bmatrix}_t \quad (5)$$

Equation (5) indicates the long-run restrictions matrix imposed on the SVAR model that was generated for Model 1.1. Following Blanchard and Quah (1989), it was assumed that demand-driven shocks did not affect the long-run level of output. In this context, GDP was placed first in the system as the fundamental variable determined by real supply shocks in the long run. This restriction on GDP rests on the assumption that, in the long run, economic growth is determined by factors such as capital accumulation, technological progress, and labour, rather than by nominal variables (Solow, 1956). Central banks determine policy by looking at output and inflation. For this reason, in standard monetary VAR models that include GDP, CPI, and INT, the monetary policy shock is determined by

the constraint that the monetary policy shock (INT) does not simultaneously affect CPI and GDP. Therefore, in such a model, the interest rate comes last. The standard order used in studies examining monetary policy shocks is: GDP, CPI, INT (Christiano et al., 1996). Placing CPI second in the matrix, after GDP, reflects the assumption that, within the long-run restricted SVAR framework, inflation is a variable associated with supply-side developments in output and that monetary shocks do not have persistent effects on the long-run level of real output. When a monetary model includes other financial variables, these variables are generally ranked after the interest rate (Gambetti, 2020). In this context, the exchange rate (EXR) is often ranked second, after the interest rate, as a variable that reacts quickly to monetary policy changes. The relevant literature is ambiguous regarding the direction of causality between the exchange rate and the policy interest rate (Tümtürk, 2020). In this study, assuming causality runs from interest rates to exchange rates, we place the EXR variable after INT. In developing countries like Türkiye, central banks can adjust interest rates to stabilise exchange rates. However, our model assumes that, in line with the long-run constraint logic of Blanchard and Quah (1989), factors such as the current account balance, capital flows, and technology determine the exchange rate in the long run. Therefore, monetary policy shocks do not permanently affect the exchange rate in the long run (Edwards, 1989). Income distribution responds relatively slowly to policy shocks. Because the study's main objective was to measure income inequality's response to changes in the other variables, we placed the GINI variable last in the model. In Models 1.2 and 1.3, we used P10 and P50, respectively, instead of GINI.

$$\begin{bmatrix} \mathrm{GDP} \\ \mathrm{CPI} \\ \mathrm{INT} \\ \mathrm{BIST} \\ \mathrm{EXR} \\ \mathrm{GINI} \end{bmatrix}_t = \begin{bmatrix} A_{11}(L) & 0 & 0 & 0 & 0 & 0 \\ A_{21}(L) & A_{22}(L) & 0 & 0 & 0 & 0 \\ A_{31}(L) & A_{32}(L) & A_{33}(L) & 0 & 0 & 0 \\ A_{41}(L) & A_{42}(L) & A_{43}(L) & A_{44}(L) & 0 & 0 \\ A_{51}(L) & A_{52}(L) & A_{53}(L) & A_{54}(L) & A_{55}(L) & 0 \\ A_{61}(L) & A_{62}(L) & A_{63}(L) & A_{64}(L) & A_{65}(L) & A_{66}(L) \end{bmatrix} \begin{bmatrix} \epsilon_{\mathrm{GDP}} \\ \epsilon_{\mathrm{CPI}} \\ \epsilon_{\mathrm{INT}} \\ \epsilon_{\mathrm{BIST}} \\ \epsilon_{\mathrm{EXR}} \\ \epsilon_{\mathrm{GINI}} \end{bmatrix}_t \tag{6}$$

Equation (6) presents the long-run restrictions matrix for the SVAR model generated for Model 2. The sorting for Model 2, the augmented version of Model 1, is as follows: "GDP, CPI, INT, BIST, EXR, and GINI". In Models 2.2 and 2.3, we used P10 and P50 instead of GINI.

Of course, SVAR models have limitations. The reliance of structural shock identification in SVAR models on certain restrictions has led to debate over interpreting the results. This discussion is a natural consequence of the identification problem required for decomposing structural shocks, a fundamental methodological feature of SVAR models. While the reliability of SVAR models largely depends on the appropriateness of the descriptive restrictions, these models are quite useful for revealing simultaneous relationships among variables when supported by sound theoretical knowledge. However, similar definition problems are not unique to SVAR models. They also appear in many methods, especially dynamic simultaneous equation models. Therefore, while SVAR models have limitations, alternative methods also have their own specific limitations (Stock

& Watson, 2001; Gottschalk, 2001). Recognising that every method, including ours, has its own strengths and weaknesses, we aim to contribute to the understanding of the monetary policy-income inequality relationship in Türkiye.

4. Findings

All variables included in the model should be stationary to implement the VAR analysis. In this study, we determined the variables' stationary levels using the ADF (Augmented Dickey-Fuller) and KPSS (Kwiatkowski-Phillips-Schmidt-Shin) unit root tests, as well as the ZA (Zivot-Andrews) unit root test, which accounts for structural breaks. Table 3 shows the results of the ADF and KPSS unit root tests, and Table 4 shows the results of the ZA unit root test.

Table: 3
Results of the ADF and KPSS Unit Root Tests

Variables	ADF		KPSS	
	Test Statistics (Constant)	Test Statistics (Constant and Trend)	Test Statistics (Constant)	Test Statistics (Constant and Trend)
GINI	-1.9948 (0)	-1.5292 (0)	0.6225 (4)**	0.1414 (4)
D(GINI)	-4.5155 (0)*	-3.7535 (0)**	0.1851 (2)	-
INT	-1.4672 (1)	-3.4884 (0)	0.5096 (4)**	0.1077 (3)
D(INT)	-8.7037 (0)*	-8.6035 (0)*	0.1277 (7)	-
GDP	-5.9587 (0)*	-3.8401 (8)**	0.3038 (6)	0.1549 (8)**
D(GDP)	-	-	-	0.1310 (8)
CPI	-1.0902 (0)	-2.4522 (4)	0.5148 (5)**	0.1120 (4)
D(CPI)	-5.5145 (0)*	-5.4381 (0)*	0.1477 (3)	-
EXR	-1.7571 (1)	-2.2138 (1)	0.4506 (4)	0.1097 (4)
D(EXR)	-6.5195 (1)*	-6.3995 (1)*	-	-
BIST	-1.4530 (3)	-1.6251 (1)	0.6897 (1)**	0.4853 (32)*
D(BIST)	-8.5707 (2)*	-9.7660 (0)*	0.1984 (11)	0.1672 (32)**
P10	-1.7494 (4)	-1.0485 (4)	0.5627 (4)**	0.1421 (4)
D(P10)	-3.8054 (3)*	-4.0650 (3)**	0.1816 (2)	-
P50	-1.7899 (0)	-1.4929 (0)	0.5725 (5)**	0.1406 (4)
D(P50)	-5.4080 (0)*	-5.5277 (0)*	0.1862 (2)	-

Note: Regarding the ADF test, the values in the parentheses indicate an appropriate lag length. Appropriate lag lengths of the model were determined using the Akaike Information Criterion (AIC). The notation "" refers to the series being stationary at a significance level of 1%, and the notation "**" refers to the series being stationary at a significance level of 5%. For the KPSS test, we selected an appropriate lag length using a Newey-West bandwidth estimator. This length is given in parentheses, and the signs "*" and "**" indicate that the series includes unit roots at significance levels of 1% and 5%, respectively. D refers to the first difference of the relevant variable.*

Table: 4
Results of the ZA Unit Root Test

Variables	Model A		Model B		Model C	
	Test Statistics	Break Year	Test Statistics	Break Year	Test Statistics	Break Year
GINI	-3,2816 (0)	2004	-2,6670 (0)	2008	-4,9290 (0)	2005
INT	-5,1423 (0)	2002	-3,8990 (0)	1995	-6,9661 (0)	2002
GDP	-6,2618 (0)	2003	-5,8785 (0)	2012	-6,1637 (0)	2003
CPI	-4,1049 (0)	2003	-2,3282 (0)	2012	-4,1944 (0)	2003
EXR	-4,6960 (1)	2002	-2,9585 (1)	2008	-4,5079 (1)	2002
BIST	-10,804 (0)	2001	-9,8274 (0)	2009	-11,1350 (0)	1993
P10	-3,8369 (4)	2004	-2,8133 (4)	2012	-4,6090 (4)	2005
P50	-3,3074 (0)	2014	-2,8112 (0)	2008	-5,1471 (0)	2005
Critical Values	1%	5%	1%	5%	1%	5%
	-5,34	-4,93	-4,80	-4,42	-5,57	-5,08

Note: Model A refers to the structural break in the constant term, Model B refers to the structural break in the trend, and Model C refers to the structural breaks both in the constant term and in the trend. The values in parentheses indicate the appropriate lag lengths determined according to the AIC.

Considering the ADF and KPSS test results together, the GDP variable was stationary at level, and all other variables were stationary at first difference. According to the ZA test results, we did not reject the null hypothesis that the GINI, INT, CPI, EXR, P10, and P50 variables included unit roots. When we examined all unit root test results together, we found that GDP and BIST were stationary at level, while the other variables were stationary in first differences.

We first estimated the unrestricted VAR model to implement the SVAR analysis. All variables included in the VAR model should be stationary. Therefore, based on the unit root test results, we included GDP and BIST in levels, and the other variables in first differences. In the VAR analysis, we determined the appropriate (optimal) lag length using the AIC criterion. Because the data were annual, we set the maximum lag length to 2. We used a lag length of 2 for all models. To determine the appropriate lag length, we tested autocorrelation using the Lagrange Multiplier (LM) test and heteroscedasticity using the White test. We also tested whether the model satisfies the stability condition (i.e., the inverse roots of the AR characteristic polynomial lie within the unit circle). Based on the tests, we found no autocorrelation or heteroscedasticity and that the stability condition was met; thus, we estimated an SVAR model with long-run restrictions. The Appendix includes estimation results for all models (Table A2-A19 and Figure A1-A6). As with the unrestricted VAR method, the SVAR method also requires examining impulse response analysis results rather than interpreting the coefficients directly (Güneş et al., 2013; Sims, 1986). Tables 1 and 2 present the impulse response analysis results from the SVAR models.

Results for Model 1

The impulse response functions show how the other variables in the model respond to a one-standard-deviation shock. Figure 1 shows the impulse-response analysis results from the SVAR model (Model 1.1) with long-run restrictions. This research primarily investigates the relationship between income inequality and monetary policy. Therefore, Figure 1 shows the responses of the other variables in the model to a contractionary monetary policy shock (an increase in the interest rate), as well as the Gini coefficient's response to shocks in those variables. The solid lines in the chart refer to the response given by the dependent variable over time to one standard-error shock occurring in the error terms of the model, and the dashed lines refer to 95% confidence intervals obtained for ± 2 standard errors. These lines indicate statistical significance; confidence intervals should not include zero for significance (Yamak & Korkmaz, 2005).

Figure: 1
Impulse Response Functions of Model 1.1

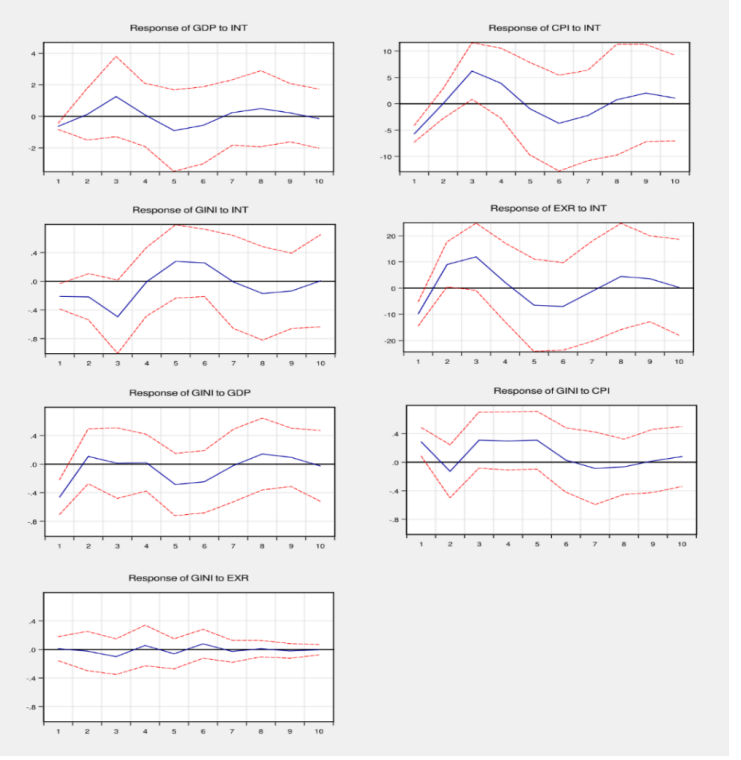


Figure 1 indicates that GDP's response to a contractionary monetary policy shock was negative and statistically significant in the first period. A contractionary monetary policy shock reduces output by decreasing investment and consumption expenditures, and this impact is temporary in the long run, which complies with theoretical expectations. CPI's response to a contractionary monetary policy shock was negative and statistically significant until the third period. The decrease in aggregate demand resulting from contractionary monetary policy, leading to lower price increases, aligns with theoretical expectations. This implies that the monetary policy stance determines prices under an inflation-targeting regime. EXR's response to a contractionary monetary policy shock was negative and statistically significant in the first period. The results align with the expectation that an interest rate increase will decrease the exchange rate and indicate that these impacts are not sustainable in the long run. GINI's response to a contractionary monetary policy shock, the study's ultimate purpose, was negative and significant in the first period. This finding shows that a contractionary monetary policy decreases income inequality.

Regarding the Gini coefficient's responses to shocks in the other variables in the model, GINI's response to a positive shock in GDP was negative and statistically significant in the first period. This shows that higher growth reduces income inequality. GINI responded positively and statistically significantly to a positive shock in CPI. This result shows that higher inflation rates increase income inequality. GINI's response to a positive shock in EXR was not significant. This finding implies that changes in the nominal exchange rate do not directly affect income inequality. The analysis also shows that higher inflation increases income inequality. One of the main drivers of inflation in Türkiye is rising exchange rates, driven by dependence on imported inputs (Republic of Türkiye Ministry of Development, 2018). Accordingly, rising exchange rates affect income inequality not directly, but indirectly through inflation. Furthermore, an increase in INT affects EXR negatively, indicating that a potential fall in the exchange rate will decrease inflation and reduce income inequality.

To examine the impact of monetary policy on the national income share held by high-income groups, we generated Model 1.2 by replacing the GINI variable in Model 1.1 with the P10 variable. Figure 2 shows the impulse response functions obtained from the SVAR analysis of Model 1.2. Since the responses given by the GDP, CPI, and EXR variables to monetary policy (INT) shocks were presented in Figure 1, these results were not repeated in Figure 2, and the impacts of the shocks that occurred in the other variables on the P10 variable were presented.

Figure: 2
Impulse Response Functions of Model 1.2

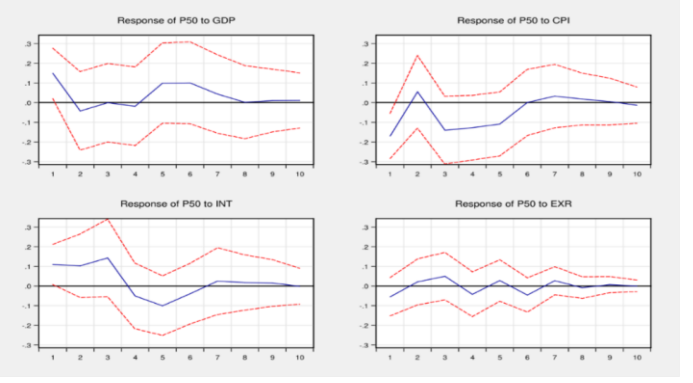


Figure 2 shows that P10's response to GDP was statistically significant and negative in the first period. A positive shock to the growth rate negatively affected the income share held by high-income groups, implying that rising incomes likely benefited mostly middle- and low-income groups. P10's response to CPI was positive and significant in the first period. This result indicates that the high-income group was affected positively by an increase in the inflation rate. The impact of positive EXR shocks on P10 was statistically

insignificant. Positive INT shocks had a negative and statistically significant impact on P10 in the first period. This finding suggests that high-income groups are negatively impacted by contractionary monetary policy shocks that raise interest rates. Considering that those who actively participate in financial markets are mostly high-income groups, contractionary monetary policy shocks can reduce asset prices and lead to decreases in high-income individuals' company profits, which are their most important sources of income, and accordingly, to decreases in their total incomes. Furthermore, a decrease in the inflation rate from contractionary monetary policy increases the real value of cash. This may affect the high-income group negatively by redistributing income from those in the high-income group, who retain relatively more financial assets, to those in the low-income group, who retain relatively more cash. Because the decrease in P10 implies reduced income inequality, the analysis results for the top 10% income group support the findings of Model 1.1.

Model 1.3 replaces the GINI variable in Model 1.1 with the P50 variable to examine the impact of monetary policy on the national income share held by low-income groups. Figure 3 shows the results of the impulse response analysis for the SVAR model generated for Model 1.3. Figure 1 presents the responses of GDP, CPI, and EXR to monetary policy shocks, so Figure 3 does not repeat these results.

Figure: 3
Impulse Response Functions of Model 1.3



The results in Figure 3 indicate that P50 responded positively and statistically significantly in the first period to a positive GDP shock. This result shows that low-income groups benefit from a GDP increase. Taken together with the finding in Model 1.2 that an increase in the growth rate negatively affects high-income groups, positive growth shocks reduce income inequality. P50's response to a positive CPI shock was negative and statistically significant in the first period. This result shows that higher inflation negatively affects low-income groups. P50's response to a positive shock in EXR was insignificant. A positive shock in INT had a statistically significant, positive effect on low-income groups during the initial period. This result shows that monetary tightening tends to benefit lower-

income groups. Price increases affect low-income households more than high-income households because they spend a larger share of their income on essential goods and services such as food, rent, and transportation. As low-income households tend to retain a large portion of their income in cash, they are more vulnerable to inflation than high-income groups. During periods of high inflation, the decline in the real value of cash reduces low-income households' purchasing power more than that of high-income households (Erosa & Ventura, 2002; Albanesi, 2007). The impulse response analysis results presented above also indicate that low-income groups are adversely affected by rising inflation. Therefore, considering that interest rate hikes help suppress inflation, the resulting slowdown in price increases can have a relatively positive effect for low-income groups by slowing the erosion of their real income.

When the analysis results for the top 10% (P10) and bottom 50% (P50) income shares are evaluated together, contractionary monetary policy reduces income inequality by negatively affecting high-income groups and positively affecting low-income groups. These results consistently support analyses that use the Gini coefficient as an indicator of income inequality. Therefore, the results from all sub-models in Model 1 indicate that contractionary monetary policy shocks in Türkiye during 1988-2021 reduced income inequality.

According to the theoretical literature, the channels that suggest contractionary monetary policy shocks decrease income inequality are the financial segmentation channel, the portfolio channel, and the income composition channel. According to Model 1.1, an increase in interest rates decreased inflation. In addition, Model 1 results show that higher inflation increases the Gini coefficient and increases the income share held by high-income groups, while decreasing the income share held by low-income groups. These findings show that higher inflation increases income inequality across all income inequality indicators. Thus, a contractionary monetary policy shock that raises interest rates reduces inflation, thereby decreasing income inequality. In summary, the findings from Model 1 support the portfolio channel, which posits that higher interest rates reduce income inequality by lowering inflation, and highlight the importance of combating inflation to achieve income equality in Türkiye.

Various statistics and studies on Türkiye support our findings. High inflation is a structural problem in the Turkish economy. In Türkiye, the inflation rate, which began to rise in the 1970s, remained above 30% for 20 years (1983-2003). From 1988 to 2001, the annual inflation rate was above 50%. In the 2000s, inflation remained in the single digits (except 2008), but began rising again in 2017, reaching 72.31% in 2022 (World Bank, 2023). The academic literature provides clear evidence that high inflation negatively affects income distribution. As Romer and Romer (1998) and Atkinson and Brandolini (2001) show, inflation and income inequality are strongly positively correlated (Republic of Türkiye Ministry of Development, 2018:10).

Low-income households are more vulnerable to inflation than high-income households. One main reason is that wage and salary increases, the primary source of income

for the low- and middle-income groups that make up the majority of the population, generally lag behind inflation. This situation reduces the purchasing power of individuals with fixed incomes while allowing entrepreneurs to make excessive profits, thus increasing income inequality (BIS, 2021; Kim & Lin, 2024). Given the high inflation in Türkiye, it is reasonable to say that inflation's erosive effect on real wages is significant.

Another reason is the difference in portfolio composition between low- and high-income groups. Low-income groups tend to hold more cash than high-income groups. Inflation erodes the purchasing power of cash, adversely affecting low-income groups. High-income groups generally have larger assets and less cash on hand. Therefore, inflation shifts portfolios from cash to real and financial assets, increasing income inequality (Kim & Lin, 2024). The results of the "Cash Usage Habits Survey" conducted by the Central Bank of the Republic of Türkiye (CBRT) in 2020 showed that cash usage decreased with increasing income (Çevik & Altunel, 2021). This finding supports the idea that low-income households in Türkiye tend to hold more cash.

On the other hand, basic expenditure items account for a larger share of low-income groups' budgets. In Türkiye, the share of basic expenditure items (food, shelter, and transportation) in the total expenditures of the lowest-income group is around 75% on average, while the share of the highest-income group is around 58-60% (Akar & Erdoğan, 2022; Yıldırım & Erdoğan, 2023).

Another reason low- and high-income groups are affected differently by inflation is their differing savings behaviour. Low-income groups generally have low savings because they spend a large share of their income on consumption. Cash and bank deposits are the financial assets most vulnerable to inflation and are typical savings instruments for low-income groups. This negatively affects low-income groups, who often lack the means to protect their purchasing power due to limited access to financial markets. Since high-income groups have more savings and financial assets than low-income groups, they have more opportunities and options to protect their savings from inflation and increase the value of their assets (BIS, 2021; Glawe & Wagner, 2024). Dikmen (2021) analysed how households in Türkiye use their savings and found that as income rises, savings increase, and the share of stocks and bonds among savings instruments also rises. Therefore, Model 1's results, supported by the above explanations, indicate that in Türkiye, where high inflation is a structural problem, one of the most effective ways monetary policy can reduce income inequality is to ensure price stability.

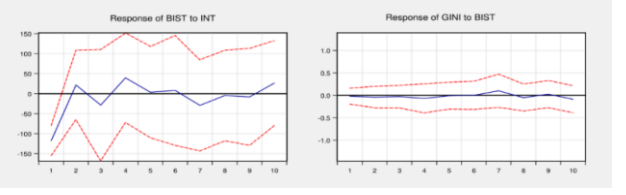
In theoretical literature, besides the portfolio channel, other channels suggesting that contractionary monetary policy reduces income inequality are the income composition channel and the financial segmentation channel. According to these channels, contractionary monetary policy reduces income inequality by lowering asset prices. To test whether asset prices play a role in monetary policy reducing income inequality, we created Model 2 by adding the BIST variable, which represents asset prices, to Model 1.

The savings redistribution channel and the earnings heterogeneity channel suggest that contractionary monetary policy increases income inequality. However, Model 1 results indicate that contractionary monetary policy reduces income inequality. The savings redistribution channel explains how contractionary monetary policy increases income inequality through falling inflation. The CPI variable, which represents inflation, was already included in Model 1. Therefore, Model 1 indirectly tested this channel and found no evidence to support it. In contrast, the earnings heterogeneity channel explains how contractionary monetary policy increases income inequality through higher unemployment. However, Model 1 findings show that contractionary monetary policy does not increase income inequality; instead, it reduces it. Therefore, Model 2 excludes the unemployment rate. Accordingly, Model 2 followed all steps used in Model 1, and the SVAR results are presented below.

Results for Model 2

Model 2.1 was estimated to examine how changes in the BIST100 index affect the Gini coefficient. In Figure 4, the SVAR impulse response analysis results showed the response of the BIST variable to a contractionary monetary policy shock and the response of the GINI variable to a positive shock in the BIST variable.

Figure: 4
Impulse Response Functions of Model 2.1



The response of the BIST variable to a positive shock in the INT variable was negative and statistically significant in the first period. The GINI variable did not show a significant response to a positive shock in the BIST variable. This finding indicates that changes in stock prices did not significantly affect the Gini coefficient.

Model 2.2 examines the impact of changes in the BIST100 index on the top 10% income share (P10). Figure 4 shows the response of the BIST variable to contractionary monetary policy shocks and is not repeated here. Therefore, Figure 5 shows the response of P10 to a positive shock in the BIST variable.

Figure: 5
Impulse Response Functions of Model 2.2

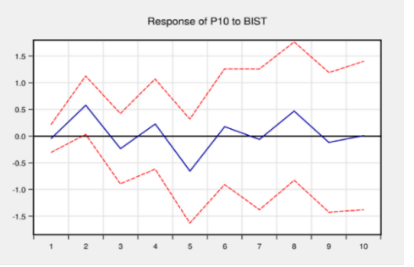


Figure 5 shows that the response of the P10 variable to a positive shock in the BIST variable was statistically significant and positive in the second period. This result indicates that high-income groups are positively affected by increases in the BIST100 index in the long run. Because stock market traders are generally high-income households, this group benefits from stock market gains, consistent with theoretical expectations. High-income individuals can invest with more capital and are generally more knowledgeable about financial markets, enabling them to better capitalise on profitable opportunities.

Model 2.3 examines the impact of changes in the BIST100 index on the lowest 50% income share (P50). Figure 6 shows the response of P50 to a positive shock in the BIST variable in Model 2.3.

Figure: 6
Impulse Response Functions of Model 2.3



The analysis results in Figure 6 indicate that the response of the P50 variable to a positive shock in the BIST variable was statistically insignificant. Because stock market traders are generally high-income individuals, low-income individuals are not affected by changes in the BIST100 index, consistent with theoretical expectations.

Considering the analysis results of all of the submodels examined within Model 2, the BIST100 index was negatively affected by contractionary monetary policy shocks, and the rise in the BIST100 index increases the income share held by the high-income group,

while it did not have a significant effect on the low-income group or the Gini coefficient. Thus, Model 2 indicates that contractionary monetary policy shocks negatively affected the high-income group by decreasing stock prices. A contractionary monetary policy reduces the income share held by the high-income group, indicating that such policy decreases income inequality (through asset prices). Due to data restrictions, the study used only the BIST variable to represent asset prices. Therefore, based on the Model 2 results, it is not possible to definitively infer that the income inequality-reducing effect of contractionary monetary policy in Türkiye occurs via the income composition and financial segmentation channels. However, data on the distribution of securities income between high- and low-income groups in Türkiye are consistent with the analysis findings. In Türkiye, the highest-income group has the largest share of total securities income. According to calculations based on TurkStat's 2023 Income Distribution Statistics, the average share of the 20% with the highest income in total securities income was 66.97%, while the average share of the 40% with the lowest income was only 8.51% in the 2006-2023 period (TurkStat, 2023). Moreover, households in the top 20% income group account for more than 80% of household savings in Türkiye (Pektaş, 2017). These data support the analysis results, which show that changes in asset prices in Türkiye affect only the high-income group and that contractionary monetary policy shocks reduce asset prices (stock prices), thereby redistributing income against high-income groups.

When Models 1 and 2 are evaluated together, the portfolio channel is mainly effective in reducing income inequality through contractionary monetary policy in Türkiye. According to calculations based on TurkStat's 2023 Income Distribution Statistics, among households' disposable income in Türkiye, the share of salary and wage income is 46.1% on average, and the share of security income is 4% on average over the 2006-2023 period. Furthermore, an average of 66.97% of those who earn security income are in the top 20% of the income group (TurkStat, 2023). This shows that the share of those who earn salary and wage income in Türkiye is high; therefore, the population most affected by inflation constitutes the majority in the country, and changes in stock prices mainly affect high-income individuals. In this context, changes in inflation are likely to affect income inequality more than changes in stock prices under conditions in Türkiye.

In short, the SVAR results showed that contractionary monetary policy shocks in Türkiye decreased inflation. According to the results, this decrease reduced the income share held by high-income groups, increased the income share held by low-income groups, and reduced the Gini coefficient covering all income groups. Thus, the findings show that contractionary monetary policy shocks decreased income inequality in Türkiye during 1988-2021, with evidence that this effect largely operated through the portfolio channel. These findings align with studies by Villarreal (2014), Davtyan (2017), Inui et al. (2017), and Andersen et al. (2021). However, as shown in the impulse-response functions, the intensity of these significant effects is low; in other words, the effects are small and limited.

5. Concluding Remarks

This study investigated the distributional effects of monetary policy shocks in Türkiye. Two models were generated to investigate the effect of monetary policy on income inequality. The SVAR analysis for Model 1 shows that contractionary monetary policy shocks that raise interest rates in Türkiye reduce economic growth, inflation, the nominal exchange rate, and income inequality. Regarding income inequality indicators, evidence indicated that a positive shock to the growth rate decreased income inequality, a positive shock to inflation increased income inequality, and exchange-rate shocks did not directly affect income inequality. Another important finding from Model 1 is that an increase in the inflation rate increases the Gini coefficient and the income share of high-income groups, while decreasing the income share of low-income groups. This finding shows that higher inflation exacerbates income inequality across all income inequality indicators; therefore, inflation is a significant determinant of income inequality in Türkiye. The findings for Model 1 support the validity of the portfolio channel, as they show that contractionary monetary policy shocks during the relevant period reduced the inflation rate, and this reduction decreased income inequality.

The SVAR analysis results for Model 2 indicate that contractionary monetary policy shocks negatively affected the BIST100 index. The increase in the BIST100 index did not affect the Gini coefficient (GINI) and the income share held by the lowest-income group (P50), while it raised the income share held by the highest-income group. Model 2 shows that contractionary monetary policy shocks negatively affect high-income groups by lowering stock prices. Therefore, the analysis indicates that contractionary monetary policy reduces the income share of the highest-income group, thereby reducing income inequality via asset prices. In this study, using only the BIST100 index to represent asset prices makes it difficult to draw clear conclusions about the effect of asset prices on income inequality. Therefore, based on the results of Model 2, it does not seem possible to definitively say that the contractionary monetary policy's decremental effect on income inequality in Türkiye operates through the income composition and financial segmentation channels. However, as explained above, the data on the distribution of securities income between high- and low-income groups in Türkiye are consistent with the analysis's findings.

Both models show that contractionary monetary policy shocks in Türkiye during the analysis period reduced income inequality, largely through the portfolio channel. Findings showing that monetary policy affects income inequality by influencing inflation indicate that inflation is a significant determinant of income inequality in Türkiye. Higher inflation can further exacerbate income inequality through the portfolio channel, one of the monetary policy transmission channels. In this context, in a high-inflation country such as Türkiye, a key step to reduce income inequality is ensuring price stability. Therefore, in the fight against income inequality, policymakers must pay special attention to ensuring price stability.

Finally, the study's findings should be evaluated cautiously because of limitations stemming from data accessibility. First, income inequality data are published annually, and

regular and reliable data for Türkiye are available only after 1987. This limits the study's time period. Second, we are limited by the lack of comprehensive data on the assets and liabilities of high- and low-income households, which limits our ability to distinguish which transmission channels best explain the impact of monetary policy on income inequality in Türkiye. Therefore, our attempt to test the impact of these channels was limited to the accessible data, and we supported the findings with relevant statistics and research. As more detailed data become available, we will revise and improve the findings. However, our results are particularly important because they show that monetary policy shocks affect income inequality and that monetary policy can reduce it by ensuring price stability.

References

Akar, T. & S. Erdoğan (2022), "Türkiye'de En Yoksul ve En Zengin Kesim Açısından Enflasyon Hesabına Yönelik Bir Değerlendirme (2003-2021)", *Recep Tayyip Erdoğan Üniversitesi Sosyal Bilimler Dergisi*, 9(2), 314-326.

Albanesi, S. (2007), "Inflation and Inequality", *Journal of Monetary Economics*, 54(4), 1088-1114.

Altunbaş, Y. & J. Thornton (2022), "Does Inflation Targeting Increase Income Inequality?", *Journal of Post Keynesian Economics*, 45(4), 558-580.

Andersen, A.L. et al. (2021), "Monetary Policy and Inequality", *Working Paper*, ZBW Leibniz Information Centre for Economics.

Anobile, F. et al. (2025), "Insights on Measuring the Economic Impact of Monetary Policy and Inequality", *Economic Change and Restructuring*, 58, 55.

Atkinson, A.B. & A. Brandolini (2001), "Promise and Pitfalls in the Use of "Secondary" Data-Sets: Income Inequality in OECD Countries As a Case Study", *Journal of Economic Literature*, 39(3), 771-799.

Bernanke, B. (1986), "Alternative Explanations of the Money-Income Correlation", *Carnegie-Rochester Conference Series on Public Policy*, (25), 49-99.

Bernanke, B.S. (2015), "Monetary policy and inequality", *Commentary* (June 1), <https://www.brookings.edu/blog/ben-bernanke/2015/06/01/monetary-policy-and-inequality>, 29.09.2022.

BIS Bank for International Settlements (2021), "The Distributional Footprint of Monetary Policy", *BIS Annual Economic Report*, <https://www.bis.org/publications/aer-2021/distributional-footprint-monetary-policy>, 25.05.2025.

Blanchard, O.J. & D. Quah (1989), "The Dynamic Effects of Aggregate Demand and Supply Disturbances", *The American Economic Review*, 79(4), 655-673.

Bonifacio, V. et al. (2021), "Distributional Effects of Monetary Policy", IMF *Working Paper* No. 21/201.

CBRT Central Bank of the Republic of Türkiye (2023), *Electronic Data Delivery System (EVDS)*, <https://evds2.tcmb.gov.tr>, 14.02.2023.

Çevik, S. & A.T. Altunel (2021), *Türkiye'de Nakit Kullanım Alışkanlıkları*, <https://tcmbblog.org/wps/wcm/connect/blog/tr/main+menu/analizler/turkiyede+nakit+kullanim+aliskanliklari>, 23.02.2025.

Christiano, L. et al. (1996), "The Effects of Monetary Policy Shocks: Evidence from the Flow of Funds", *The Review of Economics and Statistics*, 78(1), 16-34.

Coibion, O. et al. (2012), "Innocent Bystanders? Monetary Policy and Inequality in the U.S.", NBER *Working Paper* No. 18170.

Colciago, A. et al. (2019), "Central Bank Policies and Income and Wealth Inequality: A Survey", *Journal of Economic Surveys*, 33(4), 1199-1231.

Davtyan, K. (2017), "The Distributive Effect of Monetary Policy: The Top One Percent Makes the Difference", *Economic Modelling*, (65), 106-118.

Deutsche Bundesbank (2016), "Distributional Effects of Monetary Policy", *Monthly Report*, <https://www.bundesbank.de/resource/blob/667166/eaaf80cf3f98df384b5a2ad216414272/mL/2016-09-effects-data.pdf>, 25.05.2025.

Dikmen, F.H. (2021), "Türkiye'de Hanehalkı Tasarruf Eğilimi ve Portföy Tercihlerinin Analizi", *Fiscaoeconomia*, 5(3), 1159-1174.

Doepke, M. & M. Schneider (2006), "Inflation and the Redistribution of Nominal Wealth", *Journal of Political Economy*, 114(6), 1069-1097.

Dolado, J.J. et al. (2021), "Monetary Policy and Inequality Under Labor Market Frictions and Capital-Skill Complementarity", *American Economic Journal: Macroeconomics*, 13(2), 292-332.

Edwards, S. (1989), *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries*, MIT Press, Cambridge, MA.

Elbourne, A. & J. de Haan (2006), "Financial Structure and Monetary Policy Transmission in Transition Countries", *Journal of Comparative Economics*, 34(1), 1-23.

Enders, W. (2004), *Applied Econometric Time Series*, WILEY.

Erosa, A. & G. Ventura (2002), "On Inflation as a Regressive Consumption Tax", *Journal of Monetary Economics*, 49, 761-795.

Eurostat - European Union Statistical Office (2025), <https://ec.europa.eu/eurostat/en/web/main/data/database>, 12.12.2025.

Furceri, D. et al. (2018), "The Effects of Monetary Policy Shocks on Inequality", *Journal of International Money and Finance*, (85), 168-186.

Gali, J. (1992), "How Well Does The IS-LM Model Fit Postwar U.S. Data?", *The Quarterly Journal of Economics*, 107(2), 709-738.

Gambetti, L. (2020), "Structural Vector Autoregressive Models", in: A. Banerjee (ed.), *Oxford Research Encyclopedia of Economics and Finance*, Oxford Academic, New York, NY.

Glawe, L. & H. Wagner (2024), "Inflation and Inequality: New Evidence from A Dynamic Panel Threshold Analysis", *International Economics and Economic Policy*, 21, 297-309.

Gottschalk, J. (2001), "An Introduction into the SVAR Methodology: Identification, Interpretation and Limitations of SVAR models", Kiel *Working Paper* No. 1072.

Güneş, S. et al. (2013), "Dış Ticaret Hadleri, Dünya Petrol Fiyatları ve Döviz Kuru İlişkisi, Yapısal VAR Analizi: Türkiye Örneği", *Uluslararası Yönetim İktisat ve İşletme Dergisi*, 9(20), 1-17.

IMF (2023), *International Financial Statistics (IFS)*, <https://data.imf.org/?sk=4c514d48-b6ba-49ed-8ab9-52b0c1a0179b>, 10.02.2023.

Inui, M. et al. (2017), "The effects of Monetary Policy Shocks on Inequality in Japan", Bank for International Settlements *Working Papers* No. 642.

Kappes, S.A. (2023), "Monetary Policy and Personal Income Distribution: A Survey of the Empirical Literature", *Review of Political Economy*, 35(1), 211-230.

Keskin, H.I. (2021), *Para Talebi Uygulamalarıyla Ekonometrik Doğrusal Zaman Serisi Analizleri*, Ankara: Akademisyen Kitabevi.

Kim, D-H. & S-C. Lin (2024), "Inflation and Wealth Inequality", *Economic Analysis and Policy*, 82, 893-907.

Lenza, M. & J. Slacalek (2018), "How Does Monetary Policy Affect Income and Wealth Inequality? Evidence from Quantitative Easing the Euro Area", ECB *Working Paper* Series (2190).

Lütkepohl, H. & A. Velinov (2016), "Structural Vector Autoregressions: Checking Identifying Long-Run Restrictions Via Heteroskedasticity", *Journal of Economic Surveys*, 30, 377- 392.

McCoy, D. (1997), "How Useful is Structural VAR Analysis for Irish Economics?", Central Bank of Ireland: *Technical Paper* No. 2/RT/97.

Meried, E.W. (2025), "Monetary Policy and Income Inequality in Brazil: Structural Vector Autoregressive Approach", *Discover Sustainability*, 6, 473.

Mishkin, F.S. (1996), "The Channels of Monetary Transmission: Lessons for Monetary Policy", NBER *Working Paper* No. 5464.

Mumtaz, H. & A. Theophilopoulou (2017), "The impact of monetary policy on inequality in the UK: An empirical analysis", *European Economic Review*, (98), 410-423.

Neaime, S. & I. Gaysset (2022), "Macroeconomic and Monetary Policy Responses in selected Highly Indebted MENA Countries Post Covid 19: A Structural VAR Approach", *Research in International Business and Finance*, 61. 101674.

O'Farrell, R. et al. (2016), "Monetary Policy and Inequality", OECD Economics Department *Working Papers* No. 1281.

OECD (2025), *Income Distribution Database*, <https://data-explorer.oecd.org>, 12.12.2025.

Park, J. (2021), "Monetary policy and income inequality in Korea", *Journal of the Asia Pacific Economy*, 26(4), 766-793.

Pektaş, E.B. (2017), "Türkiye'de Hanehalkı Tasarruflarını Etkileyen Faktörler", *Expertise Thesis* No. 2973, Ministry of Development of the Republic of Türkiye.

Raczyński, M. (2022), "Monetary Policy and Economic Inequality: A Literature Review", *Bank i Kredyt, Narodowy Bank Polski*, 53(2), 231-278.

Republic of Türkiye Ministry of Development (2018), "Inflation Control Specialization Commission Report", *Eleventh Development Plan (2019-2023)*, <https://www.sbb.gov.tr/wp-content/uploads/2020/04/EnflasyonlaMucadeleOzelIhtisasKomisyonuRaporu.pdf>, 01.02.2025.

Romer, C.D. & D.H. Romer (1998), "Monetary Policy and the Well-Being of the Poor", *NBER Working Paper* No. 6793.

Saiki, A. & J. Frost (2014), "Does Unconventional Monetary Policy Affect Inequality? Evidence from Japan", *Applied Economics*, 46(36), 4445-4454.

Samarina, A. & A.D. Nguyen (2019), "Does Monetary Policy Affect Income Inequality in the Euro Area?", De Nederlandsche Bank *Working Paper* No. 626.

Şen, H. & A. Kaya (2015), "The Relative Effectiveness of Monetary and Fiscal Policies on Growth: What Does long-run SVAR Model Tell Us?", *MPRA*, Paper No. 65903.

Sims, C.A. (1980), "Macroeconomics and Reality, *Econometrica*, 48(1), 1-48.

Sims, C.A. (1986), "Are Forecasting Models Usable for Policy Analysis?", *Federal Reserve Bank of Minneapolis: Quarterly Review*, 10(1), 2-16.

Solow, R.M. (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics*, 70(1), 65-94.

Sousa, J.M. & A. Zaghini (2007), "Global Monetary Policy Shocks in the G5: A SVAR Approach", *Journal of International Financial Markets, Institutions and Money*, 17(5), 403-419.

Stock, J.H. & M.W. Watson (2001), "Vector Autoregressions", *Journal of Economic Perspectives*, 15(4), 101-115.

Tümtürk, O. (2020), "Evaluation of Monetary Policy Shocks in Turkey: A Structural VAR Approach", *Uluslararası Yönetim İktisat ve İşletme Dergisi*, 16(3), 457-473.

TurkStat Turkish Statistical Institute (2023), *Gelir Dağılımı İstatistikleri 2023*, <https://data.tuik.gov.tr/Bulten/Index?p=Gelir-Dagilimi-Istatistikleri-2023-53840>, 10.02.2023.

Uhlig, H. (2005), "What are the effects of Monetary Policy on Output? Results from an Agnostic Identification Procedure", *Journal of Monetary Economics*, 52(2), 381-419.

Villarreal, F.G. (2014), "Monetary Policy and Inequality in Mexico", *MPRA*, Paper No. 57074.

Williamson, S.D. (2008), "Monetary Policy and Distribution", *Journal of Monetary Economics*, 55(6), 1038-1053.

World Bank (2023), *World Development Indicators*, <https://databank.worldbank.org/source/world-development-indicators>, 22.02.2025.

World Inequality Database (2023), <https://wid.world/data>, 10.02.2023.

Yamak, R. & A. Korkmaz (2005), "Reel Döviz Kuru ve Dış Ticaret Dengesi İlişkisi", *Istanbul University Econometrics and Statistics E-Journal*, (2), 16-38.

Yıldırım, M. & S. Erdoğan (2023), "Türkiye'de %20'lik Gelir Gruplarının Yapmış Olduğu Harcamalar ile Enflasyon Karşılaştırmasına Yönelik Bir İnceleme (2010-2022)", *Journal of Economics and Research*, 4(2), 74-84.

Appendices

Table: A1
Descriptive Statistics

	GDP	CPI	INT	BIST	EXR	GINI	P10	P50
Mean	4,5461	37,130	39,342	67,238	35,601	61,973	53,392	13,180
Max	11,354	105,215	183,200	493,048	169,928	67,261	58,960	15,130
Min	-5,7500	6,2510	1,6300	-52,218	-9,0558	57,687	48,380	10,740
Std. Dev.	4,5325	32,026	39,702	138,41	37,684	2,6203	2,6458	1,2972
Obs.	34	34	34	34	34	34	34	34

Table: A2
Determination of Appropriate Lag Length for Model 1.1

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-444,1285	**68,10060***	**54261066***	31,87926	**34,19214***	**32,63320***
2	-417,8953	27,07947	69155359	**31,79970***	35,26902	32,93061

Table: A3
Results of the LM Autocorrelation Test for Model 1.1

Lag	LM Test Statistics	Prob
1	27,43622	0,3820
2	34,36503	0,1304

Table: A4
Results of the White Heteroskedasticity Test for Model 1.1

Chi-Square	Prob
347,6835	0,6698

Figure: A1
Stability Condition for Model 1.1

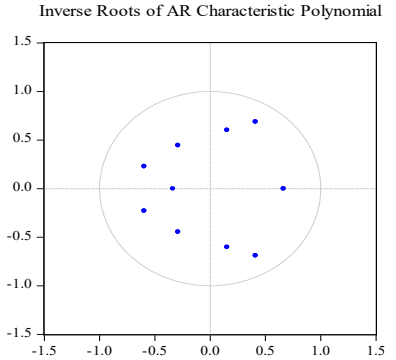


Table: A5
Determination of Appropriate Lag Length for Model 1.2

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-446,0135	**71,32077***	**61277928***	32,00087	**34,31376***	**32,75482***
2	-417,6756	29,25203	68182183	**31,78553***	35,25485	32,91644

Table: A6
Results of the LM Autocorrelation Test for Model 1.2

Lag	LM Test Statistics	Prob
1	27,95255	0,3100
2	28,07194	0,3046

Table: A7
Results of the White Heteroskedasticity Test for Model 1.2

Chi-Square	Prob
359,6949	0,4946

Figure: A2
Stability Condition for Model 1.2

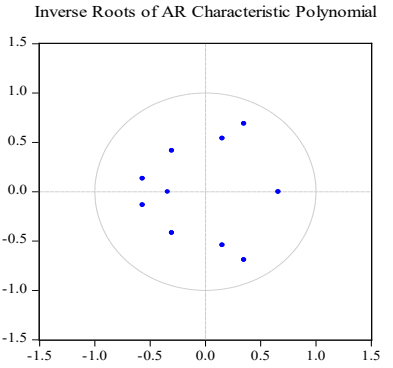


Table: A8
Determination of Appropriate Lag Length for Model 1.3

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-441,3939	**78,16176***	**31858831***	31,38025	**33,46185***	**32,05880***
2	-413,8551	30,20387	35257453	**31,21646***	34,45449	32,27198

Table: A9
Results of the LM Autocorrelation Test for Model 1.3

Lag	LM Test Statistic	Prob
1	18,84157	0,8047
2	21,98450	0,6366

Table: A10
Results of the White Heteroskedasticity Test for Model 1.3

Chi-Square	Prob
347,6843	0,6698

Figure: A3
Stability Condition for Model 1.3

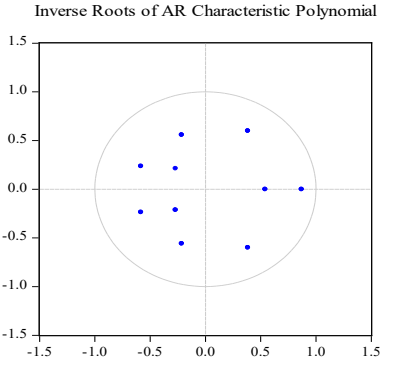


Table: A11
Determination of Appropriate Lag Length for Model 2.1

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-615,4826	**85,90656***	6,08e+11	43,96662	**47,01963***	44,96182
2	-559,1008	50,92547	**3,03e+11***	**42,65167***	47,36995	**44,18971***

Table: A12
Results of the LM Autocorrelation Test for Model 2.1

Lag	LM Test Statistics	Prob
1	29,30277	0,7777
2	45,68346	0,1293

Table: A13
Results of the White Heteroskedasticity Test for Model 2.1

Chi-Square	Prob
597,6434	0,3824

Figure: A4
Stability Condition for Model 2.1

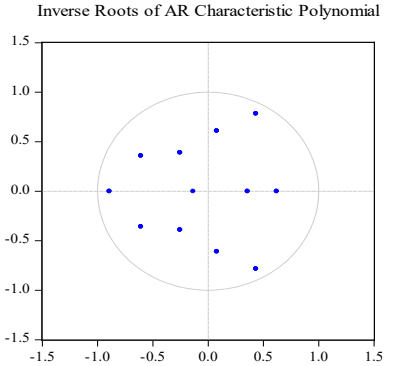


Table: A14
Determination of Appropriate Lag Length for Model 2.2

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-624,3166	**91,59528***	6,94e+11	44,14946	**46,92491***	45,05419
2	-574,2513	48,45029	**4,69e+11***	**43,24202***	47,68275	**44,68959***

Table: A15
Results of the LM Autocorrelation Test for Model 2.2

Lag	LM Test Statistics	Prob
1	34,23847	0,5525
2	38,64626	0,3510

Table: A16
Results of the White Heteroskedasticity Test for Model 2.2

Chi-Square	Prob
574,0705	0,4095

Figure: A5
Stability Condition for Model 2.2

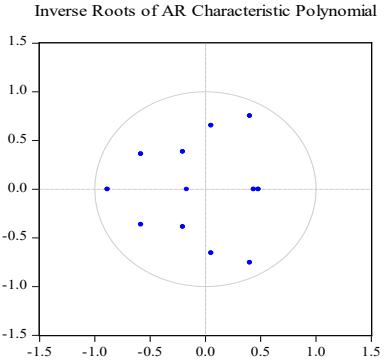


Table: A17
Determination of Appropriate Lag Length for Model 2.3

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-611,9328	**108,5199***	**2,04e+11***	42,96341	**45,46132***	**43,77766***
2	-570,9604	42,29409	2,26e+11	**42,64261***	46,80580	43,99970

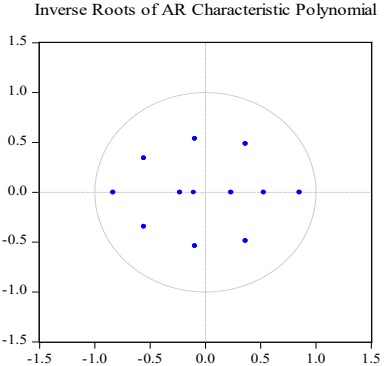
Table: A18
Results of the LM Autocorrelation Test for Model 2.3

Lag	LM Test Statistics	Prob
1	47,98741	0,0873
2	44,15709	0,1650

Table: A19
Results of the White Heteroskedasticity Test for Model 2.3

Chi-Square	Prob
580,6025	0,3371

Figure: A6
Stability Condition for Model 2.3



Sosyoekonomi

2026, Vol. 34(70), 289-310

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.12
Date Submitted: 02.08.2025
Date Revised: 11.11.2025
Date Accepted: 07.09.2026

Mapping Scientific Research Output at the National Level: A Study of Post-Soviet Kyrgyzstan

Azamat MAKSUDUNOV *(https://orcid.org/0000-0002-5010-513X), Kyrgyz-Turkish MANAS University, Kyrgyzstan; azamat.maksudunov@manas.edu.kg*

Junus GANIEV *(https://orcid.org/0000-0001-8859-5464), Kyrgyz-Turkish MANAS University, Kyrgyzstan; junus.ganiev@manas.edu.kg*

Ulusal Düzeyde Bilimsel Araştırma Çıktılarının Haritalandırılması: Sovyet Sonrası Kırgızistan Üzerine Bir Çalışma

Abstract

This study addresses a research gap on scientific productivity in post-Soviet countries by evaluating Kyrgyzstan's international scientific output (1991-2023) using a bibliometric approach based on Web of Science and Scopus. Findings show a significant increase in scientific output after 2012, driven by adopted international academic standards and new education laws requiring publications for PhD programs. Medicine and science dominate, with key collaborations involving Russia, Türkiye, and the USA. Theoretically, we recommend exploring local publications and commercialisation of scientific outputs. From a public policy standpoint, the government must finalise reforms in the national system for scientific staff training and certification to bolster national development. This underscores science policy's role in macroeconomic progress.

Keywords : Scientific Production Output, National Scientific Policy, Bibliometric Analysis, Publications, Kyrgyzstan.

JEL Classification Codes : O31, O32, O38.

Öz

Bu çalışma, Kırgızistan'ın uluslararası bilimsel çıktısını (1991-2023) bibliyometrik bir yaklaşım ile Web of Science ve Scopus veritabanları bazında değerlendirerek, Sovyet sonrası ülkelerdeki bilimsel üretkenlik konusundaki araştırma boşluğunu ele almaktadır. Bulgular, benimsenen uluslararası akademik standartlar ve doktora programları için yayın yapmayı zorunlu kılan yeni eğitim yasaları sayesinde 2012 sonrası bilimsel çıktılarda önemli bir artış olduğunu ortaya koymaktadır. Tıp ve bilim alanları baskın olup, Rusya, Türkiye ve ABD ile önemli işbirlikleri yürütülmektedir. Teorik olarak, yerel yayınların ve bilimsel çıktıların ticarileştirilmesinin araştırılmasını öneriyoruz. Kamu politikası açısından, hükümetin ulusal kalkınmayı desteklemek amacıyla akademik personel eğitimi ve sertifikasyon alanındaki ulusal sistem reformlarını tamamlaması gerekmektedir. Çalışma makroekonomik ilerlemede bilim politikasının rolünü vurgulamaktadır.

Anahtar Sözcükler : Bilimsel Üretim Çıktısı, Ulusal Bilim Politikası, Bibliyometrik Analiz, Yayınlar, Kırgızistan.

1. Introduction

The topic of scientific productivity has been extensively discussed in the literature for several decades (Carter, 1963; Abt, 2000; Miyairi & Chang, 2012; Tliba, 2022). Because this topic is closely linked to countries' economic progress and to the knowledge-based economy that relies on generating, disseminating, and using information, it is crucial to explore this subject (Godin, 2006; Nguyen & Pham, 2011). From a development economics perspective, scientific productivity serves as a macro-level indicator of a nation's capacity for innovation and sustainable growth. In this sense, examining scientific output provides valuable insights into how countries like Kyrgyzstan can design and implement macroeconomic policies that foster long-term development and competitiveness in the global knowledge economy.

The existing literature suggests that developed countries account for most global scientific output, while developing countries have limited visibility and lower participation rates (Tliba, 2022). However, recent research indicates a shift in the global scientific landscape, with the emergence of new scientific powers such as China, India, Taiwan, and other developing countries (Bornmann et al., 2015). Furthermore, in the contemporary context, simply allocating substantial financial resources to research and development or having developed-nation status is insufficient. A conducive environment for scientific advancement is often facilitated by effective governance, the absence of violence, civil conflict, and corruption, and a steadfast commitment to the rule of law (Allik et al., 2020).

In Kyrgyzstan, the post-Soviet context adds a unique dimension to studying scientific productivity. During the Soviet period, the postgraduate education and research system operated under a centrally planned model that emphasised institutional hierarchy over international collaboration or market-oriented research. In the post-independence era, Kyrgyzstan has been striving to integrate into the global academic and economic system. However, limited financial resources, structural legacies of the old system, and slow institutional transformation continue to hinder the development of research that can meaningfully contribute to the country's macroeconomic progress.

Despite differences in size, economic status, and other distinguishing factors, all countries have national scientific strategies and dedicate resources to scientific pursuits. To assess the effectiveness of national policy, it is essential to examine a country's scientific research output. Kyrgyzstan, a small country that gained independence after the Soviet Union's breakup, has a population of around 7 million people (National Statistical Committee of the Kyrgyz Republic [NSC KR], 2024). Currently, according to the National Statistical Committee of the Kyrgyz Republic (2023), more than 7 thousand individuals from 69 different scientific organisations are involved in the country's scientific production, of whom 60% are women. In addition, the state allocated 791 million Soms ($8.8 million) for scientific research and development expenditures in the budget (NSC KR, 2024).

In this context, this study aims to evaluate Kyrgyzstan's scientific production output for the period of independence, 1991-2023, and to suggest national science policy. More specifically, this paper focuses on the following research questions:

RQ1: What is the pattern of scientific outputs over time, and what are the main factors that influence it?

RQ2: What are the predominant subjects, disciplines, academic institutions, and scholarly journals associated with scientific research originating from Kyrgyzstan?

RQ3: What are the primary collaborations and interactions between Kyrgyzstan and other countries?

By addressing these questions, this study contributes to both theory and policy by providing an empirical assessment of scientific productivity as a macroeconomic development indicator. The findings are expected to inform national strategies to strengthen the research ecosystem and enhance science's role in sustainable economic growth.

Accordingly, this paper is structured as follows. First, it reviews the existing literature. Next, the study describes the methodology employed, followed by the results. The paper concludes by discussing the findings and the study's limitations.

2. Literature Review

Recent research indicates a notable correlation between science policy, R&D investment, scientific productivity, and national economic progress (Dosi et al., 2006; Hatemi-J et al., 2016; Javed & Liu, 2018; Nguyen & Pham, 2011; Solarin & Yen, 2016). According to Solarin and Yen's (2016) findings, research output plays a significant role in fostering economic growth in both developing and developed nations. The study emphasises the need to expand research and development initiatives, particularly in developing countries with limited research activity. Additionally, the research recommends increasing financial funding for the education sector, particularly in higher education, to help advance these goals. In contrast, Vinkler (2008) found no direct correlation between gross domestic product (GDP) and scientific output. The author suggests that grant allocation for research and development may reflect the financial capacity of affluent nations to invest more in scientific research, rather than genuine need. Increasing financial resources in science may not necessarily lead to a proportional increase in commercially viable products. Moreover, it suggests that underdeveloped or developing economies may benefit more from investing in areas such as education, infrastructure, and engineering than from solely increasing grants for pure scientific research (Vinkler, 2008). In one way or another, the academic literature on nations' scientific achievements continues to grow. Although more advanced nations contribute to this growth, developing countries are less represented. Developed nations such as the USA, Germany, the United Kingdom, Australia and France exhibited comparatively modest average annual growth rates (Crespi & Geuna, 2008; Gorraiz et al., 2018). For example, Crespi and Geuna (2008) conducted an empirical study examining the factors that

influence scientific production across multiple countries, including Belgium, Canada, Australia, Finland, France, Denmark, Germany, the Netherlands, Italy, Spain, Switzerland, the UK, Sweden and the US. The study utilised data from the Thomson ISI database, which includes information on published papers and citations. The study revealed a strong positive relationship between investment in research and development in higher education and research outputs, such as publications and citations. Additionally, the paper emphasises the challenges of linking research inputs to outputs and suggests alternative approaches to evaluate science's contribution to a country's economic prosperity. Investing in research and development in higher education and competing internationally on research outputs can lead to a phenomenon known as "publication inflation" if these outputs fail to generate significant scientific and socio-economic benefits. According to Butler (2003), Australia's representation in the SCI has grown in publication volume. However, these publications have declined in citation impact, suggesting a decrease in the quality and influence of Australia's research output. Although the increase in publication numbers is not inherently unfavourable, it raises concerns that a larger proportion of Australia's research is being published in lower-impact journals, indicating a decline in the overall quality of research being conducted. Another study by Gorraiz et al. (2018) on Austrian publications in the Web of Science Core Collection found that evaluating the broader impact of journal publications at the national level relies mainly on usage metrics, particularly in the Arts & Humanities. A notable rise in the proportion of publications with social media scores, particularly tweets, has been observed, especially in Health and Life Sciences and Social Sciences. Korytkowski and Kulczycki (2019) analysed 452,277 papers in Poland's national research evaluation system from 2009 to 2016 in their recently published paper. The results showed that policy measures implemented in the research evaluation system, academic promotion procedures, and competitive grants have effectively increased the number of articles with measurable impact while maintaining publication standards. In a recent study by Moreno-Delgado et al. (2021), the authors analysed publication output in communication across countries from 2011 to 2020, using the Web of Science Core Collection as the primary data source. The results showed that the nations with the most publications did not always correspond to those with the greatest influence. English-speaking nations showed a notable prevalence in publication volume, while countries like Spain and the Netherlands benefited from their inclusion in the Emerging Source Citation Index. Additionally, the investigation found that a considerable portion, around 30%, of scientific output across nations involved international collaboration.

In contrast, recent research studies have revealed that while scientific publications have historically been dominated by Western countries such as the USA and European countries, there has been a noticeable emergence of scientific powers in Asian countries including Hong Kong, China, Singapore, South Korea, and Taiwan in recent years (Bornmann et al., 2015; Tliba, 2022). However, this increase in output from developing countries occurs alongside the dominance of highly cited publications from developed countries. Despite the growing number of scientific publications, certain developing nations continue to face challenges in achieving global recognition and impact in terms of citations

(Zacca-González et al., 2014). Collaboration with leading, high-impact countries and fair distribution of financial resources for research and development can yield favourable socio-economic and scientific outcomes. Studies show that authors from the USA and China collaborated most frequently internationally, and these two countries are among the world's top producers of scientific output (Wang et al., 2013). Wang et al. (2013) emphasise that Chinese scientists who have immigrated to English-speaking countries play a significant role in facilitating China's international scientific collaboration. China's international scientific collaboration is concentrated in a select number of countries, as nearly 95% of co-authored papers involve collaboration with only 20 countries. Notably, the United States stands out as the most prominent collaborator, accounting for over 40% of all collaborations.

In the realm of emerging economies, Nguyen and Pham (2011) examined the number of scholarly articles published in global peer-reviewed publications from 1991 to 2010 for Vietnam and other ASEAN (Association of Southeast Asian Nations) nations. The authors found a strong, positive linear relationship between scientific output and knowledge economy indices in ASEAN countries. They evaluated scientific research as a crucial component of a knowledge-based economy. In another recent study, Tliba (2022) examined academic research activities across various countries. The study utilised data from Scopus and the World Bank databases, with a sample size of 161 countries, including 19 from the MENA (Middle East and North Africa) region. The findings revealed that MENA countries, such as Algeria, have lower academic research productivity than other regions. However, the study found that these countries' efficiency levels did not differ significantly. Notably, Tunisia, Iran, Türkiye, and Qatar were identified as the leading performers in the region, with Tunisia achieving the highest score. In another study by Cavacini (2016), Israel emerged as the foremost country in the Middle East in both overall citations and citations per document between 1996 and 2014. Conversely, Türkiye and Iran led in the number of scientific documents produced in the Middle East during the same period. In a study conducted by Miyairi and Chang (2012), data from the Web of Science database were utilised to examine highly cited papers from Taiwan published between 2000 and 2009. The findings indicated that Taiwan ranked among the top 30 countries in terms of the number of highly cited papers during this period. Notably, Engineering, Clinical Medicine, and Physics accounted for most of Taiwan's highly cited papers. Furthermore, the United States, China, Germany, and Japan emerged as the primary collaborating countries for these highly cited papers. Based on these results, the authors recommended that Taiwan should prioritise research collaborations with European countries rather than its neighbouring Asian nations. Bornmann et al. (2015) conducted a bibliometric study to examine the progress of the BRICS countries (Brazil, Russia, India, China, and South Africa) in terms of highly cited papers from 1990 to 2010. The findings indicate that, overall, BRICS countries have seen a greater increase in highly cited papers than the top-cited countries globally, except for Russia. Notably, China has exhibited remarkable growth in the number of highly cited papers, surpassing both other BRICS countries and countries worldwide. The authors suggest that investments in research and development infrastructure, as well as the exchange of scientists

between high-performing nations, may be crucial factors in achieving top performance in scientific output.

Allik et al. (2020) conducted an extensive investigation into how to measure national-level scientific success. The study spans 11 years, from 2008 to 2018, and includes approximately 12,000 journals from various regions worldwide. The findings indicate that while economic indicators, such as GDP and research and development expenditure, initially correlate with research output, their influence diminishes when other predictors are considered. Instead, factors such as a country's size, historical affiliation with communism, and governance quality emerge as more significant determinants of scientific excellence. Specifically, smaller countries characterised by effective governance, the absence of violence, civil conflict, and corruption, and a commitment to the rule of law tend to foster an environment conducive to scientific advancement. Currently, post-Soviet countries' research output remains insufficient in the global context (Chankseliani et al., 2021). In a study by Jurajda et al. (2017), a bibliometric analysis compared the publication performance of post-communist EU member states with that of EU-15 countries. The study specifically examined overall publication counts and high-quality publication output. The findings revealed a significant disparity between post-communist countries and their EU counterparts in terms of publication performance. Notably, research in post-communist countries emphasised quantity more than quality. A recent study by Chankseliani et al. (2021) supports these results. The study, which encompassed all 15 member countries of the Soviet Union, found that research productivity in the region has been relatively low, with these countries generating publications of significantly lower quality and impact than the global research output. Researchers from post-Soviet countries actively participate in international collaborations, resulting in a substantial share of publications with international co-authorship originating from this region.

Building on global and regional insights from the literature, this study addresses specific gaps by focusing on Kyrgyzstan's scientific productivity since independence. While prior research has explored general trends among post-Soviet and developing countries, it has given limited empirical attention to Kyrgyzstan as a distinct national case. Accordingly, this study's research questions aim to (1) identify temporal patterns and influencing factors of scientific output, (2) map dominant disciplines, institutions, and journals, and (3) assess international collaboration networks. By doing so, the paper extends existing knowledge on how small developing economies with post-Soviet legacies can leverage scientific productivity to support macroeconomic development and policy formulation.

The literature review demonstrates that a complex interplay of economic, institutional, and governance-related factors influences national scientific productivity. This study is conceptually grounded in the National Innovation System (NIS). The NIS framework emphasises the systemic relationship between universities, industry, and government in generating, diffusing, and utilising knowledge to foster economic growth (Fagerberg & Srholec, 2008; Lundvall, 2007). Within this framework, scientific productivity is regarded as both an output and a performance indicator of the effectiveness of these

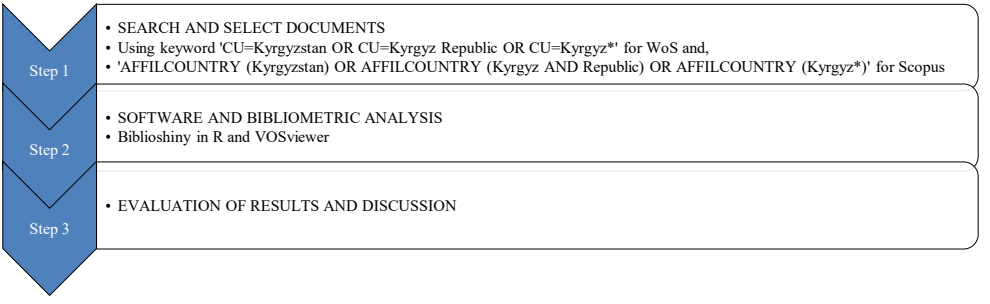
institutional relationships. Thus, the analysis of Kyrgyzstan's scientific production is guided by the understanding that research and innovation are not isolated academic activities but essential components of a country's macroeconomic development system.

The reviewed studies collectively highlight that while financial investment and policy frameworks are vital for promoting scientific productivity, they must be accompanied by institutional reforms, effective governance, and international collaboration. For Kyrgyzstan, a small, post-Soviet, developing country, these findings suggest that progress in science and technology will depend not only on increased funding but also on modernising academic structures and integrating into global scientific networks. The historical legacy of centralised Soviet research institutions, limited access to international funding, and slow adaptation to global academic standards continue to shape the nation's scientific trajectory. These structural challenges provide the rationale for examining Kyrgyzstan's scientific production within the broader macroeconomic and governance context.

3. Methodology

The study's methodology consists of three basic steps, as shown in Figure 1. In the first step, data were obtained by using relevant keywords from the Web of Science and Scopus databases. In the second step, the data were analysed using appropriate bibliometric analysis software. In the final step, the results were evaluated and discussed, and policy recommendations were proposed.

Figure: 1
Research Methodology Steps



Web of Science and Scopus were deliberately selected as data sources because they are the most widely recognised international bibliographic databases that maintain rigorous quality and citation standards. They ensure comparability with global research trends and enable internationally valid bibliometric analyses. Although this approach inherently excludes significant local and regional outputs, such as those indexed in the Russian Science Citation Index (RSCI), it aligns with the study's aim of assessing Kyrgyz research visibility at the international level. This limitation is acknowledged and further discussed in the conclusion.

The data search was conducted on October 17, 2023, and the analysis included all English-language sources published between 1991 and 2023. Searching the Web of Science database with "CU=Kyrgyzstan OR CU=Kyrgyz Republic OR CU=Kyrgyz*" yielded a total of 4819 documents, 4815 studies published between 1991 and 2023, and 4461 studies in English. This search type looks for countries or regions in the address field within a record[1]. Studies that follow a similar search method in Web of Science include Bayoumy et al. (2016), Andrade et al. (2013), Sweileh et al. (2014), and Onyancha (2016). On the other hand, the Scopus database was searched for "AFFILCOUNTRY (Kyrgyzstan) OR AFFILCOUNTRY (Kyrgyz AND Republic) OR AFFILCOUNTRY (Kyrgyz*)". This option refers to the affiliated country, i.e., the country part of an author's address[2]. Here are a few studies that used a similar search method in the Scopus database: Lee (2023), Abbas et al. (2020), Smolina et al. (2020), Alsharif et al. (2020). The search returned 5710 documents: 5648 for the period 1991-2023 and 5034 in English. When downloading from the databases, we selected only publications from 1991-2023. However, because some early-access articles were already assigned to 2024 issues by publishers, a small number of records show 2024 as the publication year. This discrepancy does not affect the temporal scope of analysis, as these records represent forthcoming 2023 outputs indexed early rather than additional data from a new period.

Therefore, we downloaded 9495 documents from the two databases for analysis (4461 from Web of Science and 5034 from Scopus). Using R, we merged the data and removed duplicates. We identified 2744 duplicate documents; after removing them, 6751 documents remained for the final analysis.

The operational definitions of some of the important terms used in this study are as follows:

- Documents refer to individual publications (articles, conference papers, reviews, book chapters, etc.) indexed in the selected databases.
- Sources denote the journals, conference proceedings, or book series where these documents were published.
- International co-authorships (%) represents the proportion of publications involving authors affiliated with institutions in more than one country.

These definitions follow standard bibliometric conventions used in Biblioshiny and VOSviewer analyses to ensure methodological consistency.

Table 1 presents details about the data. During the 30 years of independence, higher education and research institutions in Kyrgyzstan published 6751 documents in 2622 journals and books in English in the Web of Science and Scopus databases. The average

[1] *See: <https://images.webofknowledge.com/images/help/WOS/hs_advanced_fieldtags.html>, 19.09.2023.*

[2] *See: <https://schema.elsevier.com/dtds/document/bkapi/search/SCOPUSSearchTips.htm>, 19.09.2023.*

document age is 7 years, and the average number of citations is 29.24. About two-thirds of the documents are (4388) articles.

Table: 1
Key Data Information

Timespan	**1991:2024**
Sources (Journals, Books, etc.)	2622.0
Documents	6751.0
Document Average Age	7.0
Average citations per doc	29.2
References	193248.0
Single-authored docs	849.0
Co-Authors per Doc	16.6
International co-authorships %	16.1
Article	4388.0
Others (book, book chapter, proceedings paper, note, etc)	2363.0

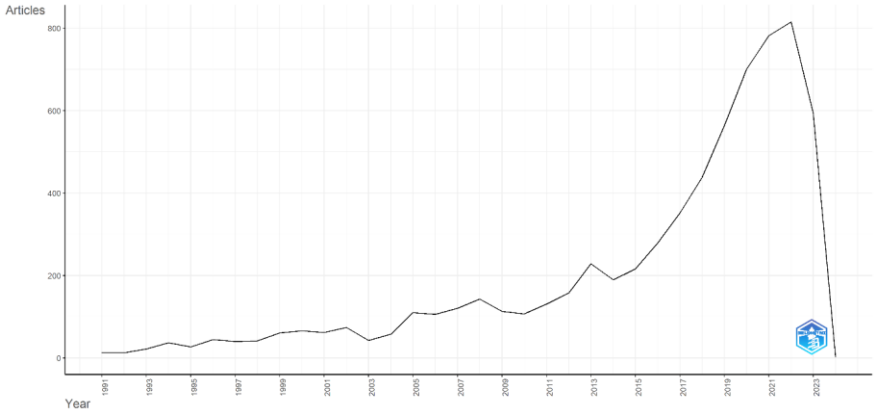
In step 2, we analysed the data downloaded from the Scopus and Web of Science databases using Biblioshiny in R and VOSviewer. We used Biblioshiny in R to merge data and run analyses such as the three-field plot and keyword thematic evolution. We used VOSviewer to perform co-authorship analysis.

4. Findings and Discussion

During the initial period of independence, the number of articles published in journals indexed in Web of Science or Scopus was limited to around 10 papers annually. Over time, this figure gradually increased and, by 2005, had reached 100 articles (Figure 2). However, growth accelerated after 2012 and has quadrupled over the last ten years, from an average of 200 to 800. One of the most important factors here is that Web of Science and Scopus articles began to be requested for the scientific titles "doctoral candidate" and "doctor" (Government of the Kyrgyz Republic [GKR], 2015a), which is a continuation of the Soviet system, and for the academic titles of associate professor and professor (GKR, 2015b), the other is that Kyrgyz higher education institutions began to give importance to international university rankings such as QS.

The surge in publication activity after 2012 corresponds with structural changes in Kyrgyzstan's academic incentives, but it also reflects broader efforts to modernise the economy. More internationally indexed research can boost national competitiveness by strengthening innovation capacity, human capital formation, and technology transfer. In macroeconomic terms, scientific productivity is expected to correlate positively with knowledge-intensive sectors of GDP, improved institutional quality, and increased foreign research investment. However, the lag between scientific output and measurable economic impact is an important policy consideration, particularly for small developing economies like Kyrgyzstan, where the mechanisms translating research into innovation and market application are still evolving.

Figure: 2
Annual Number of Publications

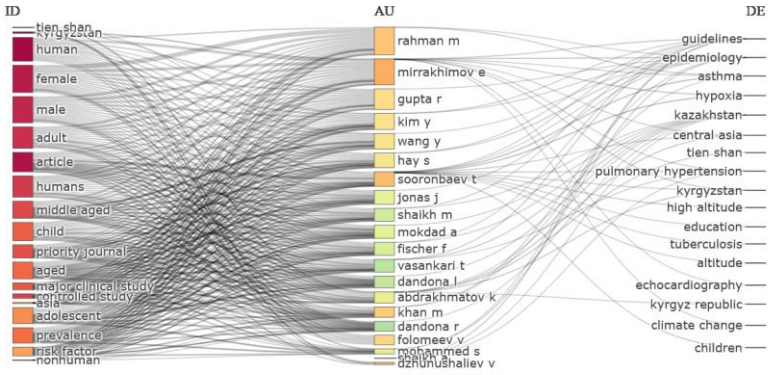


Another important development is that on June 14, 2019, Kyrgyzstan amended its Law on Education to allow universities to open PhD programs (GKR, 2019). According to the Regulation on PhD, developed under this law on December 11, 2020 (GKR, 2020), a PhD student must publish at least two articles in journals indexed in Web of Science or Scopus by graduation. Similar requirements also apply to the thesis advisor and members of the thesis defence committee. Before these developments, Kyrgyz scientists in Kyrgyzstan focused more on journals indexed in the RSCI (Russian Science Citation Index) system, but they began to feel the need to shift their focus.

The articles published in the Scopus database and used in the analysis belong mainly to Medicine, Earth and Planetary Sciences, Social Sciences, Engineering, Environmental Sciences, Physics and Astronomy, Agricultural and Biological Sciences, Computer Science, and Mathematics. A similar pattern appears in articles published in the Web of Science database, which include the following fields: Environmental Sciences, Geosciences Multidisciplinary, Geochemistry Geophysics, Public Environmental Occupational Health, Medicine General Internal, Cardiac Cardiovascular Systems, Mathematics, Physics Applied, Respiratory System, and Multidisciplinary Sciences. In contrast, the Social Sciences are not at the forefront in the Web of Science database. The main reason is the classification system. Specifically, in the Web of Science database, social sciences appear as subfields such as economics, business, sociology, education, political science, and international relations. Taken together, these fields also place social sciences at the top of the list.

A similar pattern appears in the keywords cited and used by authors of most publications; in other words, words related to medicine and technical sciences are more prominent (Figure 3). For instance, human, prevalence, risk factors, epidemiology, asthma, hypoxia, pulmonary hypertension, tuberculosis, echocardiography, climate change, high altitude, Tien Shan, adolescent, major clinical study, adult, child, nonhuman, etc.

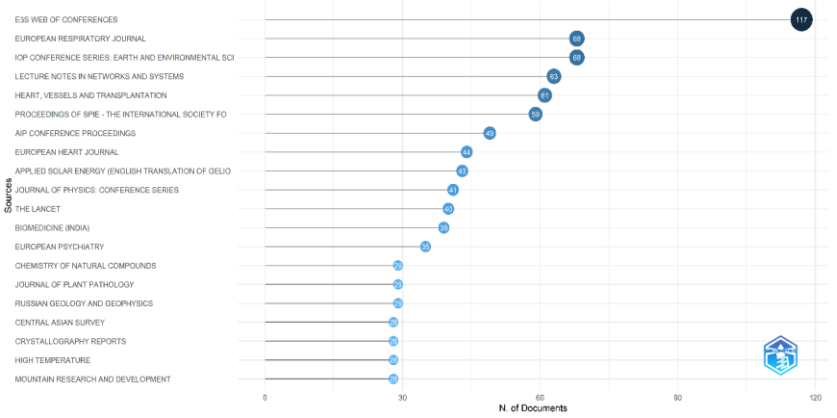
Figure: 3
A Three-Field Plot (Sankey Diagram) of Keyword Plus, Author, and Author's Keyword of the Cited References for the 20 Top Authors



In the Three-Field Plot, the size of the rectangles represents the frequency with which terms appear, and colour groupings indicate clusters of interconnected topics or authors. Stronger link lines reflect a higher frequency of co-occurrence between author keywords and cited references. This shows that national research topics are predominantly anchored in the medical and environmental domains. This visualisation reveals the limited diversification and thematic concentration of Kyrgyz research outputs.

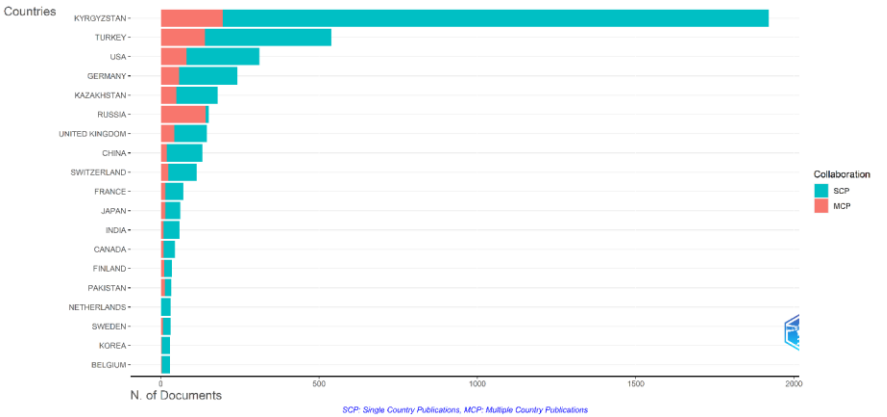
The most published journals and conference proceedings also follow this trend (Figure 4). The first-ranked E3S Web of Conferences is organised in the field of environment, energy, and geosciences. The proceedings published 117 papers, about 2% of the total papers analysed. The European Respiratory Journal and the IOP Conference Series: Earth and Environmental Science share second and third place, with 68 papers each and exactly 1% of the total. Fourth is the book series Lecture Notes in Networks and Systems with 63 papers, and fifth is the journal Heart Vessels and Transplantation with 61 papers. Next are the Proceedings of SPIE - The International Society for Optical Engineering, AIP Conference Proceedings (topics include physics, mathematics, chemistry, materials, and engineering), European Heart Journal, Applied Solar Energy (English translation of Geliotekhnika), and Journal of Physics: Conference Series. The total number of papers published in the top ten journals, book series, and conference series listed here is 613, representing nearly 10% of the total. Three of them are in medicine, and the others are in the natural sciences, such as environment, geosciences, physics, networks and systems, and energy. Other journals in the top twenty are also mainly in medicine or natural sciences such as geology, energy, and environment.

Figure: 4
Most Relevant Sources



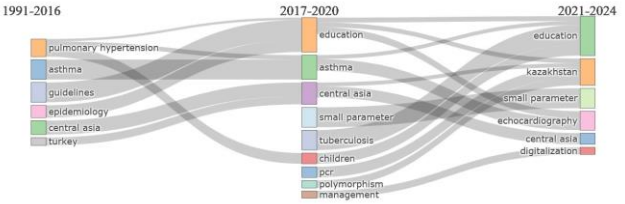
When analysing the corresponding author's country, Kyrgyzstan appears in almost 30% of the 6751 publications, Türkiye in almost 8%, and the USA in almost 5%, followed by Germany, Kazakhstan, and Russia (Figure 5). While single-country publications (SCP) are generally predominant, multiple-country publications (MCP) predominate when Russia is the corresponding author's country.

Figure: 5
Corresponding Author's Countries



Looking at the most frequently used keywords over time, medical terms dominated from 1991 to 2020, while interest in terms such as education and digitisation increased after 2021 (Figure 6).

Figure: 6
Thematic Evolution of Keywords



An analysis of trend topics by keywords shows that while medicine, physics, chemistry, and seismology were at the forefront in the first years of independence, terms such as economic growth, climate change, sustainable development, digitalisation, operational research, COVID-19, and deep learning have become trend topics in recent years (Figure 7).

Figure: 7
Trend Topics by Keywords

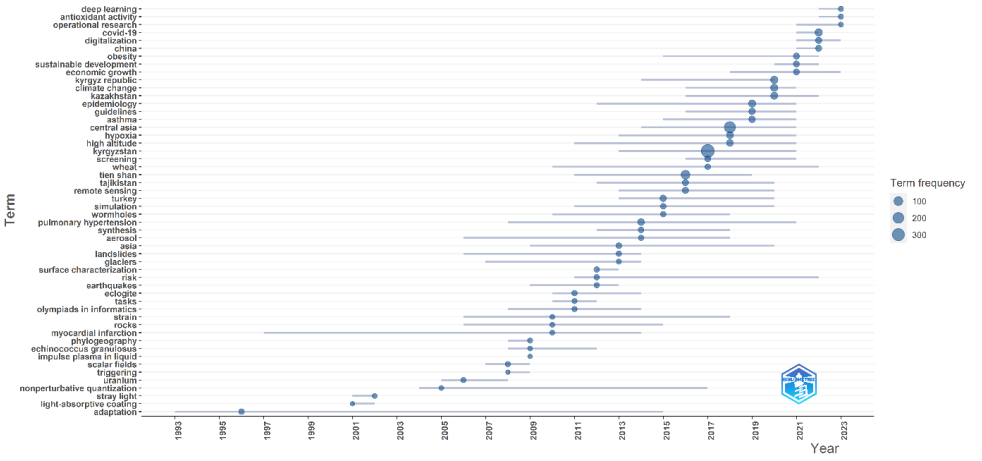
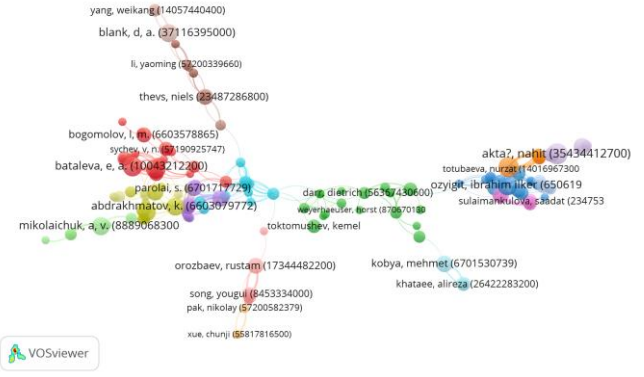


Figure 7 illustrates the relationships and evolution of research themes over time using connecting lines. Thicker, more interconnected lines indicate stronger thematic continuity or overlap between earlier and newer keywords. This shows how scientific attention has shifted from traditional fields such as medicine, physics, and seismology to emerging areas. The growing connections among terms such as digitalisation, economic growth, and sustainable development underscore the increasing integration of Kyrgyz research with global innovation and policy priorities, including those associated with the UN Sustainable Development Goals (SDGs).

Several co-authorship clusters emerge (Figure 8). At the same time, both national and foreign scientists in Kyrgyzstan's higher education institutions are prominent in these categories.

In the co-authorship network, node size corresponds to each author's number of publications, and line thickness indicates collaboration intensity. Colour clusters indicate collaboration communities, usually centred on institutional or disciplinary affinities. Several small, isolated clusters indicate a need for stronger cross-disciplinary and inter-institutional collaboration networks in Kyrgyz research.

Figure: 8
Co-authorship of Authors

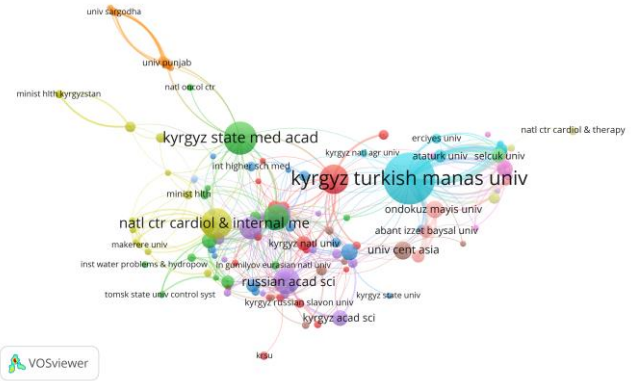


By publication count, the top 20 scientists have between 73 and 184 publications. Erkin Mirrakhimov leads with 184 publications in medicine, followed by Vladimir Dzhunushaliev with 159 publications in physics, and Talant Sooronbaev with 134 publications in medicine. The number of prominent local scientists remains comparatively low. Therefore, a priority of state science policy should be to support and incentivise young scientists to publish in journals indexed in the Web of Science and Scopus databases.

The distribution of universities and research institutions in the top 6 clusters of institutional co-authorship is as follows (Figure 9). The first cluster includes 18 institutions: Kyrgyz National University, Kyrgyz Institute of Seismology, American University of Central Asia, OSCE Academy (Kyrgyzstan), California State University, Kingston University, Michigan State University, University of Cambridge, University of Zurich, and Saint Petersburg State University (other countries). The second cluster includes 13 institutions such as Kyrgyz-Turkish Manas University and Kyrgyz National Agrarian University from Kyrgyzstan, nine universities from Türkiye such as Akdeniz University, Ankara University, Atatürk University, Gaziantep University, and Swiss Federal Institute of Technology and Uppsala University from Europe.

The third cluster consists of 13 organisations, including the National Academy of Sciences of the Kyrgyz Republic, Kyrgyz State Technical University, Kyrgyz Russian Slavic University, and Issyk Kul State University from Kyrgyzstan, and the Uzbek Academy of Sciences, Kumamoto University, Russian Academy of Sciences, and Lomonosov Moscow State University from other countries. The fourth and fifth clusters are in the field of medicine and includes institutions such as National Centre of Oncology & Hematology, Kyrgyz State Medical Academy, National Centre of Cardiology and Internal Medicine, The National Center of Maternity and Childhood Care from Kyrgyzstan, and Institute for Molecular Biology and Medicine from Kyrgyzstan, and Leiden University, University Hospital Zurich, Al-Farabi Kazakh National University, Eurasian National University, Tomsk State University from other states.

Figure: 9
Co-authorship by Organisations



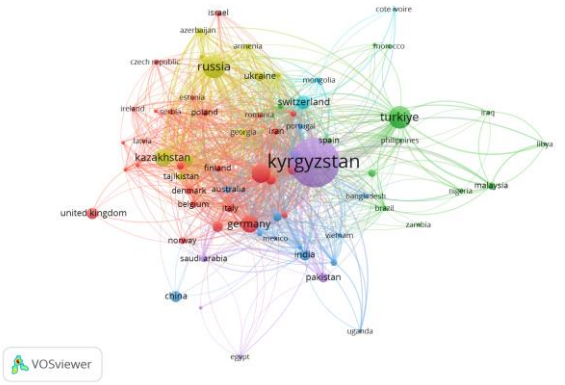
The analysis of co-authorship by country, based on the number of documents, shows that Kyrgyz scientists are most likely to collaborate with researchers in Russia, Türkiye, the United States, Kazakhstan, and Germany. Under the Kyrgyzstan category, which can be considered local collaboration, the total number of documents is 4189, the number of citations is 22299, and the total link strength is 1874. Russia follows with 643 documents, 4621 direct citations, and a total link strength of 595. Türkiye has 598 collaborative studies, 3809 citations, and a total link strength of 392. For the USA, these indicators are 372 documents, 37410 citations, and a total link strength of 518. Finally, for Kazakhstan, the number of documents is 310, the number of citations is 22748, and the total link strength is 380.

As this information shows, a very different picture emerges when the ranking is based on the number of citations. According to this indicator, the United Kingdom ranks first with 48017 citations, followed by the United States with 37410 citations, Kazakhstan with 22748 citations, Kyrgyzstan with 22299 citations, and Iran with 11243 citations. However, in terms

of the number of documents, the United Kingdom ranks 8th, and Iran ranks 22nd. Citations are as important as publications in international rankings. Therefore, scientists should consider this when publishing.

Collaboration patterns reveal quantitative and qualitative asymmetries. Partnerships with neighbouring countries, such as Russia and Kazakhstan, tend to be rooted in long-standing institutional and linguistic proximity and often focus on applied or regional studies. In contrast, collaborations with the United States and the United Kingdom, though fewer in number, show higher citation impact and greater methodological sophistication, particularly in medical and environmental sciences. A third distinctive pattern emerges in cooperation with Türkiye, which has grown considerably in recent years. This cooperation often involves co-authorship in engineering, agriculture, and education through joint university projects, such as those initiated by Kyrgyz-Turkish Manas University. These collaborations combine regional relevance with increasing international quality standards. Overall, this diversity suggests that collaboration quality may matter more than quantity in boosting international visibility and citation performance. Future policy could aim to balance regional cooperation with strategic partnerships that elevate scientific influence and facilitate the transfer of innovation.

Figure: 10
Co-authorship by Countries



Overall, the growth in internationally visible research output reflects deliberate policy interventions to strengthen Kyrgyzstan's knowledge economy. For instance, the 2019 amendment to the Law on Education and the 2020 Regulation on PhD programs introduced new academic standards that require publications in internationally indexed journals. These reforms have boosted productivity and helped align local scientific activity with international benchmarks.

For long-term national benefit, however, a bidirectional policy feedback loop is essential- one in which research outcomes actively inform evidence-based policymaking and, in turn, policies shape the strategic direction of scientific development. This reciprocal relationship is critical for translating academic progress into measurable socioeconomic outcomes.

From a macroeconomic perspective, increased scientific output can enhance total factor productivity through innovation diffusion, improve institutional performance via knowledge-based governance, and foster diversification of the national economy. Conversely, policy instruments, such as research funding programs, innovation grants, and higher education reforms, can amplify the effectiveness of scientific activity by providing clear national research priorities and performance incentives.

5. Conclusion, Recommendations and Limitations

Integration reforms in the scientific sector are progressing more slowly than reforms in other fields in Kyrgyzstan. We believe three primary factors explain Kyrgyzstan's limited scientific productivity, as observed in the databases under analysis. First, the national scientific community is small, with around 7 thousand individuals, compared with other Central Asian countries; for instance, Kazakhstan has more than 36 thousand scholars (Bureau of National Statistics of Kazakhstan [BNSK], 2023). Another reason is that most national scholars publish their academic work in Russian in local academic journals or in journals indexed in the Russian Science Index. Currently, the average number of publications in Web of Science and Scopus per scholar for 1991-2023 is around 1 document. Nevertheless, the Russian Science Index reports a significantly higher figure, with an average of 13 publications per scholar (Elibrary.ru - Scientific Electronic Library, 2024). To better represent the nation's scientific productivity, it is crucial to account for these publications. The third reason is inadequate financial support. Developed nations typically allocate approximately 3-5% of their Gross Domestic Product (GDP) towards Research and Development (R&D) expenditures. In contrast, Kyrgyzstan's R&D expenditure ratio stands at a mere 0.08% of its GDP, positioning it as one of the least funded countries in Central Asia (World Bank, 2024). Given this, low participation in international scientific production is not only true for Kyrgyzstan but also a common issue across post-Soviet countries (Chankseliani et al., 2021; Jurajda et al., 2017).

However, our findings show slow growth in scientific publications in Web of Science- and Scopus-indexed academic periodicals, conference proceedings, and books until 2012, followed by rapid growth after 2012, reaching 800 papers annually. This significant expansion can be attributed to several factors, including the implementation of global standards for academic designations, the importance of international university rankings, and revisions to the Education Law that allow universities to establish PhD programs requiring publications in reputable journals indexed in Web of Science or Scopus. It should be noted that the National Development Strategy of the Kyrgyz Republic for 2018-2040 sets the following goal for higher education institutions: "Universities have become a source of

innovation and high technology. A system of knowledge and technology transfer has been created. The task is to change the system of financing the higher education sector, to introduce a rating system of higher education institutions, including participation in international and regional rankings" (National Development Strategy [NDS KR 2018-2040] of the Kyrgyz Republic, 2018). In addition, the National Development Program of the Kyrgyz Republic until 2026 states that "University science should become an active part of the international scientific community and global and regional scientific research. It is particularly important to support technical, medical and social research" (National Development Program [NDP KR until 2026] of the Kyrgyz Republic, 2021). Higher education institutions in the nation are facing increasing pressure from both local and global competition to incorporate a third mission. This entails a shift not only towards prioritising research publications in prestigious academic journals and other platforms, but also towards emphasising the commercialisation of knowledge, technology transfer, and collaboration among stakeholders.

Because Scopus and Web of Science publications are taken into account in international rankings, and because these platforms are an important means of establishing cooperation with the international scientific community, Kyrgyz universities and scientific institutions are increasingly competing based on the number of publications in these databases. Over time, however, the race should shift from quantity to quality and from short-term goals such as academic career concerns of scientists and international ranking concerns of universities to high value-added scientific publications, which have big potential for commercialisation. Addressing this "quality versus quantity" paradox requires aligning research incentives with national development goals. Policies should link academic evaluation and funding to the quality, relevance, and measurable impact of research, such as patents, industry collaboration, or policy influence, rather than publication counts alone. Establishing impact-based funding programs and technology transfer centres can ensure that scientific output generates innovation, commercial value, and productivity gains, strengthening the country's macroeconomic development.

In addition, post-2020, universities in Kyrgyzstan have begun establishing PhD programs, duly authorised by the Ministry of Education of the Kyrgyz Republic. The inaugural cohort of PhD candidates is anticipated to complete their studies and graduate within the current academic year (2023-2024). To fulfil the graduation criteria, students must publish a minimum of two articles in journals indexed in Scopus or Web of Science. This prerequisite also extends to their thesis supervisors and members of the thesis defence committee. This shift led Kyrgyz scientists to focus more on journals indexed in the Web of Science or Scopus (GKR, 2020).

Our research also found a prevalence of publications in disciplines such as Medicine, Earth Sciences, Social Sciences, and Engineering. Consequently, most published works appear in journals and conference proceedings in these areas. Notable sources for scientific outputs from Kyrgyzstan include E3S Web of Conferences (environment, energy, and geosciences), the European Respiratory Journal, and the IOP Conference Series: Earth and

Environmental Science. Top local authors also have expertise in medicine and physics. Kyrgyz scientists in multiple country collaborations predominantly publish with authors from Russia, followed by Türkiye, the USA, Germany, Kazakhstan, and other countries. As other countries' experience shows, one way to increase national scholars' contribution to international scientific production and enhance national scientific performance is to collaborate with authors from high-performing countries (Wang et al., 2013). Kyrgyzstan has collaboration opportunities beyond the United States and European nations. Scholarly sources highlight the increasing prominence of several Asian countries, including Hong Kong, China, Singapore, South Korea, and Taiwan, as significant scientific entities in recent years (Bornmann et al., 2015; Tliba, 2022).

Based on the existing literature, the findings of this bibliometric review, and Kyrgyzstan's socioeconomic context, this review proposes several suggestions to improve the country's international scientific performance. Currently, the Government of the Kyrgyz Republic is working to transform higher education institutions by implementing various programs and changing the legislative framework in this sector. First, ongoing reforms in the national system of training and certification of scientific staff should be finalised by aligning it with international standards. Further, higher education and research institutions should be stimulated to achieve higher rankings in international ranking systems such as QS, Times Higher Education, and others. Second, increase investment in human resources by expanding the number of PhD students who can earn degrees abroad and by empowering local scholars within the system. In our view, early-career researchers need stronger support. All further activities should consider the country's strengths in scientific production, particularly in medicine and science. Experience transfer among local scientific institutions and exchanges among local scholars could also help activate the country's entire system, giving leadership to the most relevant institutions and scholars. Another way to address funding challenges is to strengthen cooperation between higher education institutions and public and private sector organisations in research and development. Strengthening these partnerships can encourage new ideas by connecting universities, the government, and businesses. This can lead to new technologies, new companies, and market-focused solutions. This process directly contributes to economic diversification, job creation, and improved productivity, which are key pillars of macroeconomic stability and sustainable growth. In other words, the aim is to transform local higher education institutions into entrepreneurial entities that can actively contribute to the country's socio-economic development.

This study is among the first to evaluate the country's scientific output internationally, which may provide significant insights for public policy at both the national and international levels. However, it focuses on the number of scientific outputs, top institutions, and individuals, which is a main limitation of this study. The next phase of research on this topic should prioritise the dissemination and commercialisation of scientific outputs rather than solely focusing on the quantity of international academic publications. One way to broaden the scope of research is to examine scientific publications produced at the national level in Russian and Kyrgyz. Examining these local-language publications is crucial from a

development economics perspective because they often address national policy challenges and local innovation potential not visible in international databases. Future studies should also explore how scientific outputs are disseminated, commercialised, and integrated into productive sectors of the economy, providing a more holistic understanding of how knowledge creation contributes to Kyrgyzstan's long-term economic growth and diversification.

Another approach is to conduct bibliometric and systematic review studies focusing on key disciplines such as medicine, science, and others. In conclusion, the bibliometric analysis of scientific output in post-Soviet Kyrgyzstan reveals both progress and challenges. While publications are increasing, Kyrgyzstan needs to improve the quality and international visibility of its research.

References

Abbas, A.F. et al. (2020), "Bibliometric Analysis of Global Research Trends on Electronic Word of Mouth Using Scopus Database", *Journal of Critical Reviews*, 7(16), 405-412.

Abt, H.A. (2000), "Do Important Papers Produce High Citation Counts?", *Scientometrics*, 48(1), 65-70.

Allik, J. et al. (2020), "Factors Predicting the Scientific Wealth of Nations", *Cross-Cultural Research*, 54(4), 364-397.

Alsharif, A.H. et al. (2020), "Bibliometric Analysis", *Journal of Theoretical and Applied Information Technology*, 98(15), 2948-2962.

Andrade, D.C. et al. (2013), "Bibliometric Analysis of South American Research in Sports Science from 1970 to 2012", *Motriz: Revista de Educação Física*, 19, 783-791.

Bayoumy, K. et al. (2016), "Bibliometric Analysis of Rheumatology Research in the Arab Countries", *BMC Research Notes*, 9, 1-6.

Bornmann, L. et al. (2015), "BRICS Countries and Scientific Excellence: A Bibliometric Analysis of Most Frequently Cited Papers", *Journal of the Association for Information Science and Technology*, 66(7), 1507-1513.

Bureau of National Statistics of Kazakhstan (2023), *Statistics of Education, Science and Innovation*, <https://stat.gov.kz/ru/industries/social-statistics/stat-edu-science-inno/publications/3921/>, 10.02.2025.

Butler, L. (2003), "Explaining Australia's Increased Share of ISI Publications: The Effects of a Funding Formula Based on Publication Counts", *Research Policy*, 32(1), 143-155.

Carter, C.F. (1963), "The Distribution of Scientific Effort", *Minerva*, 1(2), 172-181.

Cavacini, A. (2016), "Recent Trends in Middle Eastern Scientific Production", *Scientometrics*, 109(1), 423-432.

Chankseliani, M. et al. (2021), "A Big Picture: Bibliometric Study of Academic Publications from Post-Soviet Countries", *Scientometrics*, 126(10), 8701-8730.

Crespi, G.A. & A. Geuna (2008), "An Empirical Study of Scientific Production: A Cross-Country Analysis, 1981-2002", *Research Policy*, 37(4), 565-579.

Dosi, G. et al. (2006), "The Relationships Between Science, Technologies and Their Industrial Exploitation: An Illustration Through the Myths and Realities of the So-Called 'European Paradox'", *Research Policy*, 35(10), 1450-1464.

Elibrary.ru (2024), *Scientific Electronic Library*, <https://www.elibrary.ru/defaultx.asp>, 15.02.2025.

Fagerberg, J. & M. Srholec (2008), "National Innovation Systems, Capabilities and Economic Development", *Research Policy*, 37(9), 1417-1435.

Godin, B. (2006), "The Knowledge-Based Economy: Conceptual Framework or Buzzword?", *The Journal of Technology Transfer*, 31(1), 17-30.

Gorraiz, J. et al. (2018), "Monitoring the Broader Impact of the Journal Publication Output on Country Level: A Case Study for Austria", in: M. Erdt et al. (eds.), *Altmetrics for Research Outputs Measurement and Scholarly Information Management* (39-62), Springer.

Government of Kyrgyz Republic (2020), *Regulations on the procedure for organizing postgraduate professional education (PhD),* <https://cbd.minjust.gov.kg/157711/edition/1036237/ru>, 05.01.2025.

Government of the Kyrgyz Republic (2015a), *Regulations on the procedure for awarding academic degrees*, <http://cbd.minjust.gov.kg/act/view/ru-ru/93716/30?cl=ru-ru>, 05.01.2025.

Government of the Kyrgyz Republic (2015b), *Regulations on the procedure for awarding academic titles*, <http://cbd.minjust.gov.kg/act/view/ru-ru/93718/30?cl=ru-ru>, 05.01.2025.

Government of the Kyrgyz Republic (2019), *Law of the Kyrgyz Republic "On Education"*, <http://cbd.minjust.gov.kg/act/view/ru-ru/111918?cl=ru-ru>, 05.01.2025.

Hatemi-J, A. et al. (2016), "Research Output and Economic Growth in G7 Countries: New Evidence From Asymmetric Panel Causality Testing", *Applied Economics*, 48(24), 2301-2308.

Javed, S.A. & S. Liu (2018), "Predicting the Research Output/Growth of Selected Countries: Application of Even GM (1, 1) and NDGM Models", *Scientometrics*, 115(1), 395-413.

Jurajda, Š. et al. (2017), "Scientific Publication Performance in Post-Communist Countries: Still Lagging Far Behind", *Scientometrics*, 112(1), 315-328.

Korytkowski, P. & E. Kulczycki (2019), "Examining How Country-Level Science Policy Shapes Publication Patterns: The Case of Poland", *Scientometrics*, 119(3), 1519-1543.

Kyrgyz Republic (2018), *National Development Strategy (2018-2040) of the Kyrgyz Republic*, <https://www.gov.kg/storage/2020/01/files/program/8/natsionalnaya_strategiya_razvitiya_kyrgyzskoy_respubliki_na_2018_2040_gody.pdf>, 05.01.2025.

Kyrgyz Republic (2021), *National Development Program (until 2026) of the Kyrgyz Republic,* <https://www.gov.kg/storage/2022/02/files/program/16/plan_meropriyatiy_kabineta_ministrov_kyrgyzskoy_respubliki_po_realizatsii_natsionalnoy_programmy_razvitiya_kyrgyzskoy_respubliki_do_2026_goda.doc>, 05.01.2025.

Lee, D. (2023), "Bibliometric Analysis of Asian 'Language and Linguistics' Research: A Case of 13 Countries", *Humanities and Social Sciences Communications,* 10(1), 1-23.

Lundvall, B. (2007), "National Innovation Systems: Analytical Concept and Development Tool", *Industry and Innovation*, 14(1), 95-119.

Miyairi, N. & H.-W. Chang (2012), "Bibliometric Characteristics of Highly Cited Papers from Taiwan, 2000-2009", *Scientometrics*, 92(1), 197-205.

Moreno-Delgado, A. et al. (2021), "Assessing the Publication Output on the Country Level in the Research Field Communication Using Garfield's Impact Factor", *Scientometrics*, 126(7), 5983-6000.

Nguyen, T.V. & L.T. Pham (2011), "Scientific Output and Its Relationship to Knowledge Economy: An Analysis of ASEAN Countries", *Scientometrics*, 89(1), 107-117.

NSC KR National Statistical Committee of the Kyrgyz Republic (2023), *Education and Science in the Kyrgyz Republic*, <https://www.stat.kg/en/publications/sbornik-obrazovanie-i-nauka-v-kyrgyzskoj-respublike/>, 10.01.2025.

NSC KR National Statistical Committee of the Kyrgyz Republic (2024), *Population*, <http://stat.kg/en/statistics/naselenie/>, 10.01.2025.

Onyancha, O.B. (2016), "Open Research Data in Sub-Saharan Africa: A Bibliometric Study Using the Data Citation Index", *Publishing Research Quarterly*, 32(3), 227-246.

Smolina, S.G. et al. (2020), "Bibliometric Analysis of the Publication Activity of Russian Scientific Institutions in Sports Science for 2008-2018", *Journal of Physical Education and Sport*, 20(2), 783-790.

Solarin, S.A. & Y.Y. Yen, (2016), "A Global Analysis of the Impact of Research Output on Economic Growth", *Scientometrics*, 108(2), 855-874.

Sweileh, W.M. et al. (2014), "Substance Use Disorders in Arab Countries: Research Activity and Bibliometric Analysis", *Substance Abuse Treatment, Prevention, and Policy,* 9, 1-9.

Tliba, M.T. (2022), "The Scientific Wealth of Nations with Special Reference to Algeria: A Cross-Country Productivity Analysis of Academic Research", *Les Cahiers Du Cread*, 38(3), 3.

Vinkler, P. (2008), "Correlation Between the Structure of Scientific Research, Scientometric Indicators and GDP in EU and non-EU Countries", *Scientometrics*, 74(2), 237-254.

Wang, X. et al. (2013), "International Scientific Collaboration Of China: Collaborating Countries, Institutions and Individuals", *Scientometrics*, 95(3), 885-894.

World Bank (2024), *World Development Indicators*, <https://databank.worldbank.org/source/world-development-indicators>, 12.01.2025.

Zacca-González, G. et al. (2014), "Bibliometric Analysis of Regional Latin America's Scientific Output in Public Health through SCImago Journal & Country Rank", *BMC Public Health*, 14(1), 632.

Sosyoekonomi

2026, Vol. 34(70), 311-330

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.13
Date Submitted: 11.08.2025
Date Revised: 30.11.2025
Date Accepted: 09.09.2026

Tax Competitiveness Performance: An Examination of OECD Countries via MARCOS

Simla GÜZEL *(https://orcid.org/0000-0001-5249-8873), Tekirdağ Namık Kemal University, Türkiye; simlaguzel@nku.edu.tr*

Dilek MURAT *(https://orcid.org/0000-0002-5667-8094), Bursa Uludağ University, Türkiye; dilekm@uludag.edu.tr*

Vergi Rekabetçiliği Performansı: MARCOS ile OECD Ülkeleri Üzerine Bir İnceleme

Abstract

This study aimed to assess the tax competitiveness performance of OECD countries. The study analysed International Tax Competitiveness Index (ITCI) data for 2022-2024. ITCI measures tax policies in terms of neutrality and competitiveness. The findings showed that Estonia and Latvia were the most tax-competitive countries during 2022-2024. Criteria with the highest weight were cross-border tax regulations and corporate income tax. Unlike existing papers in the literature, this manuscript investigates the tax competitiveness performance of OECD countries using the LOPCOW-based MARCOS method.

Keywords : Tax Competitiveness, International Tax Competitiveness Index, MARCOS.

JEL Classification Codes : H20, H29, C44.

Öz

Bu çalışmada OECD ülkelerinin vergi rekabetçiliği performanslarının belirlenmesi amaçlanmaktadır. Bu doğrultuda 2022-2024 yılları Uluslararası Vergi Rekabet Edebilirliği Endeksi (ITCI) bileşenlerine ait veriler analiz edilmiştir. ITCI vergi politikalarını tarafsızlık ve rekabetçilik açısından ölçen bir veridir. Elde edilen bulgulara göre 2022-2024 periyodunda vergi rekabet edebilirliği bakımından Estonya ve Letonya'nın en başarılı ülkeler olduğu saptanmıştır. Performans üzerinde en etkili faktörlerin sınır ötesi vergi düzenlemeleri ve kurumlar vergisi olduğu tespit edilmiştir. Bu makale, literatürdeki mevcut çalışmalardan farklı olarak, OECD ülkelerinin vergi rekabet gücü performansını LOPCOW tabanlı MARCOS yöntemini kullanarak analiz etmeyi amaçlamaktadır.

Anahtar Sözcükler : Vergi Rekabetçiliği, Uluslararası Vergi Rekabetçiliği Endeksi, MARCOS.

1. Introduction

During the last phase of globalisation, the liberalisation of trade, the removal of capital controls, the provision of convertible currencies, and advances in transportation and communication technologies have reduced the costs of capital, labour, and service mobility since the 1980s (Genschel & Schwarz, 2011: 340), emphasising the significance of national tax policies. Consequently, national tax systems have been exposed to intense competition, and the tax base has become increasingly mobile (Podviezko et al., 2019: 1).

Tiebout (1956) introduced the concept of tax competitiveness based on local taxation authorities. This approach aimed to reduce the local tax burden. Local governments can incentivise business investment through competitive tax rates, which can contribute to both local and national budgets. Economic integration and tax competition, namely, the adoption of low effective tax rates or incentives by governments to attract capital to their countries (Kargı & Yaygır, 2016: 4), have led to a flow of investments to countries with low tax requirements, driven by the potential for high profits. Corporations constantly seek a suitable tax climate. High tax rates can hinder economic growth by pushing investments to alternative locations. A competitive tax structure that promotes business development can encourage entrepreneurship, resulting in higher employment and innovation (Pomerleau & Cole, 2017: 6). Innovative products and services influence a country's competitiveness. A successful economy requires emphasis on advanced products and services, infrastructure investments, strong investment incentives, qualifications, and investment capital. Innovation-oriented economies are more resilient to external shocks (Kalaš et al., 2017: 57). Tax policies commonly enhance these characteristics. To attract direct foreign investment, countries need competitive corporate, income, and customs taxes. Countries under pressure to reduce these tax rates struggle to maintain tax revenues. Therefore, governments should develop a balanced tax system that provides adequate tax revenues and fosters an attractive investment environment (Pomerleau & Cole, 2017: 6). Tax competitiveness, which influences international competitiveness, has prompted several nations to adopt similar tax legislation and systems, resulting in a reduction of direct tax rates, particularly through incentives. For indirect taxes, nations have implemented tax harmonisation methods (Öz & Yaraşır, 2010: 3).

There are positive and negative consequences of competitive tax policies. International tax competition is intense since individual investors and corporations consider tax rates in their investment decisions. Economic growth from competitive taxes is a positive effect of tax competition (Risse & Meyer, 2019: 480). Consequently, politicians feel pressured to enhance public efficiency and utilise tax revenues effectively as they alter the monopolistic structure of states (Rahn & de Rugy, 2003: 7). Furthermore, tax competitiveness, which is a critical factor in the economic development of countries, plays a vital role in creating a quality investment environment, especially in instances where financial resources are insufficient (Mazurenko & Tiutiunyk, 2021: 127). On the other hand, tax avoidance and evasion driven by international tax policies are also important (Risse & Meyer, 2019: 480). Countries under pressure to reduce tax rates face significant tax revenue

losses. Tax havens emerging from this pressure also contribute to the detrimental effects of tax competition (Yıldız & Demir, 2019: 330). Furthermore, developed welfare states benefit from their established infrastructure and capital accumulation. Even if they implement relatively high tax rates compared with underdeveloped countries, they can retain mobile factors of production within their borders. Conversely, excessively high tax rates will inevitably lead to capital flight over time (Baldwin & Krugman, 2004: 2). However, in addition to tax rates, factors such as regulations and overall economic stability also affect corporate investment location preferences. Thus, understanding the dynamics of global competition is important for ensuring sustainable economic development (Pomerleau & Cole, 2017: 6).

To benefit from tax competitiveness, countries need to understand their tax competitiveness performance. This understanding can highlight a country's competitive strengths. When national performance is insufficient, the government can identify shortcomings and take corrective measures.

Several methods have been utilised to analyse and compare global tax systems. The most common method is the ratio of collected taxes to a country's economic size, namely the tax burden. Although this method has been preferred, it only gives an idea of the adequacy of tax revenues but does not provide information about the fitness of the tax system (Bunn et al., 2018: 1). Another method is the tax competitiveness index. The International Tax Competitiveness Index (ITCI) analyses the tax systems in 38 OECD countries based on competitiveness and neutrality. A competitive tax structure aims to keep marginal tax rates low. A neutral tax system aims to facilitate taxpayers' compliance and collect the highest revenue without negatively affecting the economy. Together, these elements improve the tax system's overall efficiency, encourage economic growth, and create a fairer tax burden. A competitive and neutral tax system allows businesses and individuals to make economic decisions without changing them because the tax burden is predictable. Such a system can continue to provide necessary revenues while supporting economic growth (Mendgen, 2024: 1-2).

This study aimed to investigate and compare the tax competitiveness of OECD member countries from 2022 to 2024 using five sub-indices of the International Tax Competitiveness Index (ITCI). The ITCI measures tax policies in terms of neutrality and competitiveness. This matters for tax return performance, which is important for attracting foreign direct investment in today's globalised world. The article also aims to identify the main factors affecting tax competitiveness in OECD countries. The paper also examines changes in countries' performance by analysing the 2022-2024 period. In addition, it allows observation of temporal trends and policy impacts. Consequently, the study analysed thirty-seven countries using five criteria and MARCOS (Measurement of Alternatives and Ranking According to Compromise Solution), a Multi-Criteria Decision-Making (MCDM) method. The study used the LOPCOW (Logarithmic Percentage Change-Driven Objective Weighting) method to determine the criteria weights. A review of previous studies on tax competitiveness revealed that few studies employ a tax competitiveness index.

Various studies in the literature aim to determine tax competitiveness (Gedik, 2011; Liapis et al., 2014; Kubátová, 2014; Tudose & Strapuc, 2015; Podviezko et al., 2019). Although these studies are valuable, a review of previous studies on tax competitiveness revealed that few studies use the tax competitiveness index. Only Altıntaş (2022) analysed the tax competitiveness of OECD member European countries using the OCRA method and based the analysis on 2021 data. The present study examined the most recent data covering 2022-2024, allowing observation of temporal changes. This will provide a clearer picture of how countries are grouped by tax competitiveness. It will also provide an opportunity to assess the strengths and weaknesses of high-performing countries. Furthermore, the study will discuss policy recommendations for low-performing countries. Thus, the current study can further contribute to the literature.

2. Literature Review

In the literature section, we primarily reviewed tax competitiveness papers and then included papers using different MCDM methods. We examined the tax competitiveness literature in two stages. First, we reviewed studies on the effects of taxes on competitiveness and the economy, followed by an analysis of studies on tax competitiveness performance.

Gedik (2011) analysed the impact of tax competition on GDP using the data envelopment method. The study concluded that reducing the ratio of taxes on social security payments, individual and corporate income to gross domestic product could improve employment, growth, and foreign direct investment. Kalaš, Mirović, and Pjanić (2017) analysed the impact of tax rates on competitiveness and Serbia's position among South-East European and Western Balkan countries. They reported that a stable, predictable, and effective tax system is essential for increasing national competitiveness. Tecl (2018) determined the correlation between global competitiveness and tax indicators based on taxes levied on labour using regression analysis for 2014-2016. The findings revealed that labour tax incentives increased competition. It also found that consumption taxes were effective. Lyon and McBride (2018) assessed the impact of incentives introduced after the 2017 tax reform on corporate investment in the USA. Lower tax rates increased domestic investment. Hodges and Anderson (2023) argued that tax burden and tax competitiveness were not correlated. Velagala (2024) analysed the impact of corporate tax on economic growth in G7 and BRICS countries between 1990 and 2002 using the comparative analysis method. The global trend was toward reducing corporate tax rates, which vary by country.

Certain studies have focused on the tax competitiveness of nations. Liapis et al. (2014) developed a total competitive taxation index (TCTI) by analysing value-added, corporate, and personal income taxes in 27 European Union countries using a least-squares dummy-variable model and a weighted hierarchical quantitative approach. The findings revealed varying tax rates across the nations, leading to different tax performances. Kubátová (2014) determined the competitiveness of old and new EU members based on income tax, corporate tax, and VAT between 1995/1996 and 2008/2009 using analysis of variance (ANOVA). The findings demonstrated that the Baltic States have the highest tax

competitiveness, while Germany had the lowest. Tudose and Strapuc (2015) examined the impact of taxes on investment incentives and the effects of total tax rates on employment incentives in EU countries. They found that tax policies had the greatest impact on investment in Luxembourg, while Finland ranked first in the competitiveness index.

Huşmana and Brezeanu (2018) developed a financial index based on 2017 financial indicators such as tax rates, tax incentives, taxation opportunities, and tax administration to analyse economic competitiveness across the EU. The findings showed that Eastern European countries attracted more investors because of their corporate tax rates. Banociova and Tahlova (2019) assessed EU countries' competitiveness based on the share of corporate tax revenues in GDP over a decade using panel regression analysis. They found a significant correlation between corporate tax revenues and tax competitiveness and reported tax competition among EU countries. Podviezko et al. (2019) analysed tax competitiveness in EU countries using multi-criteria decision-making methods and found that Lithuania, Latvia, and Estonia, new members of the Union, had high tax competitiveness. Helcmanovská and Andrejovská (2021) analysed the effects of selected indicators on corporate tax revenues in new and old member countries between 2004 and 2021 using multiple regression analysis for 2004-2019. They reported that the tax rate did not affect tax revenues. Andrejovska and Glova (2022) compared the Slovak Republic's tax performance with that of EU countries by examining the impact of tax rates on foreign direct investment. They contrasted the Slovak Republic's effective tax rate with that of other EU countries to assess tax competitiveness, then conducted a cluster analysis of effective tax rates and direct foreign investment. The Slovak Republic attracted more foreign investment than older EU members, and the study found that the tax rate was the most crucial factor in investment decisions. Altıntaş (2022) analysed the tax competitiveness of OECD member European countries using the OCRA method. The findings revealed that the income score was the most effective factor in tax competitiveness. The study reported that Estonia, Latvia, and Lithuania were the most tax-competitive nations, while Italy, France, and Poland performed the worst.

Miškufová et al. (2022) examined variations in European countries' tax competitiveness between 2014 and 2020 using correlation analysis. They also compared the tax competition index with GDP per capita. They reported a positive correlation between tax competitiveness and GDP per capita. Thus, tax competitiveness appears to positively affect economic performance. In a literature review, Sosnowski (2023) examined tax competitiveness based on tax efficiency and justice and reported that tax competitiveness positively affects foreign direct investment transfers. Furthermore, efficient tax practices positively influence public revenues and tax justice. İnneci (2025) concluded that Türkiye holds a strong position in corporate tax competitiveness by examining the key components used to measure competitiveness in corporate taxation.

The literature also includes papers that use different MCDM methods. Çobanoğulları et al. (2026) analysed the innovation capacity of countries in transition economies in South-Eastern Europe using data from the Global Innovation Index (GII), a comprehensive benchmarking tool. The ARTASI ranking model, integrated with the objective weighting

methods (Entropy and CRITIC) preferred in the study, offered a transparent and flexible evaluation perspective. According to the study's findings, output-oriented indicators such as knowledge and technology outputs, market sophistication, and creative outputs are the most important factors affecting national innovation performance. Murat (2020) reached the same conclusion in her study of OECD countries' innovation performance using Data Envelopment Analysis (DEA) and Global Innovation Index (GII) data. Robustness checks such as sensitivity analysis and cross-validation confirm the model's stability and reliability. Moreover, the study filled a geographical gap in the innovation literature and presented a methodological approach to innovation analysis. Arman et al. (2026) conducted another innovation study. The authors aimed to evaluate the digital innovation performance of European Union (EU) member states and candidate countries using a novel integrated MCDM method. The authors evaluated digital innovation indicators from the Global Innovation Index (GII) 2024 report using the IDOCRIW-based CRADIS method and analysed performance. The analysis found significant differences in digital innovation performance across countries, with Cyprus, Ireland, and the Netherlands performing best. The integrated IDOCRIW-CRADIS model contributes methodologically to the literature by addressing the limitations of single-method evaluations and providing more stable, consistent rankings. This hybrid model serves as a guide for policymakers, researchers, and practitioners in innovation policy and digital transformation.

Sangare-Oumar et al. (2025) conducted a comprehensive literature review and, incorporating expert opinions, investigated the factors affecting graduate unemployment in Tanzania. The study aims to prioritise factors using the Stepwise Weight Assessment Ratio Analysis (SWARA) method within the interval-valued spherical fuzzy (IVSF) approach, which incorporates expert opinions. The study found that job-skills mismatch, inadequate career guidance and counselling services, and an ineffective labour market information system are the main reasons for the high unemployment rates in Tanzania. Although the study provides valuable information to the government, it cannot be generalised to other African countries and regions because it was conducted at the national level and is based on a limited number of expert opinions. Bouraima et al. (2025) conducted another study that considered expert opinions. The authors examined the strategies required to develop Nigeria's higher education system within the context of the Sustainable Development Goals. The authors used the FullEX method to prioritise strategies identified through a literature review and expert opinions. Sensitivity analyses assessed the method's robustness. The findings indicated that the most effective strategies for supporting the development and sustainability of the Nigerian higher education sector are increased funding, hiring additional faculty, improving infrastructure, and ensuring a stable academic calendar.

Özekenci (2025) evaluated the economic performance and fiscal sustainability of European capitals using a hybrid MCDM method. The study used twelve indicators reflecting areas such as environmental resilience, resource efficiency, and infrastructure investments as decision criteria. The MEREC method weighted the criteria, and the final ranking used an integrated approach combining RAWEC, Extended AROMAN, MARA, and Borda Count methods. The analysis shows that cities such as Stockholm, Oslo, and

Copenhagen consistently rank as top performers with cost-effective urban sustainability policies. In contrast, Paris, Istanbul, and Amsterdam have lower cost-effectiveness scores.

Studies in different fields used the MARCOS method, a flexible approach for solving complex problems. Asker & Kılınç (2025) used the LOPCOW-based MARCOS method to examine how companies in the Asian airline market responded to the crisis caused by the COVID-19 pandemic. In this context, according to the findings of the study analysing the financial and operational performance of 18 airlines in the Asian airline market for the 2019-2022 period, Spring Airlines (2019), Qantas Airways (2020), Air Arabia (2021) and Singapore Airlines (2022) were found to be the airlines with the best performance. El-Araby (2023) investigated the applicability of the MARCOS method by considering four different engineering problems. In this context, the MARCOS method was used to solve the problems of industrial robot selection, gear material, layout design, and side-loading forklifts, and the Rank Reversal Phenomenon (RRP) was explored. The MARCOS ranking was compared with different MCDM rankings used for each problem in the past. Excellent correlation coefficients with other MCDM methods support the MARCOS method. Rank reversal tests performed on the problems demonstrated that the MARCOS method provides a stable and consistent ranking. The method's only limitation is its inability to consider qualitative criteria; however, this can be easily overcome by using fuzzy sets or grey numbers.

Stević et al. (2020) developed a new Measurement of Alternatives and Ranking by Compromise Solution (MARCOS) method for sustainable supplier selection in the healthcare sector in Bosnia and Herzegovina. In the study addressing supplier selection, a critical issue in the medical sector, eight alternatives were ranked according to 21 criteria. The authors created 21 scenarios, each with varying criteria weights, and compared them using six MCDM methods. The analysis findings, including the validation of the MARCOS method, indicated that A2 was the best alternative. Demir et al. (2024) investigated the evolution and applications of the MARCOS method through a comprehensive bibliometric analysis. This study reviewed 115 English articles from the Scopus database published between 2020 and 2024. According to the study findings, the countries that produce the most academic studies in this field are China, Serbia and India; the most productive study is Stević et al. (2020); the most cited journal is "Sustainability (Switzerland)"; the institution or organisation that has produced the most studies is "East Sarajevo University"; the MARCOS method and the most integrated weighting model are CRITIC. Traffic risk analysis, supplier selection, and evaluation of renewable energy sources were the topics most frequently applied to this MCDM method.

3. Data and Methodology

The Tax Foundation developed the International Tax Competitiveness Index (ITCI) to analyse tax policy variables that measure the neutrality and competitiveness of a national tax system. ITCI examines corporate, personal income, consumption, and property taxes, as well as the taxation of overseas profits across 37 Organisation for Economic Co-operation and Development (OECD) member countries. Thus, ITCI encompasses the aforementioned

five components and 42 related variables (Mengden, 2024). Calculating the national ITCI involves determining normalised scores (z-scores) based on averages and standard deviations to standardise the index variables. Subsequently, subcategory, category, and total scores, ranging from 0 to 100, are calculated from the z-scores (Mengden, 2024: 56-58). The components of ITCI 2024 are presented in Table 1.

Table: 1
ITCI 2024 Components

Component		Code	
Corporate Score		**C1**	**max**
	Corporate rate		
	Cost recovery		
	Tax incentives and complexity		
Income Score		**C2**	**max**
	Income tax		
	Income tax complexity		
	Capital gain dividends		
Consumption Score		**C3**	**max**
	Consumption tax rate		
	Consumption tax base		
Property Score		**C4**	**max**
	Real property taxes		
	Wealth/estate taxes		
	Capital/transaction taxes		
Cross-Border Score		**C5**	**max**
	Territoriality		
	Withholding taxes		
	Tax treaties		
	Anti-tax avoidance rules		

Source: Mengden, 2024: 57.

Corporate score: It indicates tax competitiveness based on corporate and institutional profit and includes the corporate rate, cost recovery, tax incentives, and complexity.

Income score: A tax competitiveness indicator based on personal or household income that includes income tax, income tax complexity, and capital gains and dividends.

Consumption score: A tax competitiveness indicator for individual goods and services purchases that includes the consumption tax rate and consumption tax base.

Property score: It indicates tax competitiveness in taxable property and includes real property, wealth/estate, and capital/transaction taxes.

Cross-border score: It indicates the tax competitiveness of multinational corporations' activities and includes territoriality, withholding taxes, tax treaties, and anti-tax avoidance measures.

3.1. LOPCOW Method

LOPCOW (Logarithmic Percentage Change-driven Objective Weighting) is an MCDM method introduced by Ecer and Pamucar (2022). This objective weighting method eliminates gaps caused by data size, generates more reasonable weightings, and considers

both positive and negative data in the weighting process. For instance, the Entropy method, a frequently used objective weighting method in the literature, can produce large differences in the weight values. The LOPCOW algorithm eliminates this problem. In the LOPCOW method, the mean square values of the data are expressed as a percentage of their standard deviations. This eliminates the difference (gap) caused by data scale (Ecer & Pamucar, 2022: 3). Because of these advantages, the paper preferred LOPCOW as the criterion weighting method.

The LOPCOW method consists of the following steps (Ecer & Pamucar, 2022: 4-5; Biswas et al., 2024: 8):

Step 1: Form the initial decision matrix (IDM) for m decision alternatives and n criteria, as in Equation 1.

$$IDM = \left[X_{ij}\right]_{m\times n} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} i = 1,2,3,\dots m; \quad j = 1,2,3,\dots n \tag{1}$$

Step 2: Normalise the IDM using the linear max-min normalisation formulas. Equation 2 is used if j is a cost criterion and Equation 3 if j is a benefit criterion.

$$r_{ij} = \frac{xij_{max}}{xmin_{max}} \tag{2}$$

$$r_{ij} = \frac{x_{ij} - x_{min}}{xmin_{max}} \tag{3}$$

Step 3: Each criterion's percentage values are computed by Equation 4.

$$PV_{ij} = \left| ln\left(\frac{\sqrt{\frac{\sum_{i=1}^{m} r_{ij}^2}{m}}}{\sigma} \right) .100 \right| \tag{4}$$

In this equation, the standard deviation is denoted by σ and the number of alternatives by m.

Step 4: Calculate the ultimate objective weights of the criteria using Equation 5.

$$w_j = \frac{PV_{ij}}{\sum_{i=1}^{n} PV_{ij}} \tag{5}$$

3.2. MARCOS Method

MARCOS is an MCDM method developed by Stević et al. (2020). The method aims to reveal the performance of the alternatives by defining the correlations between alternatives and reference values (ideal and anti-ideal alternatives). The method determines

utility functions that represent an alternative's position relative to the ideal and anti-ideal solutions, then develops a compromise ranking based on these solutions. The best alternative is the closest to the ideal solution and the farthest from the anti-ideal solution. By combining ratio and reference-point ranking approaches, the MARCOS method produces more reliable, accurate, and logical results. It is a flexible, powerful, and robust decision-making tool that remains stable even when considering a large number of alternatives/criteria. Compared to similar methods, MARCOS follows a simple, effective approach that can easily generate rankings. Its most important feature is that its simple algorithm does not become complex as the number of criteria/alternatives increases. Its focus on ideal and anti-ideal solutions allows for a clearer determination of the degree of benefit. Considering these points, MARCOS has been deemed appropriate for use as the decision-making tool in this manuscript. The steps of the MARCOS method are as follows (Stević et al., 2020:4-5; Ecer, 2020: 338-342):

Step 1: The initial decision-making matrix, consisting of *m* alternatives and *n* criteria, is determined as shown in Equation 1.

$$X = \left[X_{ij}\right]_{m\times n} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} i = 1,2,3,\dots m; \quad j = 1,2,3,\dots n \tag{1}$$

Step 2: The extended decision matrix is created by adding the ideal solution (*AI*) and the anti-ideal solution (*AAI*) to the decision matrix (Equation 2).

$$X = \begin{array}{c} \\ A_1 \\ A_2 \\ \dots \\ A_m \\ \text{AAI} \\ \text{AI} \end{array} \begin{array}{c} \begin{array}{cccc} \text{C}_1 & \text{C}_2 & \dots & C_n \end{array} \\ \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \\ x_{aa1} & x_{1aa2} & \dots & x_{aan} \\ x_{ai1} & x_{ai2} & \dots & x_{ain} \end{bmatrix} \end{array} \tag{2}$$

The ideal (*AI*) solution is the best alternative, while the anti-ideal (*AAI*) solution is the worst. Equations 3 and 4 calculate *AAI* and *AI*, respectively, where *B* represents the criteria in the benefit group, and *C* represents the criteria in the cost group.

$$AAI = \min_i \text{x}_{\text{ij}}, \text{ if } j \in B \text{ and } \max_i \text{x}_{\text{ij}}, \text{ if } j \in C \tag{3}$$

$$AI = \max_i \text{x}_{\text{ij}}, \text{ if } j \in B \text{ and } \min_i \text{x}_{\text{ij}}, \text{ if } j \in C \tag{4}$$

Step 3: Calculate the normalised matrix elements n_{ij} using Equations 5 and 6.

$$n_{ij} = \frac{x_{ai}}{x_{ij}} \text{ if } j \in C \tag{5}$$

$$n_{ij} = \frac{x_{ij}}{x_{ai}} \quad \text{if} \quad j \in B \tag{6}$$

Step 4: The weighted matrix elements v_{ij} are computed using Equation 7, where w_{ij} represents the weight of the criteria.

$$v_{ij} = n_{ij}.\, w_{ij} \tag{7}$$

Step 5: The utility degree of alternatives based on the anti-ideal and ideal solutions is calculated using Equations 8 and 9. S_i indicates the sum of the weighted matrix elements in these equations ($S_i = \sum_{i=1}^{n} v_{ij}$).

$$K_i^- = \frac{S_i}{S_{aai}} \tag{8}$$

$$K_i^+ = \frac{S_i}{S_{ai}} \tag{9}$$

Step 6: In this step, the utility functions of the alternatives are determined as shown in Equation 10. The utility function represents the compromise solution obtained using the ideal and anti-ideal solutions.

$$f(K_i) = \frac{K_i^+ + K_i^-}{1 + \frac{1 - f(K_i^+)}{f(K_i^+)} + \frac{1 - f(K_i^-)}{f(K_i^-)}} \tag{10}$$

Utility functions concerning the ideal and anti-ideal solutions are obtained using Equations 11 and 12.

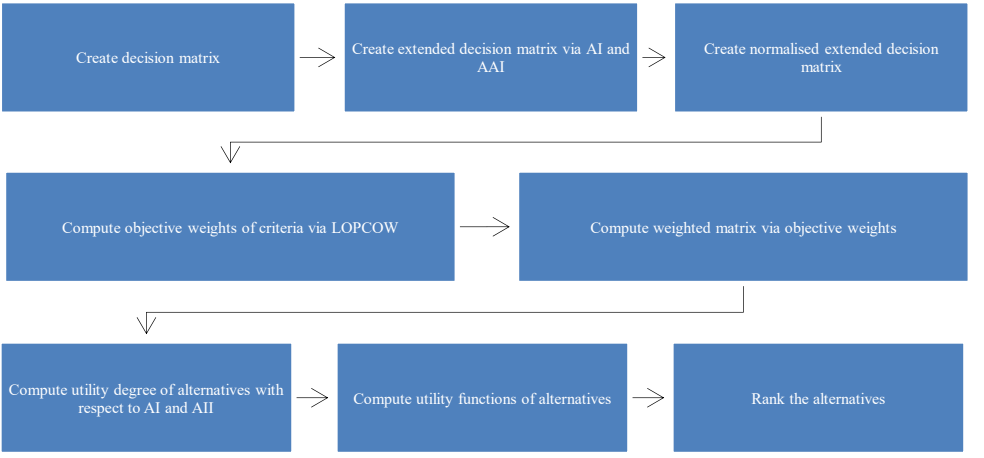
$$f(K_i^-) = \frac{K_i^+}{K_i^+ + K_i^-} \tag{11}$$

$$f(K_i^+) = \frac{K_i^-}{K_i^+ + K_i^-} \tag{12}$$

Step 7: Rank the alternatives according to the final utility values. The alternative with the highest value is the most preferred.

The steps of the MARCOS method can also be examined in the flowchart presented in Figure 1.

Figure: 1
Flowchart of the MARCOS Method



4. Empirical Findings

The current study investigated the tax competitiveness performance of OECD member countries. To do so, we analysed ITCI 2022-2024 data published by the Tax Foundation using the LOPCOW-based MARCOS method. The analysis for 2024, the most recent year with available data, was more detailed, while findings for other years were summarised. The ITCI 2022-2024 criteria included corporate and personal income, consumption, and property taxes, along with taxation of overseas profits for 37 countries. Table 2 presents the initial decision-making matrix developed from the 2024 data.

Table: 2
The Initial Decision-making Matrix

Countries / Criterion	C1	C2	C3	C4	C5
Australia	46	68.9	81.4	79.4	58.7
Austria	61.3	58	61.9	62.8	74.7
Belgium	62	73	52	44.8	64.7
Canada	53.4	52.9	82.6	53.3	70.3
Chile	39.3	59.4	78.1	66.4	37.3
Colombia	31.6	69.7	61.8	36.9	39.2
Costa Rica	40.8	51.2	84.9	68	60.6
Czech Republic	69.8	93.9	41.2	76.4	78.6
Denmark	63.4	47.6	55.4	62.3	59.1
Estonia	98.7	99.3	59.6	100	82.5
Finland	71	57.3	52.7	60.8	66.3
France	44.6	49.9	43.1	41	77.8
Germany	48.3	48.2	66.3	68	83.4
Greece	62.1	82.2	40.7	47.1	66.5
Hungary	82.9	91.7	36.9	57	93.7
Iceland	63.2	61.7	48.3	40	62.9
Ireland	79.1	42.4	38.4	61.8	54.4
Israel	66.4	54.3	78.3	68.2	80.8
Italy	55.1	64.4	31.3	31.8	64.5
Japan	43.4	49	87.9	50	60.6
Korea	54.5	40.3	100	40.6	60
Latvia	100	94.5	54.9	77.2	85.7
Lithuania	84	81.9	49.8	74.8	73.4
Luxembourg	56.4	59.9	87.7	64.5	90.4
Mexico	52.3	62	66.6	80.4	43.3
Netherlands	55.9	53.1	59.7	59.6	93.6
New Zealand	48.8	86.5	98.6	74.4	72.2
Norway	64.6	55	52.3	63.1	77.6
Poland	65.6	76.7	33.7	43.6	66
Portugal	36.1	57.6	53.2	60.7	60
Slovak Republic	63.2	100	48.6	80.5	63.8
Slovenia	67.5	75.7	45.9	54.8	67.4
Spain	50	61.6	58.9	36.5	71.8
Sweden	72.6	62.2	53.1	72.6	78.2
Switzerland	67.3	83.8	94.2	36.6	100
Türkiye	59.7	85.9	59.9	57.3	87.7
United Kingdom	51.8	61.6	40.9	39	95.5
United States	61	63	93.7	45.9	46.7

Table 2 provides a criterion-by-criterion overview of the ITCI 2024 data. Analysis of the first criterion, corporate income tax (C1), showed that Latvia, Estonia, and Lithuania scored highest. In personal tax (C2), the Slovak Republic scored highest, while Türkiye ranked 7th. In consumption tax (C3), Korea scored highest. Estonia scored highest in property tax (C4). Switzerland scored highest in cross-border tax regulations (C5), followed by the UK and Hungary, while Chile scored lowest in C5. Türkiye ranked 6th. A general review of Türkiye indicated that it ranked among the highest-scoring countries in personal tax (C2) and cross-border regulations (C5), with moderate scores on other criteria.

The study used the LOPCOW method to determine the criteria weights. LOPCOW findings revealed that C5 (cross-border tax regulations) has the highest weight (0.24). The weight of C1 (corporate income tax) was 0.21, that of C4 (property tax) was 0.19, and that of C2 (personal tax) was 0.18. C3 (consumption taxes) had the lowest weight (0.17).

Next, we applied the MARCOS method to the initial decision-making matrix presented in Table 2. We first normalised the initial decision-making matrix. Next, we

obtained the weighted matrix using the criteria weights calculated with the LOPCOW method. Next, we calculated the utility rates and functions. The utility functions determined the final ranking. Table 3 presents the findings for the 2024 data.

Table: 3
MARCOS' Findings and Rankings

Countries	Ki+	Ki-	f(Ki+)	f(Ki-)	f(Ki)	MARCOS Rank	ITCI Rank
Australia	0.657	1.903	0.743	0.257	0.604	14	13
Austria	0.644	1.864	0.743	0.257	0.591	15	15
Belgium	0.596	1.726	0.743	0.257	0.547	26	26
Canada	0.624	1.808	0.743	0.257	0.573	19	17
Chile	0.543	1.573	0.743	0.257	0.499	34	29
Colombia	0.465	1.346	0.743	0.257	0.427	38	38
Costa Rica	0.603	1.747	0.743	0.257	0.554	22	21
Czech Republic	0.726	2.103	0.743	0.257	0.667	7	8
Denmark	0.579	1.678	0.743	0.257	0.532	29	28
Estonia	**0.884**	**2.560**	**0.743**	**0.257**	**0.812**	**1**	**1**
Finland	0.623	1.804	0.743	0.257	0.572	20	20
France	0.527	1.525	0.743	0.257	0.484	36	36
Germany	0.637	1.845	0.743	0.257	0.585	16	16
Greece	0.602	1.743	0.743	0.257	0.553	23	27
Hungary	**0.742**	**2.148**	**0.743**	**0.257**	**0.682**	**5**	**7**
Iceland	0.558	1.617	0.743	0.257	0.513	33	34
Ireland	0.562	1.627	0.743	0.257	0.516	32	32
Israel	0.701	2.031	0.743	0.257	0.644	11	10
Italy	0.505	1.461	0.743	0.257	0.464	37	37
Japan	0.575	1.666	0.743	0.257	0.528	30	25
Korea	0.584	1.693	0.743	0.257	0.537	27	24
Latvia	**0.834**	**2.415**	**0.743**	**0.257**	**0.766**	**2**	**2**
Lithuania	0.734	2.125	0.743	0.257	0.674	6	5
Luxembourg	0.722	2.092	0.743	0.257	0.664	8	6
Mexico	0.597	1.730	0.743	0.257	0.549	25	23
Netherlands	0.659	1.909	0.743	0.257	0.606	13	14
New Zealand	**0.748**	**2.165**	**0.743**	**0.257**	**0.687**	**4**	**3**
Norway	0.636	1.843	0.743	0.257	0.585	17	19
Poland	0.580	1.678	0.743	0.257	0.532	28	31
Portugal	0.534	1.548	0.743	0.257	0.491	35	35
Slovak Republic	0.708	2.049	0.743	0.257	0.650	10	9
Slovenia	0.628	1.818	0.743	0.257	0.577	18	22
Spain	0.563	1.631	0.743	0.257	0.517	31	33
Sweden	0.687	1.991	0.743	0.257	0.631	12	12
Switzerland	**0.769**	**2.227**	**0.743**	**0.257**	**0.707**	**3**	**4**
Türkiye	**0.708**	**2.050**	**0.743**	**0.257**	**0.650**	**9**	**11**
United Kingdom	0.598	1.733	0.743	0.257	0.550	24	30
United States	0.606	1.755	0.743	0.257	0.557	21	18

Based on the utility function values and rankings presented in Table 3, Estonia, Latvia, Switzerland, New Zealand, and Hungary ranked highest in tax competitiveness performance, in that order. Colombia, Italy, France, Portugal, and Chile ranked lowest. Türkiye ranked 9th among the countries with the strongest performance. The last column of Table 3 presents the rankings based on the ITCI 2024 final scores. We conducted Spearman's rank correlation analysis between the MARCOS and ITCI rankings. The statistically significant Spearman's rank correlation coefficient (Spearman's rho = 0.98 – $p < 0.001$) demonstrated a strong and positive correlation between the MARCOS and ITCI rankings. In other words, these two ranking methods were consistent.

Next, we applied the procedure used for the 2024 data to the 2022 and 2023 data to compare findings across periods. The LOPCOW criterion weights for ITCI 2023 were as

follows: C1 (corporate income tax) = 0.21, C2 (personal tax) = 0.23, C3 (consumption taxes) = 0.15, C4 (property tax) = 0.18, and C5 (cross-border tax regulations) = 0.25. The ITCI 2022 criteria LOPCOW weights were 0.21 for C1, 0.20 for C2, 0.15 for C3, 0.18 for C4, and 0.25 for C5. C5 (cross-border tax regulations) had the highest weight in both years. Table 4 presents the final MARCOS rankings for the 2022 and 2023 ITCI data.

Table: 4
MARCOS and ITCI Rankings

	MARCOS Rank	ITCI Rank	MARCOS Rank	ITCI Rank	MARCOS Rank	ITCI Rank
Countries	**2022**	**2022**	**2023**	**2023**	**2024**	**2024**
Australia	14	11	13	10	14	13
Austria	17	18	20	20	15	15
Belgium	22	24	23	27	26	26
Canada	21	16	16	15	19	17
Chile	31	27	38	35	34	29
Colombia	34	32	37	38	38	38
Costa Rica	23	19	25	22	22	21
Czech Republic	4	5	4	5	7	8
Denmark	33	33	31	29	29	28
Estonia	**1**	**1**	**1**	**1**	**1**	**1**
Finland	20	20	18	19	20	20
France	38	38	36	36	36	36
Germany	15	15	19	18	16	16
Greece	27	29	21	25	23	27
Hungary	**5**	**7**	**6**	**9**	**5**	**7**
Iceland	29	31	32	32	33	34
Ireland	32	35	26	28	32	32
Israel	11	10	10	8	11	10
Italy	36	37	35	37	37	37
Japan	24	21	27	24	30	25
Korea	28	25	29	23	27	24
Latvia	**2**	**2**	**2**	**2**	**2**	**2**
Lithuania	8	8	8	9	6	5
Luxembourg	7	6	9	6	8	6
Mexico	35	30	33	26	25	23
Netherlands	13	14	14	14	13	14
New Zealand	**3**	**3**	**5**	**3**	**4**	**3**
Norway	16	17	17	17	17	19
Poland	26	28	28	33	28	31
Portugal	37	36	34	34	35	35
Slovak Republic	12	13	11	12	10	9
Slovenia	18	23	15	16	18	22
Spain	30	34	30	31	31	33
Sweden	10	12	12	13	12	12
Switzerland	**6**	**4**	**3**	**4**	**3**	**4**
Türkiye	**9**	**9**	**7**	**7**	**9**	**11**
United Kingdom	19	26	24	30	24	30
United States	25	22	22	21	21	18

Table 4 presents statistically significant Spearman's rank correlation coefficients derived from the Spearman's rank correlation analysis, indicating a strong correlation between the MARCOS and ITCI rankings (Spearman's rho = 0.97, $p < 0.001$ for both 2022 and 2023). This finding demonstrates the consistency between the MARCOS and ITCI rankings.

In addition to the MARCOS ranking, Table 4 also presents the overall ITCI ranking. A comprehensive analysis indicates that nearly all countries maintained their rankings between 2022 and 2024. Estonia and Latvia exhibited the most consistent performance

across the three years in both rankings. Furthermore, Switzerland and New Zealand consistently placed in the top five during the same timeframe. Conversely, Colombia, Italy, and France showed the weakest performance. Türkiye ranked among the countries exhibiting commendable performance within the top ten. Tax competitiveness is significant in attracting foreign investment. Estonia and Latvia's alignment of competitive corporate tax rates with the need to maintain reasonable tax levels as a strategy to enhance investment underscores the importance of effective tax policies in attracting foreign direct investment.

5. Conclusion

Economic integration highlights the importance of liberalising international capital movements. Tax competitiveness, driven by lower tax rates and effective incentives, is highly effective in boosting global competitiveness. Investors seeking a favourable tax environment direct their investments to countries with the most reasonable tax practices. Factors such as R&D and innovation are also vital to enhancing national competitiveness, prompting efforts to improve tax competitiveness to attract direct foreign capital.

A national tax policy should aim to control the budget deficit and public debt and collect adequate tax revenues. The national tax system effectively shapes economic performance. Therefore, it should collect sufficient revenues to finance public expenditures and stimulate the economy.

In this manuscript, we analysed ITCI 2022-2024 data for 37 OECD member countries using the MARCOS method. ITCI includes OECD countries and assesses the competitiveness and neutrality of their tax systems. Tax system competitiveness refers to low tax rates. Neutrality refers to provisions that facilitate taxpayer compliance without negatively affecting the economy.

LOPCOW findings showed that cross-border tax regulations and corporate income tax had the highest weight. In other words, cross-border tax regulations and corporate income tax are the most important factors affecting tax competitiveness performance. Therefore, these criteria most affected the MARCOS method rankings. Similarly, Huşmana and Brezeanu (2018), Banociova and Tahlova (2019), and Andrejovska and Glova (2022) concluded that tax rates are the most effective factor in tax competitiveness. Taxation and effective tax rates are quite significant in investment decisions. The significance of tax competitiveness in global markets and economic development is clear. As Miškufová et al. (2022) state, tax competitiveness positively influences economic performance and welfare by increasing per capita income. Moreover, tax revenues, the state's primary source of income, also matter. Low corporate tax rates and cross-border tax rules effectively promote tax competitiveness. Both factors play a crucial role in attracting foreign investment.

The MARCOS analysis of 2024 data revealed that Estonia had the highest tax competitiveness, followed by Latvia and Switzerland. The Spearman's rank correlation analysis between MARCOS and ITCI rankings also confirmed that the MARCOS ranking

was statistically reliable. Tax competitiveness among OECD member nations was similar between 2022 and 2024. This similarity is mainly because tax competitiveness indicators (cross-border tax regulations, corporate income tax, property tax, personal tax, consumption taxes) did not change significantly between 2022 and 2024. Estonia and Latvia performed best during that period. These findings were consistent with those reported by Podviezko et al. (2019) and Altıntaş (2022). Both studies reported that Latvia and Estonia scored highest in tax competitiveness. These two countries generally perform well on the factors affecting tax competitiveness. They also perform well on C5 (cross-border tax regulations), which the study identified as the most important factor in tax competitiveness.

Türkiye has achieved moderate success in the MARCOS and ITCI rankings. In recent years, a general worldwide trend has emerged toward reducing corporate tax rates. According to Inneci (2025), rising corporate tax rates and additional tax applications in Türkiye may negatively affect tax competitiveness. In this context, policies should ensure competitiveness and neutrality in the tax system, including simplifying tax systems, aligning corporate tax rates with global levels, and revising additional tax applications. Furthermore, while striving to enhance tax competitiveness, it is essential to establish a tax system that does not compromise justice in income distribution. Therefore, tax policies that promote efficient taxation and strong governance should be prioritised. A fair tax system, effective tax management that mitigates corruption, low tax compliance costs, and transparent, accountable tax policies are crucial.

Although the study produces theoretical and empirical findings on tax competitiveness performance analysis for OECD countries, these findings should be interpreted within some limits. These include the International Tax Competitiveness Index (ITCI) examined, the country group, the preferred weighting method, and the ranking method. The study considered only ITCI data, an index that evaluates tax competitiveness in terms of neutrality and competitiveness. However, the disruptive effects of a competitive and neutral tax system on tax equity should not be overlooked. While attracting foreign capital is important for a country's development, it is crucial to strike a balance and avoid a tax system that compromises equity in income distribution.

In addition, although using LOPCOW as a weighting method provides objectivity, the lack of expert opinion and some fiscal indicators in the ranking limits the study. Lastly, the study applies only to OECD countries and does not allow global generalisation. Future studies that address these limitations and conduct broader research would benefit the literature and policymakers.

References

Altıntaş, F.F. (2022), "OECD grubundaki Avrupa ülkelerinin vergi rekabetçiliği performanslarının analizi: İstatistiksel varyans prosedürü tabanlı ocra yöntemi ile bir uygulama", *Journal of Emerging Economies and Policy*, 7(2), 104-119.

Andrejovska, A. & J. Glova (2022), "An effective average tax rate as the deciding factor in tax competitiveness in the context of foreign investment influx", *Journal of Competitiveness*, 14(3), 5-23.

Arman, K. et al. (2026), "Digital Innovation Performance Evaluation of European Union Member and Candidate Countries with IDOCRIW and CRADIS Methods", *Spectrum of Decision Making and Applications*, 3(1), 364-382.

Asker, V. & Z. Kılınç (2025), "Financial and operational performance analysis using LOPCOW Based MARCOS Method: A case study of the Asian airline market", *Journal of Mehmet Akif Ersoy University Economics and Administrative Sciences Faculty*, 12(1), 246-270.

Baldwin, R.E. & P. Krugman (2004), "Agglomeration, integration and tax harmonisation", *European Economic Review*, 48(1), 1-23.

Banociova, A. & S. Tahlova (2019), "European States in a Bout of Corporate Tax Competition", *Journal of Competitiveness*, 11(3), 19-34.

Biswas, S. et al. (2024), "Evaluation based on Relative Utility and Nonlinear Standardization (ERUNS) Method for Comparing Firm Performance in Energy Sector", *Decision Making Advances*, 2(1), 1-21.

Bouraima, M.B. et al. (2025), "Prioritizing Strategies for the Development and Sustainability of Higher Education in Developing Countries: A FullEX MCDM Approach", *Decision Making and Applications*, 2(1), 166-176.

Bunn, D. et al. (2018), *International Tax Competitiveness Index*, Tax Foundation, <https://taxfoundation.org/research/all/global/2018-international-index/>, 27.04.2025.

Çobanoğulları, G. et al. (2026), "Analysis of Innovation Performance of South-Eastern European Countries in Transition Economies: An Application of the Entropy-Based ARTASI Model", *Spectrum of Operational Research*, 3(1), 193-214.

Demir, G. et al. (2024), "Measurement of Alternatives and Ranking according to Compromise Solution (MARCOS) Method: A Comprehensive Bibliometric Analysis", *Decision Making: Applications in Management and Engineering*, 7(2), 313-336.

Ecer, F. & D. Pamucar (2022), "A novel LOPCOW-DOBI multi-criteria sustainability performance assessment methodology: An application in developing country banking sector", *Omega*, 112, 102690.

Ecer, F. (2020), *Çok Kriterli Karar Verme*, Ankara: Seçkin Yayıncılık.

El-Araby, A. (2023), "The utilization of MARCOS method for different engineering applications: a comparative study", *International Journal of Research in Industrial Engineering*, 12(2), 155-164.

Gedik, M. (2011), "Vergi rekabeti etkinlik değerlendirmesi: OECD üyesi ülkeler için veri zarflama analizi uygulaması", *Maliye Dergisi*, 160, 329-350.

Genschel, P. & P. Schwarz (2011), "Tax competition: a literature review", *Socio-economic Review*, 9(2), 339-370.

Helcmanovská, M. & A. Andrejovská (2021), "Tax rates and tax revenues in the context of tax competitiveness", *Journal of Risk and Financial Management*, 14(284), 284.

Hodges, H. & B.F. Anderson (2023), "Economic competitiveness and taxes", *Competitiveness Review: An International Business Journal*, 33(5), 939-958.

Huşmana, A.I. & P. Brezeanua (2018), "A map of EU28 countries in terms of corporate income tax competitiveness. How is Romania positioned?", in: *AMIS 2018 Accounting and Management Information Systems* (644-664), Bucharest University of Economic Studies, June, 13-14.

İnneci, A. (2025), "Uluslararası vergi rekabet edebilirlik endeksi bağlamında Türkiye'nin kurumlar vergisinde rekabet edebilirliği", *Fiscaoeconomia*, 9(1), 636-655.

Kalaš, B. et al. (2017), "Economic and tax competitiveness in selected South East European Countries", *Economic Analysis*, 50(3-4), 55-65.

Kargı, V. & T. Yayğır (2016), "Küreselleşme, vergi rekabeti ve Türkiye'de vergi yükü", *International Journal of Public Finance*, 1(1), 1-22.

Kubátová, K. (2014), "Long-term tax competitiveness of the new EU member states compared to the original EU members", *Acta Aacademica Karviniensia*, 14(2), 48-57.

Liapis, K. et al. (2014), "A Quantitative approach to measure tax competitiveness between EU countries", *International Journal of Economic Sciences and Applied Research*, 7(3), 7-23.

Lyon, A.B. & W.A. McBride (2018), "Assessing US Global Tax Competitiveness after Tax Reform", *National Tax Journal*, 71(4), 751-788.

Mazurenko, O. & I. Tiutiunyk (2021), "The International Tax Competitiveness: Bibliometric Analysis", *Financial Markets, Institutions and Risks*, 5(1), 126-138.

Mendgen, A. (2024), *International Tax Competitiveness Index 2024*, Tax Foundation, <https://taxfoundation.org/research/all/global/2024-international-tax-competitiveness-index/>, 11.02.2024.

Miškufová, M. et al. (2022), "The Tax Competition Among European Countries", *Journal of Management and Business: Research and Practice*, 14(2), doi:10.54933/jmbrp-2022-14-2-2.

Murat, D. (2020), "The Measurement of Innovation Performance in OECD Countries", *Journal of Management and Economic Research*, 18(4), 209-226.

Öz, E. & S. Yaraşır (2010), "Global Bir Kavram: Vergi Rekabeti", *Maliye Araştırma Merkezi Konferansları*, 52. Seri, 1-39.

Özekenci, E.K. (2025), "A Multi-Criteria Framework for Economic Decision Support in Urban Sustainability: Comparative Insights from European Cities", *International Journal of Economic Sciences*, 14(1), 162-181.

Podviezko, A. et al. (2019), "Tax competitiveness of the new EU member states", *Journal of Risk and Financial Management*, 12(1), 34.

Pomerleau, K. & A. Cole (2017), *International Tax Competitiveness Index 2015*, Tax Foundation, <https://files.taxfoundation.org/legacy/docs/TF_ITCI_2015.pdf>, 23.04.2025.

Rahn, R.W. & V. de Rugy (2003), "Threats to financial privacy and tax competition", CATO Institute *Policy Analysis*, No. 491.

Risse, M. & M. Meyer (2019), "Tax competition and global interdependence", *Journal of Political Philosophy*, 27(4), 480-498.

Sangaré-Oumar, M.M. et al. (2025), "Evaluation of Factors Influencing University Graduates' Unemployment in Developing Country: A Multi-Criteria Decision-Making Perspective", *Spectrum of Operational Research*, 2(1), 151-160.

Sosnowski, M. (2023), "International Tax Competitiveness: Between Tax Optimization and Tax Fairness", *Studia Sieci Uniwersytetow Pogranicza*, 7, 199-212.

Stević, Ž. et al. (2020), "Sustainable supplier selection in healthcare industries using a new MCDM method: Measurement of alternatives and ranking according to Compromise Solution (MARCOS)", *Computers & Industrial Engineering*, 140, 106231.

Tecl, J. (2018), "Dependence between competitiveness and tax indicators based on competitiveness reports", *Acta Academica Karviniensia*, 18(2), 46-57.

Tiebout, C.M. (1956), "A pure theory of local expenditures", *Journal of Political Economy*, 64(5), 416-424.

Tudose, B. & C. Strapuc (2015), "The impact of tax system on global competitiveness. Analysis on the level of European Union member states", *Studies and Scientific Researches. Economics Edition*, (21), 56-63.

Velagala, S.R.A (2024), "Comparative analysis of G7 and BRICS corporate tax structures and their impact on economic growth: A quantitative study from 1990 to 2022", *International Journal of Science and Research*, 13(2),778-784.

Yıldız, A. & M. Demir (2019), "Vergi cennetleri ve küresel gelir eşitsizliği", *Maliye Dergisi*, 179(1), 329-354.

Sosyoekonomi

2026, Vol. 34(70), 331-351

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.14
Date Submitted: 03.09.2025
Date Revised: 08.12.2025
Date Accepted: 19.09.2026

Taxpayers' View of the Tax Concept: A Metaphorical Analysis[1]

Tamer BUDAK *(https://orcid.org/0000-0003-0062-2734), Alanya Alaaddin Keykubat University, Türkiye; tamer.budak@alanya.edu.tr*

Serkan BENK *(https://orcid.org/0000-0002-2804-2486), İnönü University, Türkiye; serkan.benk@inonu.edu.tr*

Osman GEYİK *(https://orcid.org/0000-0001-9885-9638), Dicle University, Türkiye; osman.geyik@dicle.edu.tr*

Vergi Mükelleflerinin Vergi Kavramına Bakışı: Metaforik Bir Analiz[2]

Abstract

This study examines taxpayers' perceptions of the tax concept through metaphors. Metaphor analysis is an effective tool for revealing how taxpayers make sense of the tax concept. This research used qualitative data collection techniques to compile and thematically classify metaphors produced by taxpayers from different sociodemographic groups about taxation. The findings reveal diverse and layered perceptions of tax. While most metaphors were classified as neutral, negative metaphors frequently reflected notions of burden, coercion, and punishment, whereas positive metaphors emphasised social responsibility and collective contribution.

Keywords : Tax, Metaphor Analysis, Qualitative Research, Türkiye.

JEL Classification Codes : H26, H29.

Öz

Bu çalışma, vergi mükelleflerinin vergi kavramına ilişkin algılarını metaforlar aracılığıyla incelemek amacıyla yapılmıştır. Metafor analizi yöntemi, vergi mükelleflerinin vergi kavramını zihinlerinde nasıl anlamlandırdıklarını ortaya çıkarmak için etkili bir araçtır. Araştırmada, farklı sosyo-demografik gruplardan vergi mükelleflerinin vergilendirmeyle ilgili ürettikleri metaforları derlemek ve tematik olarak sınıflandırmak için nitel veri toplama teknikleri kullanılmıştır. Bulgular, vergiye ilişkin algıların çeşitli ve çok katmanlı olduğunu göstermektedir. Metaforların çoğu nötr olarak sınıflandırılırken, olumsuz metaforlar sıklıkla yük, zorlama ve ceza kavramlarını; olumlu metaforlar ise sosyal sorumluluk ve ortak katkı anlayışını yansıtmaktadır.

Anahtar Sözcükler : Vergi, Metafor Analizi, Nitel Araştırma, Türkiye.

---

[1] *This study is an expanded, improved, and updated version of the paper titled "A Metaphorical Analysis of Tax Concept in Turkey," presented by Tamer Budak and Serkan Benk at the "MIRDEC 18th International Academic Conference on Economics, Business and Contemporary Discussions in Social Science," held in Lisbon from July 4 to 7, 2022.*

[2] *Bu çalışma, Tamer Budak ve Serkan Benk tarafından 4-7 Temmuz 2022 tarihlerinde Lizbon'da düzenlenen "MIRDEC 18th International Academic Conference on Economics, Business and Contemporary Discussions in Social Science" başlıklı bilimsel etkinlikte sunulan "A Metaphorical Analysis of Tax Concept in Turkey" başlıklı bildirinin genişletilmiş, geliştirilmiş ve güncellenmiş bir versiyonudur.*

1. Introduction

Taxation is as old as human history and has been vital for states to sustain their existence and finance public services. Throughout history, tax practices have emerged in different forms, shaped by societies' economic, social, and cultural structures, and have been one of the most important tools for revealing the individual-state relationship in every period. With the modern understanding of the state, tax systems have become more institutional and comprehensive, and this transformation has also shaped individuals' perceptions of tax. In the individual mind, tax has moved beyond a mere financial obligation and become a reflection of psychological, sociological, and cultural bonds with the state.

In this context, how taxpayers view taxes, the meanings they ascribe to them, and their emotional or cognitive attitudes toward this concept remain core research areas in public finance. While the traditional taxation literature has largely focused on technical regulations, tax collection, tax evasion, and compliance, concepts such as tax psychology, tax ethics, and tax consciousness have gained increasing importance in recent years. In-depth examination of perceptions and attitudes toward taxes, in particular, requires understanding the abstract structures and narratives within an individual's mind, not limited to quantitative data. At this point, metaphor analysis stands out as a powerful tool for understanding how an abstract, multidimensional concept like tax is represented in individuals' worlds.

Metaphors are powerful linguistic and cognitive tools that enable individuals to concretise complex thoughts, experiences, and emotions. As emphasised in the classic study by Lakoff and Johnson (1980), metaphors are not merely a literary element but a fundamental component of the human thought system. From this perspective, people make sense of abstract concepts by associating them with concrete experiences, and metaphors play a crucial intermediary role in this process. While tax is a directly experienced phenomenon for many individuals, it is also intertwined with abstract dimensions such as the relationship with the state, justice, burden, and sharing. Therefore, metaphors can help explore taxpayers' mental world regarding taxes more deeply.

Attitudes toward taxation in Türkiye are shaped by a socio-cultural context and by different historical and social dynamics. Many factors, such as the nature of the state-citizen relationship inherited from the Ottoman Empire and carried into the Republic, understandings of social solidarity, income distribution inequalities, perceptions of tax justice, and the state's tax-collection capacity, influence tax consciousness and voluntary tax compliance. How society interprets tax also significantly shapes voluntary compliance or tax avoidance behaviours. Therefore, a metaphor analysis in the Turkish context would not only reveal the meanings individuals ascribe to taxes but also help develop strategies to strengthen the social legitimacy of tax policies.

The main goal of this study is to reveal how taxpayers view taxes, the concepts they use to make sense of them, and the potential sociopsychological dynamics behind these perceptions by examining their mental images of tax through metaphors. To do so, the study

uses metaphor analysis, a qualitative research method, and systematically classifies and analyses tax metaphors collected from taxpayers. In this way, the aim is to evaluate perceptions of taxes not only at the individual level but also through shared narratives that reflect society as a whole.

In this respect, the study is expected to make significant contributions at both theoretical and practical levels. Theoretically, it adopts an interdisciplinary perspective by conceptualising taxation not merely as an economic phenomenon but also as a social and cultural construct. This approach strengthens interaction between public finance studies and other disciplines such as psychology, sociology, and linguistics, thereby opening new dimensions for analysing the notion of taxation. In practice, identifying negative perceptions or misconceptions about taxation will provide a foundation for developing policy recommendations to enhance tax awareness and compliance.

Indeed, many countries today are not only focusing on sanctions and inspection mechanisms to increase voluntary tax compliance but are also emphasising softer approaches like public information, transparency, and building trust. In this context, understanding the metaphors in taxpayers' minds will allow the state to design more targeted and effective tax administration and communication strategies. For example, while perceiving tax as a burden or punishment negatively affects voluntary compliance, concepts like shared contribution, a service in return, or social responsibility can frame tax more positively. Consequently, metaphor analysis can create practical social benefits beyond mere academic curiosity.

In conclusion, this article aims to make an original contribution to the literature by revealing taxpayers' mental images of the tax concept in the context of Türkiye. To this end, this study will first briefly introduce metaphor theory and its methodology, and then classify and analyse the collected data. The findings will contribute to understanding the general patterns of tax perception and will provide a basis for suggestions to help tax policies gain stronger social legitimacy. Thus, the goal is to help reinforce the understanding that tax is not just an obligation but a social contract that ensures the sustainability of shared life.

2. Literature

Metaphor analysis is a powerful qualitative research method that helps individuals make sense of abstract concepts by concretising them (Lakoff & Johnson, 1980). Studies of the concept of tax are often examined in economic, sociological, and psychological contexts. The metaphorical study of attitudes towards tax is widely used, especially in educational sciences and social sciences (Saban, 2008). This method is an important tool in revealing individuals' subconscious perceptions and value judgments.

As mentioned above, metaphor analysis is widely used, especially in education and the social sciences. In a study by Saban (2008), teacher candidates' metaphors about the concept of school were analysed. This study shows that metaphors shed light on individuals'

mental representations. Similarly, Seferoğlu (2012) examined teachers' perceptions of teaching technologies through metaphors and emphasised that metaphors convey meaning powerfully.

Metaphorical analyses of the concept of tax are more limited. However, Lakoff and Johnson (1980) supported the use of metaphors for economic concepts. Lakoff (1993) also discussed in detail how metaphor shapes thinking in daily life. Although metaphor analysis studies of the concept of tax are limited, they have been conducted in different contexts. For example, Gencel (2013) aimed to reveal the meanings that university students attribute to the concept of "tax" through metaphor analysis. The aim was to understand students' mental images and perceptions of taxes, including the positive and negative dimensions of these perceptions. Aydın and Akbaş (2019) used metaphor analysis to understand individuals' tax awareness in Türkiye and categorised citizens' positive and negative metaphors about tax. Similarly, Kurt and Koç (2020) discussed tax ethics at work, showing that metaphors are an effective tool for understanding individuals' value judgments and perceptions of tax. Güzel and Sönmez-Çalış (2024) examined public finance department students' perceptions of the concept of tax through metaphor analysis. In the study, 128 students produced 63 metaphors, which the authors classified into six conceptual categories. These findings reveal several perceptions about the concept of tax and students' different perspectives on tax.

Although tax-only metaphor analyses are limited, metaphor studies on economic and financial concepts and facts are relatively more common. In his article, Sarıgül (2014) identified the relationship between the financial literacy levels and the demographic characteristics of university students. The study found significant relationships between demographic characteristics and financial literacy levels. In the study, male students were more knowledgeable than female students in general knowledge, banking and investment. The study found that social sciences students had higher financial literacy than students in other fields. Demir (2019) reported a similar result, finding that men's financial literacy was higher than women's.

In his work, Langer (2015) reveals the underlying metaphorical structures of concepts such as "price flexibility" and "money demand" in economic terminology and details how these metaphors make it easier for students to understand complex economic concepts. The article emphasises that teachers should use these metaphors cautiously in classrooms because they emphasise certain aspects of a concept while obscuring others.

In their study, Şahin and Barış (2017) examined whether public employees' financial literacy levels meaningfully affect savings behaviour. The results showed that household income, the ability to follow financial developments, age, and basic and advanced financial literacy positively affect public employees' savings behaviour.

Bayrı and Akçacı (2020) examined the perceptions of individuals living in Kilis province, Türkiye, regarding basic economic and financial concepts through the metaphor method. Participants were given concepts such as "inflation", "unemployment", "gold", and

"savings" and asked to define them. The research used qualitative and quantitative methods and found that demographic factors strongly influenced metaphor choice. For example, some participants associated "inflation" with an out-of-control fire or "trouble". Participants described "saving" as "life-saving" and "unemployment" as a "coffee house".

Cesur and Yılmaz (2021) examined metaphorical perceptions of "bank, credit, insurance and risk." According to the findings, the most prevalent metaphors identified were "loan shark" for the concept of bank, "requirement" for credit, and "life" for risk.

In addition, Zhu Tian-yi (2022) examined both the theoretical and practical functions of metaphors for economic concepts. The research used economic and financial news in English and Spanish. The study concluded that metaphors help illuminate economic activities.

Mohammed and Jawad (2023), in their work titled "Conceptual Metaphor in English Economic News Reports", aimed to reveal how abstract and complex economic concepts are made more understandable to ordinary readers. According to the findings, structural metaphors are the most commonly used type of conceptual metaphor in economic news texts, while orientational metaphors are the least used. The research highlights linguistic metaphors as an important cognitive tool for transferring economic information.

Malik (2023) makes a significant contribution to the literature by addressing a rare topic: the use of visual metaphors in financial literacy. The research aimed to show how visual metaphors can express complex and abstract financial concepts. In this context, he examined visual metaphors for basic financial concepts, including risk diversification, inflation, interest, time value of money, and financial risk. The study's findings showed that visual metaphors can effectively and creatively present complex financial concepts as representational images.

3. Methodology

This study utilised a qualitative research methodology, specifically adopting the metaphor analysis approach. Participants were instructed to form a metaphorical comparison between the concept of tax and an object, entity, or emotion, and subsequently to substantiate their reasoning. We collected and systematically analysed responses from 460 participants using MAXQDA software. We used convenience and snowball sampling to recruit participants until we reached data saturation. Participation in the study was entirely voluntary, and participants were assured that their responses would be kept confidential. We classified the resulting data using content analysis. We categorised metaphors by valence (positive, negative, and neutral) and conceptual nature (abstract or concrete). To ensure data validity and reliability, independent coders conducted an independent assessment. The study examines prominent metaphors and their frequencies within each thematic classification, facilitating a comprehensive understanding of participants' perceptions of tax. The research began only after obtaining the necessary ethical committee approval from the Dicle

University Social and Human Sciences Ethics Committee (Decision number: 14-07-2025-389).

4. Findings

The thematic analysis grouped participant statements by content similarity. For example, while tax is defined with a positive metaphor as a vital factor, such as 'water', negative perceptions are also expressed with intensity through concepts such as 'burden' and 'monster'. Neutral metaphors generally describe tax in a neutral or functional framework.

4.1. Participant Frequency Distributions

When demographic variables and metaphor status are taken together, participants' attitudes towards taxes vary. These attitudes vary by age, gender, and education level. These findings suggest that metaphor analysis can be a functional tool for tax education and tax awareness-raising policies.

Table: 1
Gender Frequency

Gender	Frequency
Male	280
Female	180

Of the survey participants, 60.9% were male (n=280) and 39.1% were female (n=180). This distribution shows that male participants were more heavily represented in the sample group. Gender differences in metaphor production about tax may vary depending on social roles, economic circumstances, and perceptions of taxpayers' social responsibility. The predominance of male participants suggests that this group's perceptions shape the variety and tone of the metaphors. This suggests that social perceptions of tax may differ by gender and that similar studies should consider gender.

Table: 2
Age Distribution

Age Range	Frequency
18-20	45
21-30	204
31-40	114
41-50	63
51 and Above	34

Regarding the age distribution of the participants, a significant portion of the sample is in the 21-30 years of age range (n=204, 44.3%). This is followed by the 31-40 age group (n=114, 24.8%) and the 41-50 age group (n=63, 13.7%). The 51-and-over age group was least represented (n=34, 7.4%).

This age distribution shows that young adults make up the bulk of the sample. Young adults' metaphors about taxes offer important clues about new workers' tax perspectives and

the development of economic responsibility awareness. The limited contribution of older age groups to metaphor production suggests they may prefer more traditional or direct expressions to convey their tax-related perceptions.

Table: 3
Educational Background

Education Level	Frequency
Primary education	73
High school	147
Associate Degree	59
Bachelor's Degree	174
Postgraduate	7

Regarding the distribution of the sample according to educational background, the largest group consisted of Bachelor's degree graduates (n=174, 38.1%). This was followed by high school (n=147, 32.2%), primary education (n=73, 16.0%), and associate degree (n=59, 12.9%). Only 7 graduates (1.5%) reported having a graduate degree.

This table shows that the participants were mainly educated at these secondary and tertiary levels. As education levels increase, taxpayers are more likely to produce metaphors for the concept of tax that are more abstract, creative, and consider social dimensions.

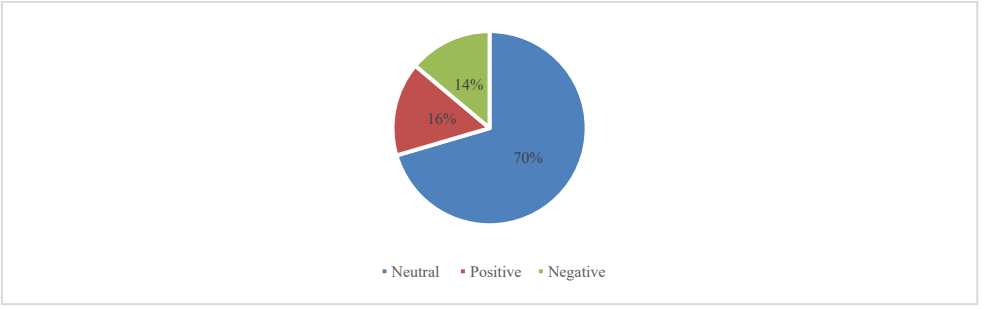
Undergraduate and graduate taxpayers, in particular, tend to develop positive metaphors that frame tax in terms of social function, resourcing, and the welfare state, whereas taxpayers with lower education levels may use more negative or burden-focused definitions.

Table: 4
Frequency Distribution of Metaphors by Situation

Situation	Frequency
Neutral	324
Positive	72
Negative	64

In terms of the general frequency distribution of the metaphors produced, most participants described the tax as a neutral concept (n=324, 70.4%). Of these, 72 individuals (15.7%) produced positive metaphors, while 64 individuals (13.9%) produced negative metaphors.

Graph: 1
State Distribution of Metaphors



The high incidence of neutral metaphors suggests that people generally perceive tax as a social necessity, a natural obligation, or an unbiased obligation. Positive metaphors reflect the awareness that tax is a vital resource that finances public services, while negative metaphors reveal the depressing effect of taxes on taxpayers' economic power and perceptions of possible injustice. This finding points to the need to shift negative taxpayer perceptions by developing tax awareness and tax ethics.

Table: 5
Confusion Matrix for Positive/Negative/Neutral Coding

Index	C2_Positive	C2_Neutral	C2_Negative
C1_Positive	1	0	0
C1_Neutral	3	59	1
C1_Negative	0	0	11

Cohen's Kappa (Positive/Negative/Neutral) = 0.83. This coefficient reflects a very high level of agreement between coders.

The confusion matrix for the positive-negative-neutral coding shows that the two coders agreed most of the time. The closest alignment shows up in the neutral and negative categories, where their choices were almost identical. A few differences appeared in sorting neutral versus positive metaphors, which isn't surprising because some expressions carry a tone that can be interpreted in more than one way depending on how the reader feels about them.

For instance, three metaphors that one coder considered positive were marked neutral by the other, suggesting that the emotional side of certain metaphors leaves room for subjective judgment. Still, these mismatches are small and don't change the overall picture. Cohen's Kappa of 0.83 indicates very strong agreement, showing that the coding system worked consistently in practice.

Overall, the results indicate that the emotional categories used in the study were clear enough for different coders to apply them similarly. This also means the emotional tone of the metaphors can be identified reliably, strengthening the credibility of later interpretive stages in the analysis.

Table: 6
Confusion Matrix for Theme Coding

Index	C2_Protectiveness	C2_Source of Life	C2_Coldness/Rigidity	C2_Exploitation	C2_Economic Resource	C2_Difficulty/Burden	C2_Force of Nature	C2_Direction/Guidance	C2_Emotional
C1_Protectiveness	1	0	0	0	0	0	0	0	0
C1_Source of Life	0	39	1	1	0	0	1	0	1
C1_Coldness/Rigidity	0	0	1	0	0	0	0	0	0
C1_Exploitation	0	0	0	6	0	0	0	0	0
C1_Economic Resource	0	0	0	0	9	0	1	0	0
C1_Difficulty/Burden	0	0	0	0	0	4	0	0	0
C1_Force of Nature	0	1	0	0	0	0	5	0	0
C1_Direction/Guidance	0	0	0	0	0	0	0	2	0
C1_Emotional	0	0	0	1	0	0	0	0	1

Cohen's Kappa (Themes) = 0.86. This indicates a strong thematic agreement between the coders.

The confusion matrix for the thematic coding shows that the two coders agreed on most classifications. In several themes such as Protectiveness, Exploitation, Burden or Difficulty, and Coldness or Rigidity, their decisions were almost identical. This suggests that many metaphors naturally fell into well-separated conceptual groups that the coders could recognise with little hesitation.

However, a few moments didn't line up perfectly. For instance, one coder placed certain metaphors in the Source of Life theme, while the other interpreted them as belonging to Exploitation or Emotional themes. This isn't unusual, since metaphors can blend meanings or shift depending on how a person interprets the tone or context. A similar situation appeared between the Economic Resource and Force of Nature themes, where a small number of metaphors straddled more than one idea. Considering the complexity of metaphorical language, such overlaps are understandable. Even with these minor differences, overall agreement was very strong. Cohen's Kappa of 0.86 supports this, showing that the thematic coding process was applied reliably and consistently. This suggests that the thematic structure used in the study is conceptually solid and practical to work with.

Alongside the affective coding results, this thematic reliability shows that the qualitative part of the study is built on firm ground. The high agreement between coders indicates that the categories and themes used here are not only well-defined but also effective at capturing how people make sense of taxation through metaphor. This is particularly important for research on public attitudes toward tax, since these metaphors help reveal the emotional, moral, economic, and social layers that shape how people think about the tax system.

Table: 7
Metaphor Coding Table

Theme	Valence	Concrete / Abstract	Metaphor
Protectiveness	Positive	Concrete	Blanket
Life Source	Neutral	Concrete	Soil
Coldness / Rigidity	Negative	Concrete	Ice
Exploitation	Negative	Concrete	Leech
Economic Resource	Neutral	Concrete	Market
Life Source	Neutral	Concrete	Tree
Difficulty / Burden	Negative	Abstract	Burden
Force of Nature	Neutral	Abstract	Sun
Life Source	Neutral	Concrete	Breath
Direction / Guidance	Neutral	Abstract	Compass
Emotional	Neutral	Concrete	Tree
Economic Resource	Neutral	Concrete	Gold
Life Source	Positive	Concrete	Soil
Life Source	Neutral	Concrete	Oxygen
Life Source	Neutral	Concrete	Water
Life Source	Neutral	Abstract	Sun
Force of Nature	Neutral	Concrete	Market
Exploitation	Neutral	Abstract	Love
Force of Nature	Neutral	Concrete	Oxygen
Life Source	Negative	Concrete	Breath
Economic Resource	Positive	Concrete	Bread
Economic Resource	Neutral	Concrete	Bread
Coldness / Rigidity	Neutral	Concrete	Water
Exploitation	Neutral	Concrete	Water
Emotional	Neutral	Abstract	Love
Economic Resource	Neutral	Concrete	Money
Life Source	Positive	Concrete	Water
Economic Resource	Neutral	Concrete	Dollar

When you put all the metaphors in the table together, you get a picture that is much more than just one. People seem to have different ideas about taxes. They sometimes say good things about them, but other times they are clearly angry. Many metaphors, such as soil, water, breath, oxygen, and a tree, link taxes to things essential for life. These images show that people don't see taxes only as a financial burden; they also see them as something that keeps the state and society going. People see taxes as a kind of "lifeblood" for society that keeps everything running smoothly. These metaphors keep coming up, showing how strongly the people who answered agree with this idea. Beyond life metaphors, another group of associations places taxes in everyday life. Tax is part of the economic cycle and a way to make money and live, as shown by words like "market," "money," "bread," "gold," and "dollar." This suggests that many people see taxes as tied to the practical needs and routines of everyday life, rather than as an abstract public tool. The table also shows a darker side. Tax seems like something that takes from you, feels heavy, or feels unfair when you use metaphors like leech, burden, exploitation, or coldness. The leech imagery is especially strong because it suggests that taxes take away more than they give back, or that the system is unfairly hard on some people. These negative metaphors suggest that people feel uncertain about fairness and stressed, even when things seem to be going well or are neutral.

This reliance on concrete, discernible, or sensory imagery suggests that individuals understand taxation through elements that align with their personal experiences. Fewer abstract metaphors suggest that most people feel the effects of taxes more than the ideas or morals behind them. Taken together, the metaphors show that people have different,

sometimes conflicting, ideas about taxes. Tax can also be seen as something that provides direction, energy, or order, like the "force of nature" category of words such as "sun," "compass," and "oxygen." There are fewer of these pictures, but they show that some participants see taxes as a way to keep the social system stable, more structurally or symbolically. The dataset includes many real-life examples, which stand out. Many people see it as unfair or too much labour, while others see it as necessary but not harmful. This range of interpretations shows how challenging people's emotions and experiences around taxes can be. Instead of presenting a single overarching story, the table depicts a world in which obligation, need, doubt, and even wrath are all present at the same time. These results show that taxes, often seen as a technical issue, are deeply human and psychologically significant in daily life.

Figure: 1
Tax Metaphor Analysis Word Cloud



This word cloud visualises the meanings participants attribute to the concept of tax by condensing them into metaphors. Word size shows how strongly certain metaphors stand out among participants and which thematic areas they cluster in. For example, "water", "breath", "soil", and "oxygen": the inclusion of words such as these in large print indicates that the tax is imposed by an individual's nature and source of life; it shows that it is frequently metaphorized within the framework of its theme. This reflects the perception that the tax is an essential resource for the state's continuity. Similarly, the "medication", "column", and "glasses" metaphors suggest that the tax is seen as a protective and supportive tool. On the other hand, "tribute", "rob", "leech", "tick", and "thief" carry negative connotations, suggesting that for some respondents the tax is perceived as a burden, exploitation, or injustice. This shows that negative/threat-themed metaphors have a strong place in participants' minds. Another remarkable element is "fire", "electricity", and "sun"; energy metaphors like these sit at the centre of the cloud. These metaphors suggest that the tax is a source of energy or a moving element that ensures the state's continuity. Also, "mother", "child", and "friend" metaphors represent social relations, emphasising that the tax functions as a binding force in the social order. These metaphors also make individuals' emotional and social perceptions of taxes visible. As a result, the word cloud, as a visual summary of the metaphor analysis, shows that society perceives tax in multiple ways. It

reveals: Tax is seen as both a source of life and a building block of social order, but it is also criticised as a burden or threat. This shows, as one of the study's main findings, that social perceptions of taxes are contradictory and layered.

4.2. Abstract and Concrete Classification of Metaphors Related to the Concept of Tax

Concrete metaphors are produced through perceivable entities or objects with sense organs and a counterpart in the physical world. Abstract metaphors are ideas, values, emotions, mental concepts, or elements that lack a complete physical counterpart.

Table: 8
Sample Classification Table

Metaphor	Abstract/Concrete	Sample Comment
Water	Concrete	The tax is embodied as a resource that nourishes life.
Soil	Concrete	A relationship between productivity and return has been established.
Egg	Concrete	The main element of nutrition is emphasised.
Sun	Abstract	Power supply, abstract in a conceptual context.
Compass	Abstract	Direction-finding function; its functional meaning is abstract.
Blanket	Concrete	Function to protect and provide warmth.
Ice	Concrete	A metaphor is established through melting.
Leech	Concrete	Negative concrete analogy with the bloodsucking function.
Love	Abstract	Emotion-based abstract metaphor.
Burden	Abstract	The suppressive nature of the tax.
Light	Abstract	Guiding metaphor; abstract in the conceptual sense.

When the metaphors are arranged on a scale from concrete to abstract, a clearer picture emerges about how people think about taxation. The mix of tangible images with more symbolic or emotional ones shows that participants do not rely on a single way of understanding tax. Instead, they seem to move back and forth between everyday experiences and broader, more conceptual ideas.

The concrete metaphors like water, soil, egg, blanket, ice, and leech come from ordinary objects or sensations. These comparisons suggest that people often fall back on what they know from daily life when trying to make sense of taxation. Some of these, such as water, soil, or an egg, carry positive associations tied to growth and nourishment, which may suggest that tax is imagined as something that sustains society. A blanket evokes protection. But not all of these concrete images are positive: ice and leech, for instance, reflect discomfort or distrust, hinting that taxation can feel cold, distant, or draining.

Abstract metaphors work differently. Words like sun or light bring up ideas tied to direction, clarity, or continuity, almost as if tax helps keep the system steady. Compass fits this same pattern by pointing to guidance or orientation, something that helps people navigate the relationship between the state and citizens. The metaphor of love, although unusual in this context, adds an emotional colour that suggests responsibility, unity, or shared benefit. Burden, by contrast, carries the weight of obligation and strain, showing how taxation can also feel heavy on a personal level.

Taken together, the metaphors in this table show that participants do not stick to one type of reasoning. They draw from concrete physical experiences, but they also use more abstract or symbolic ways of thinking. This variety suggests that taxation is not experienced only as a technical or financial issue. It is also wrapped up in emotional, moral, and social meanings that shape how people talk about it. The range of metaphors across the abstract-concrete continuum points to the complexity of how people understand tax.

Table: 9
Abstract-Concrete Metaphors Estimated Frequency Distribution

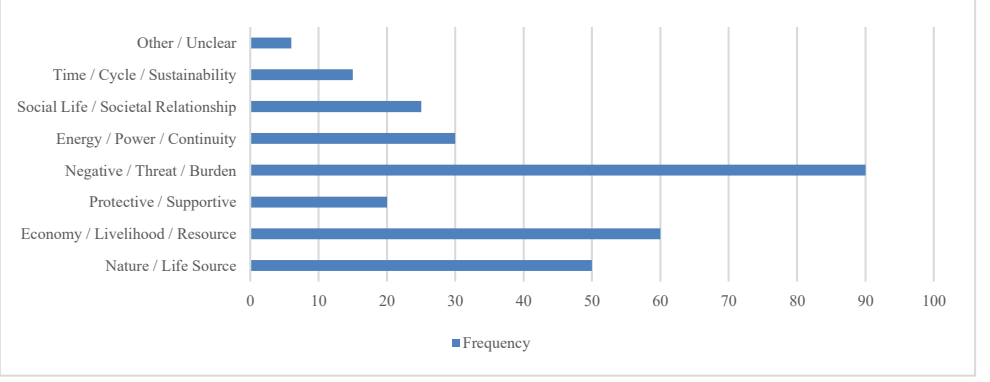
Category	Example Metaphors	Frequency (Example)	Rate (%)
Concrete Metaphors	Water, Earth, Eggs, Blankets, Ice, Leech	320	70%
Abstract Metaphors	Compass, Light, Love, Burden, Fear	140	30%
Total		**460**	**100%**

The vast majority of respondents prefer concrete metaphors, suggesting they associate tax with everyday life. Metaphors such as water, soil, and eggs reflect the perception that tax is a resource that sustains life, while examples such as leeches and ice define tax as a burden with negative, concrete connotations. Abstract metaphors, by contrast, frame tax as guidance, obligation, or an element of social order. This distinction reflects participants' awareness of tax.

4.3. Thematic Analysis of Metaphors and Examples

Taxpayers' answers and the metaphors they create are classified in relation to each other and grouped under 7 themes. The metaphor responses were classified into seven substantive themes, while five metaphors that could not be assigned to these themes were placed in the Other/Unclear category.

Graph: 2
Metaphor Frequencies by Themes



Together, the themes in Graph 2 show how unevenly the metaphors are distributed. The Negative / Threat / Burden theme stands out with a noticeably high count. This suggests that people often approach taxation with feelings of pressure, unfairness, or a sense that tax takes something away rather than giving anything back. The emotional weight in this cluster is strong and hints at broader discomfort with tax practices or the institutions that administer them. The next major cluster is tied to Economy / Livelihood / Resource, which makes sense given that most individuals interact with taxation through their earnings, purchases, and savings. These metaphors show that people largely understand taxation as intertwined with personal financial life.

Another sizable category is Nature / Life Source, which brings a different tone into the overall picture. These metaphors frame tax as something necessary, almost like a resource that keeps society operating. It reflects an understanding that public services rely on tax revenue just as living things rely on natural elements. Themes such as Energy / Power / Continuity and Social Life / Social Relationship occupy a middle ground in frequency. They portray taxation as either the force that keeps the state running or part of the ties that hold society together. They do not dominate the picture, but they show that some participants view tax as more than an economic tool, one that contributes to movement, order, or shared responsibility.

Less frequent but still meaningful are the Protective / Supportive and Time / Cycle / Sustainability themes. These metaphors show an awareness of taxation as something long-term and stabilising. They hint at ideas of security, continuity, and structure. Finally, the Other / Unclear group is quite small, meaning nearly all metaphors fit into identifiable themes. This suggests people tend to frame taxation in familiar mental categories, even when they are not consciously thinking about it.

Overall, the distribution shows a layered understanding of tax: negative emotions appear strongly, but economic, social, ecological, and temporal ideas also play a role. Taxation, in participants' minds, seems to stretch far beyond numbers and income slips, carrying meanings that touch on daily life, collective order, and even existential concerns.

Table: 10
Nature/Life Source

Metaphor	Description	Frequency
Water	The source of life describes the necessity of taxation.	12
Breath	It is necessary for the state's continuity.	10
Oxygen	If not, the state cannot survive.	8
Soil	Abundance, sustainability.	7
Tree	It grows, develops, and is the basis of society.	6
Sun	It is a source of energy and gives life.	5
Rain	It constantly comes and nourishes the cycle.	2
Air	It covers everyone; it cannot be controlled.	3
Life	State existence.	4
Brook	It flows constantly and is uninterrupted.	2
Ocean	Infinitely large resource.	1
Lifeblood	Artery of the state.	2
Stream	Uninterrupted flow, continuity.	1

When looking at the metaphors placed under the "nature" or "life source" theme, it becomes clear that many participants think about taxation in a way that goes beyond money or policy. They seem to picture tax as something that keeps the whole system, both society and the state, running. Many of the metaphors in this group come from basic elements of life, suggesting that people try to make sense of taxation through things that feel essential or sustaining.

Some of the most frequently mentioned metaphors water, breath, oxygen show this quite plainly. These comparisons suggest that tax is treated almost like something a state needs to survive, much the way a person relies on air or water. In that sense, taxation is viewed not just as a tool for collecting revenue, but as a kind of lifeline that allows public institutions to keep functioning. Other metaphors soil, tree, sun, rain, and stream bring out different shades of meaning. Soil and trees, for instance, often represent growth or the roots of a system, so participants may be suggesting that taxation supports society's long-term development. Sun and rain suggest renewal and energy. Flowing-water metaphors, like a stream or river, suggest movement that doesn't stop, which fits the idea of tax revenue being constant and necessary.

The air metaphor adds another layer, since everyone shares it and cannot avoid it. That comparison reflects the idea that taxation touches everyone, regardless of status or choice. A few others, like ocean or lifeblood, point to the scale and importance of tax revenues as something vast, deep, and essential to keeping the system alive. Together, these metaphors form a general picture: many participants seem to view taxation, at least in this theme, as something that enables life rather than restricts it. By linking tax to natural elements, they frame it as something that supports society's continuity, helps public systems operate, and sustains the state itself. This shows that people sometimes think about taxation not only in economic terms but also in ways that resemble biological or ecological processes.

Table: 11
Economy/Livelihood/Resource

Metaphor	Description	Frequency
Bread	Livelihood, basic food.	6
Money	Economic resources, income.	5
Gold	Valuable savings.	4
US Dollar	Foreign trade, foreign exchange.	3
Market	Everything is found; diversity.	6
Nutrient	It nourishes and gives vitality.	4
Food	Means of livelihood, vital.	5
Source	Income source.	5
Earnings	Economic benefit.	2
Debt	Burden to be paid.	3
Zakat	Mandatory contribution.	1
Piggy bank	Accumulation tool.	2
Investment	Future preparation.	2
Food	Nourishing element.	1
Food coloring	Fake image.	1
Rent	It goes on constantly.	2

Metaphors in this group show that many participants interpret taxation through what they deal with every day: work, income, expenses, and survival. Terms like bread, money,

market, or earnings connect tax directly to the economic pressures people feel. Some metaphors such as bread, food, and nutrients suggest that tax is woven into the basic conditions of living. Others, including gold, US dollar, piggy bank, or investment, frame tax as something that interacts with personal savings or long-term financial plans. A few negative metaphors, like debt or rent, reflect irritation or fatigue with taxation as an ongoing financial responsibility.

Table: 12
Protective/Supporting

Metaphor	Description	Frequency
Medicine	Treatment, protection.	5
Vitamin	Reinforcement strengthens.	3
Glasses	Clarifies vision.	2
Glove	Protective tool.	1
Umbrella	Protective shield.	1
Collateral	Assurance.	1
Warranty	State guarantee.	1
Insurance	Hedging.	1

This theme presents taxation as something that protects, strengthens, or clarifies social life. Metaphors such as medicine, vitamin, glasses, umbrella, and insurance describe tax as helpful rather than harmful. Some participants see taxation as something that repairs issues (medicine), others as something that strengthens society (vitamin), while some view it as a safety net (insurance, warranty). This theme portrays tax as a shared contribution that ultimately benefits the community.

Table: 13
Negative/Threat/Burden

Metaphor	Description	Frequency
Tribute	Forced.	6
Robbery	Unfair seizure.	5
Leech	Constantly sucking.	4
Tick	It sticks; it doesn't let go.	4
Vampire	Bloodsucker, exploitation.	3
Thief	Steal.	3
Swamp	No exit.	2
Yoke	Forcing.	2
Loan shark	Exploitation with interest.	2
Cancer	It kills slowly.	1
Persecution	Pressure and torment.	1
Burden	Difficult to move.	1
Unnecessary	It goes in vain.	1
Eraser	Deletes, destroys.	1
Garbage	Useless spending.	1

This cluster contains the most intense metaphors. Words like tribute, robbery, leech, tick, vampire, or loan shark carry strong emotional reactions. They depict tax as something taken unfairly, or as a force that drains resources. Metaphors such as swamp, yoke, or persecution convey a lack of control or a lack of escape. Overall, these images show deep frustration with taxation, reflecting not just financial concerns but also issues of trust and perceived fairness.

Table: 14
Energy/Power/Continuity

Metaphor	Description	Frequency
Fire	Burning power.	4
Electric	Energy source.	3
Charging	It gives strength again.	2
Fuel	Working resource.	2
Molasses	Sweet energy.	1
Engine	Provides movement.	1
Charger	Feeds, renews.	1
Volcano	Explosive energy.	1
Fuel tank	Energy stock.	1

Metaphors in this theme describe taxation as fuel that keeps the state running. Terms like fire, electricity, fuel, engine, or charger portray tax as something that activates systems, keeps them going, or restores energy when necessary. Some metaphors emphasise movement (engine), others highlight vitality or renewal (charging). The theme suggests that taxation is understood as an ongoing source of power behind government functions.

Table: 15
Social Life/Social Relationship

Metaphor	Description	Frequency
Mother	It enlarges and protects.	4
Child	It develops and grows.	4
Marriage	Binding structure.	3
Friend	Sharing.	3
Court	Justice.	2
Love	Emotional connection.	2
Wedding	Togetherness.	1
Baby	New beginning.	1
Friendship	Social relationship.	1
Family	The basis of society.	1
Queen bee	Production leader.	1

Here, tax is expressed in relational or emotional terms. Metaphors such as mother, child, marriage, friend, family, or love show that some participants view taxation as part of the social fabric. In these metaphors, tax appears as something that nurtures or supports (mother, child), creates bonds (marriage), or fosters cooperation (friendship, family). It suggests that taxation is sometimes interpreted as part of a collective agreement or shared moral responsibility.

Table: 16
Time/Cycle/Continuity

Metaphor	Description	Frequency
Time	Never-ending cycle.	4
Hour	Transition, flow.	3
Vicious circle	No exit	2
Working capital	Continuous system.	2
Pi number	There is no end.	1
Well	Deep, no way out.	1
Time machine	Past-future.	1
Bucket with hole in the bottom	No matter what you do, it won't fill up.	1
Faucet	It flows constantly.	1
Brook	It flows constantly and is uninterrupted.	2
Swirl	It sucks.	1
Dead end	No alternative.	1
Elevator	Up down.	1
Clock hand	Continues.	1
Infinity	Never-ending.	1

Metaphors in this theme emphasise how taxation is experienced as an ongoing, recurring part of life. Words like time, hour, faucet, brook, infinity, or vicious circle portray tax as something that keeps happening, routine, predictable, and constant. Some metaphors highlight flow (brook, faucet), while others reflect frustration (dead end, well). Still, the dominant idea is continuity: taxation is not temporary, but built into the rhythm of social life.

Table: 17
Other / Indeterminate Metaphors

Metaphor	Description	Frequency
Infinite space	Limitlessness and uncertainty.	1
Black hole	It absorbs everything.	2
outer space	Meaninglessness, disconnection.	1
Night	Darkness, uncertainty.	1
Fog	It obstructs and obscures the view.	1

The metaphors here infinite space, black hole, outer space, night, fog are less straightforward. They evoke confusion, distance, or uncertainty. These images suggest that, for some participants, taxation feels abstract, hard to grasp, or unclear. The small size of this category indicates that such ambiguity is relatively rare compared to the more defined themes. Across all themes, participants express a wide range of feelings and thoughts about taxation. Many metaphors are negative, but others view tax as a resource, a source of strength, a stabilising factor, or even a part of social relationships. This shows that taxation is not seen only as an economic obligation; it carries emotional, symbolic, and social meanings that shape how people make sense of it.

5. Conclusion

In this study, the perceptions of taxpayers towards the concept of "tax" are studied in depth through the method of metaphor analysis, and the meanings attributed to tax are presented through the mental representations of individuals. In this qualitative study, participants were asked to complete the statement "Tax is like… Because…" and the

resulting metaphorical expressions were analysed for content and classified into themes. The findings reveal that perceptions of tax are highly diverse, layered, and often emotionally driven.

One main finding is that a significant portion of taxpayers associate tax with negative connotations. These metaphors suggest that individuals perceive tax as an unfair, coercive, one-way, and unrequited obligation. Participants said that tax operates as the state seizing individual resources rather than providing social benefits. This situation is closely related to elements such as distrust of taxes, lack of transparency, doubts about the effectiveness of public expenditures and weak voluntary compliance with taxes.

On the other hand, although fewer, some participants evaluated the tax in positive or functional terms. These statements show that individuals view the tax as a tool of the social contract, accepting it as a means of financing public services and promoting social justice. These positive metaphors can be considered as indicators of relative trust in public administration and citizenship awareness.

In light of these findings, public policies should consider not only financial obligations but also perception management to strengthen tax awareness and increase voluntary compliance. Organising tax-related communication strategies in a more transparent, participatory way that increases the visibility of public services can turn negative metaphors into positive ones. In this context, informing taxpayers about after-tax services, increasing the visibility of public investments, and establishing trust in fair tax practices are important.

Metaphor analysis is a valuable tool because it goes beyond classical quantitative survey techniques to capture abstract concepts, emotional evaluations, and cultural representations ingrained in individuals' minds. As this study shows, the meanings that individuals attach to taxes are not only economic; they also carry psychological, social and political dimensions. This multi-layered structure makes it necessary to consider not only technical but also social and cultural dimensions in designing tax policies.

The findings show that people think about taxes in a layered, sometimes conflicting way, yet still in a recognisable pattern. Because most participants were men (about 61%) and many were between the ages of 21 and 30, the metaphors naturally reflect younger adults' viewpoints. The high number of undergraduate respondents also contributed to a mixture of metaphor types, some very concrete and tied to everyday experiences, others more abstract and focused on broader social meanings. When considering the emotional tone of the metaphors, most participants described tax in neutral terms. Still, a meaningful number offered positive or negative images, suggesting that tax is seen as both necessary and financially straining. The strong presence of concrete metaphors (around 70%) shows that many people rely on physical objects or daily routines to explain what tax feels like. Items such as water, soil, bread, markets, ice, or leeches reflect this tendency. The thematic analysis adds more depth to this picture. In the "Nature / Life Source" theme, metaphors like

water, breath, oxygen, and soil portray tax as essential to keeping society and the state functioning. In the "Economy / Livelihood / Resource" theme, images such as bread, money, market, income, debt, and rent show that participants link tax closely to their economic lives. At the same time, the prominence of the "Negative / Threat / Burden" theme, filled with metaphors like racketeering, robbery, leech, vampire, or loan shark, reveals widespread concerns about fairness and trust in the tax system. Other themes reflect different ways people understand tax. Some see tax as protective, as shown in metaphors like medicine, vitamins, or insurance. Others treat it as a kind of energy that keeps the state operating, as seen in references to fire, electricity, or fuel. Other metaphors highlight tax's role in social life, such as mother, child, or marriage, which imply shared responsibility or social structure. Lastly, metaphors like time, tap, or stream reflect tax as a continuous cycle that never stops. Altogether, these insights show that people interpret taxation in several ways at once: as an ordinary obligation, as something that supports social life, and as a potential burden or threat. This complex network of meanings suggests that efforts to improve tax awareness and strengthen tax ethics must account for these multiple, sometimes conflicting perceptions.

As a result, the metaphors that take shape in taxpayers' minds reflect not only individual perceptions but also structural problems with the tax system. New regulations, reforms and communication strategies in this context should address not only rates or obligations, but also perceptions and maps of meaning. Only in this way can the tax be repositioned from an "obligatory burden" on individuals to a necessary contribution to the sustainability of common life.

In line with the findings of the research, the recommendations are:

- Training programs should be organised to increase tax awareness.
- Taxpayers' trust in the state should be increased by ensuring the transparency of its expenditures.
- A fair distribution of the tax burden should be ensured, and the public should be informed about this issue.

References

Aydın, S. & H.E. Akbaş (2019), "Vatandaşların Vergiye İlişkin Algılarının Metafor Analizi ile İncelenmesi", *Vergi Dünyası Dergisi*, 46(538), 123-140.

Bayrı, Y. & T. Akçacı (2020), "Metafor Yöntemi ile Temel Ekonomik ve Finansal Kavramların Algı Seviyelerinin Belirlenmesi: Kilis Örneği", *Akademik Araştırmalar ve Çalışmalar Dergisi*, 12(23), 452-470.

Cesur, E. & T. Yılmaz (2021), "Banka, Kredi, Sigorta ve Risk Kavramlarına İlişkin Bankacılık ve Sigortacılık Öğrencilerinin Metaforik Algılarının Değerlendirilmesi (Sakarya İli Örneği)", *İşletme Araştırmaları Dergisi*, 13(2), 1712-1736.

Demir, T. (2019), "Determining Financial Literacy Level of University Students: The Case of Yildiz Technical University", *Master's Thesis*, YTÜ Sosyal Bilimler Enstitüsü, İstanbul.

Gencel, U. (2013), "Vergi Kavramına İlişkin Öğrenci Metaforları Üzerine Bir Araştırma", *Maliye Dergisi*, 165, 123-140.

Güzel, S. & Ö.A. Sönmez-Çalış (2024), "Maliye Bölümü Öğrencilerinin Vergi Kavramına İlişkin Algılarının Metafor Analizi Yolu ile İncelenmesi", *International Journal of Social Inquiry*, 17(3), 617-635.

Kurt, I. & A. Koç (2020), "Analysis of Tax Morality Through Metaphors: A Qualitative Research", *Journal of Finance*, 179, 250-267.

Lakoff, G. (1993), "The Contemporary Theory of Metaphor", in: A. Ortony (ed.), *Metaphor and Thought* (2nd ed.) (202-251), Cambridge: Cambridge University Press.

Lakoff, G. & M. Johnson (1980), *Metaphors We Live By*, Chicago: University of Chicago Press.

Langer, T. (2015), "Metaphors in Economics: Conceptual Mapping Possibilities in the Lectures of Economics", *Procedia Economics and Finance*, 25, 308-317.

Malik, A. (2023), "Evaluating the Visual Metaphors of Financial Concepts through Content Analysis", *Journal of Risk and Financial Management*, 16(3), 202.

Mohammed, N.J. & H.F. Jawad (2023), "Conceptual Metaphor in English Economic News Reports", *Journal of University of Raparin*, 10(4), 154-172.

Saban, A. (2008), "Okula İlişkin Metaforlar", *Kuram ve Uygulamada Eğitim Bilimleri*, 8(2), 459-496.

Şahin, M. & S. Barış (2017), "Finansal Okuryazarlık ve Tasarruf Davranışları: Kamu Çalışanları Üzerine Bir İnceleme", *Çankırı Karatekin Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 7(2), 77-103.

Sarıgül, H. (2014), "Üniversite Öğrencilerine Yönelik Bir Finansal Okuryazarlık Anketi Uygulaması", *Muhasebe ve Finansman Dergisi*, (63), 19-35.

Seferoğlu, S.S. (2012), "Öğretmen Adaylarının Öğretim Teknolojilerine Yönelik Metaforları", *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 42, 273-284.

Zhu, T. (2022), "An Analysis of Conceptual Metaphors in Economic Discourse", *Journal of Economics and Management*, 12(6), 113-125.

Sosyoekonomi

2026, Vol. 34(70), 353-376

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.15
Date Submitted: 08.09.2025
Date Revised: 12.10.2025
Date Accepted: 01.10.2026

Technological Unemployment and Its Reflection in Cities: The Case of Zonguldak Province

Gökhan OFLUOĞLU *(https://orcid.org/0000-0002-4909-1113), Zonguldak Bülent Ecevit University, Türkiye; gofluoglu@yahoo.com*

Teknolojik İşsizlik ve Kentlere Yansıması: Zonguldak İli Örneği

Abstract

In developing countries, urban unemployment often results from newcomers' inability to adapt to technological advancements. A segment of the unemployed population in large cities needs upskilling to meet the demands of new technologies and evolving workplace requirements. This will help reduce unemployment caused by a lack of technological adaptation in urban areas. This study, specifically focused on the city of Zonguldak, examines the technological and urban adaptation of employees who have moved from rural areas to work in the manufacturing industry. The research also investigates their concerns about technological unemployment.

Keywords : Technological Unemployment, Urbanisation, Employment, Industry 4.0, Technological Unemployment Anxiety, Technology Education.

JEL Classification Codes : J6, J2, C4, C5.

Öz

Gelişmekte olan ülkelerde kentsel bölgelerde görülen işsizlik, kente yeni gelenlerin teknolojik gelişmelere uyum sağlayamamalarından da kaynaklanmaktadır. Büyük kentlerdeki işsiz kitlenin bir bölümü yeni teknolojilere ve çalışma hayatındaki yeni gelişmelerin gerektirdiği niteliklere uygun hale getirilmelidir. Böylece kentlerde teknolojik uyumdan kaynaklanan işsizlik azaltılabilir. Bu çalışmada, Zonguldak şehri özelinde kırsal bölgeden kentsel alandaki imalat sanayinde bir işe yerleşmek amacıyla gelen ve imalat sanayinde çalışanların teknolojik gelişmelere uyum sağlama durumu ile teknolojik işsizlik kaygısı incelenmiştir.

Anahtar Sözcükler : Teknolojik İşsizlik, Kentleşme, İstihdam, Endüstri 4.0, Teknolojik İşsizlik Kaygısı, Teknoloji Eğitimi.

1. Introduction

Technology distinguishes humans from other living beings as social entities, shapes the emergence of different types of societies, and can even create differentiation within the same societal structure by expressing humanity's ability to adapt to new environments. This concept, which can bring seemingly opposing ideas together in the same space and time, also emerges as a crucial infrastructural concept from both social and economic perspectives. When discussing social and economic development, technology must come first. Technology stands out as a key infrastructural element that transforms societies (Bal, 2010: 2).

To adapt to technology, the public and private sectors are investing in research and development. It is important to ensure a workforce qualified to keep up with new developments. For those seeking new job opportunities in cities, adapting to technology matters to prevent or reduce technological unemployment. In developing countries, including Türkiye, increasing research, development, and education expenditures to build a qualified workforce becomes inevitable to reduce technological unemployment in urban areas. Technology is driving new transformations in cities' social structures. This new transformation signals a shift in purpose that also affects the behavioural patterns of individuals living in urban areas. Technology influences many variables on social, economic, and behavioural levels. While technological changes increase the demand for skilled labour in urban areas, they reduce the demand for unskilled labour. Income inequality is steadily increasing. As technology meets ever-growing human needs, it also drives changes in social phenomena such as urbanisation, organisation, shifts in family structures, and the need for higher education (Fukuyama, 1999: 244).

2. Industry 4.0, Technological Developments, and Their Impact on Unemployment

The Industry 4.0 process was first introduced at the industrial fair held in Hannover, Germany. This concept is seen as a phenomenon expected to affect key economic actors structurally. With Industry 4.0, the main goal is to redesign production, particularly in the manufacturing sector, by equipping it with new technological innovations. The aim is to achieve maximum efficiency and flexibility in production, reduce human error, and replace human labour with computers. As a result, while artificial intelligence and increasingly widespread automation -currently dominating the global agenda - are expected to create new job sectors over time, many existing occupations and professions are also anticipated to become obsolete. New job sectors are particularly evident in urban areas. However, a significant portion of the population may lack the qualifications required by these emerging job sectors but still have the desire and willingness to work, and may face the harsh reality of technological unemployment (Öcal & Altıntaş, 2018: 2066).

One core component of the Industry 4.0 process, the Internet of Things (IoT), supports systems that can operate without human supervision and become increasingly

intelligent over time through unique algorithms. According to Greengard, this process will bring both advantages and disadvantages. As artificial intelligence continues to evolve, many professions will disappear due to automation. However, this transformation will also create new job sectors. By the end of the process, the overall landscape of working life, employment models, social norms, and behavioural patterns will be redefined. Those who fail to adapt to the new norms of working life will face technological unemployment (Greengard, 2017: 13-14).

Technological advancements substitute labour with capital, contributing to unemployment. At the same time, increasing demand for new products and services can generate new job sectors and employment opportunities. For people migrating to urban areas in search of these new job opportunities, access to suitable positions that match the qualifications required by emerging sectors will be possible only through increased investment in research, development, and education (Schwab, 2017: 44).

It is stated that technological developments emerging from the Industry 4.0 process have led to technological unemployment. Authors who take a positive view argue that technological advancements improve the quality of working life and that information technology increases employment. According to proponents of this view, unemployment rates would rise even more if new technologies were not utilised. Although technological developments may cause technological unemployment, increased productivity is expected to raise overall prosperity. This, in turn, is believed to positively affect markets, leading to the creation of new employment opportunities. On the other hand, those with a negative perspective argue that replacing labour with information technologies will result in technological unemployment. Authors with a more neutral stance suggest that the impact of technological innovations will vary depending on how and for what purpose employees use the technology. (Naz & Altay, 2023: 94).

In Türkiye, the employment structure has also changed alongside industrial development. Following migration from rural to urban areas, the working population's living standards have changed. Employment has shifted from agriculture to industry and services. The main reason for this transition between sectors is undoubtedly the developments and technological advances that occurred following the Industry 4.0 process. As a result, the employment structure has changed, especially in urban areas of Türkiye. Demand for qualified labour aligned with technological developments has increased. This situation highlights the need for research and development and education expenditures across all sectors (Naz & Altay, 2023: 94).

3. Literature

Numerous studies examine technological unemployment worldwide and in Türkiye. In Türkiye, these studies are generally micro-level. These studies use variables such as research and development expenditures, high-technology exports, and the number of patents. Overall, technological advancements positively affect employment rates in developed

countries. In contrast, in developing countries, technology has a negative impact because workers cannot adapt to it. Global studies have found that in high-tech industries, technology positively affects unemployment, whereas in sectors with relatively lower technology levels, it does not affect unemployment (Manga & Tuna, 2023: 558; Naz & Altay, 2023: 95).

In the 1940s, Joseph Alois Schumpeter studied the concept of creative destruction. He argued that entrepreneurs who want to strengthen business competitiveness and gain monopolistic profits must prioritise research and development. Schumpeter claimed that as new ideas are introduced, previous ones will lose their validity, and workers who fail to adapt to new technological advancements may become unemployed (Schumpeter, 1942). Over thirty years after 1960, Paolo Pini examined the impact of technological conditions on employment in the USA, Japan, Canada, Germany, Belgium, France, Italy, the Netherlands, and the UK. He found that technological investment increased unemployment rates (Pini, 1995: 185).

In 1991, Zimmerman conducted a study in Germany on demand and labour costs in 16 manufacturing enterprises from 1980 to 1984. Using surveys, Zimmerman analysed how demand and labour cost levels, as well as technological innovations, affected employment levels. He found that demand uncertainty could negatively affect employment, while technological progress also had a secondary effect. Labour costs, by contrast, did not determine employment levels (Zimmerman, 1991: 253).

In his study examining the sectoral distribution of the labour force in Türkiye between 1985 and 1992, Taymaz investigated the effects of technological innovations on employment and production in the manufacturing sector using the least squares method. The author found that technological innovations negatively affected employment levels but noted that increases in productivity and production could mitigate this effect (Taymaz, 1998: 1-36).

Another study on technological unemployment by Cardullo and Ansal (1997), which examined the effects of technology on employment, found that introducing technological equipment in printers led to a decrease in employment levels (Ansal & Cardullo, 1997: 45).

Borrego and Collado investigated the causal relationship between skilled-labour employment and research and development investments. Their research found that businesses investing in renewing production processes experienced increased employment. According to the authors, in an innovative business, reductions in employment stem more from the company's internal structure than from technological innovations (Borrego & Collado, 2002: 148). Piva, Santarelli, and Vivarelli also argued that increases in technological innovation lead to higher employment levels. They argued that companies that prepare for technological investments and plan accordingly in advance will not experience a contraction in employment (Piva et al., 2005: 141). Another study in Italy by Bronwyn Hall and colleagues suggested that innovations in the production process do not directly

affect employment; rather, employment levels depend on sales of new products (Hall et al., 2007).

According to some economists who have studied the effects of technological innovations, when demand exists for products that can survive in the market, employment levels increase; however, innovations aimed at improving productivity tend to reduce employment (Manga & Tuna, 2023: 561). Harrison and colleagues attempted to analyse the data from 1998 to 2000 on the relationship between R&D activities and employment levels of businesses operating in Germany, the UK, Spain, and France. They found that introducing technological innovations to improve production processes changes job descriptions, job requirements, and, naturally, job evaluations, creating technological unemployment. However, the authors argued that this situation is temporary and, contrary to popular belief, that R&D increases profitability and productivity, thereby raising employment levels (Harrison et al., 2008).

In a 2008 study, Altıntepe and Öztürk examined migrants' adaptation to urban areas in Türkiye and to technological innovations in urban workplaces. Using a survey method, the authors found a positive relationship between the length of time people from rural areas spent in cities and their adaptation to the urban environment and the labour market in urban regions (Öztürk & Altıntepe, 2008: 1587-1625).

Kocabaş analysed the relationships between production, capital, labour, and technology variables in Türkiye between 1980 and 2001. Based on the effects of technological innovations on production capacity and labour force, he examined manufacturing sector data using the least squares method. The study found that technology positively affected labour, capital, and production (Kocabaş, 2010).

Raul Katz and his colleagues stated that advancements in internet technology have deeply affected all aspects of our lives. They empirically analysed the impact of investments in the internet sector on employment in Germany. Their studies showed that internet expenditures would increase gross domestic product and, in turn, raise employment (Katz et al., 2010: 26).

Horst Rottmann and Stefan Lachenmaier examined data from German manufacturing enterprises between 1982 and 2003. They demonstrated that the employment-increasing potential of R&D for new products was much higher than the employment-reducing effect of process-related innovations (Rottmann & Lachenmaier, 2011: 210).

Francesco Bogliacino, Maria Christina Piva, and Marco Vivarelli analysed data from 674 enterprises, selected from 701 enterprises operating in manufacturing and service sectors within the European Union, covering the years 1990 to 2008, using panel data analysis. As a result, they found a positive relationship between R&D expenditures and employment levels in enterprises that utilised technological innovations. Conversely, in

enterprises that did not invest in technology, they found no relationship between R&D expenditures and employment levels (Bogliacino et al., 2012: 56).

Rinaldo Evangelista and Antonio Vezzani identified organisational renewal as a connecting mechanism between technological development and the labour market. The authors conducted empirical studies to determine whether technological investments, when combined with organisational change, affect employment levels. They argued that in the manufacturing sector, only process-related innovations, when coupled with organisational change, reduced employment, whereas this effect was absent in the service sector (Evangelista & Vezzani, 2012: 817).

In 2013, Horst Feldman examined patent and unemployment variables for 21 industrialised countries from 1985 to 2009. Panel data analysis identified technological unemployment in industrialised countries. The results indicated that technological innovations increased unemployment within three years. However, the author argued that this effect was not present in the long term (Feldman, 2013: 1099).

In their 2014 study, Erik Brynjolfsson and Andrew McAfee argued that as artificial intelligence applications advanced, software-assisted robots began to replace human labour in the production process. According to the authors, although economic growth recovered after the 2008 financial crisis, the delayed decrease in unemployment was primarily due to artificial intelligence applications (Brynjolfsson & McAfee, 2014).

In 2016, Jae-Hee Chang and colleagues examined the relationship between technological investments and unemployment in developing countries. They found that in Southeast Asian Nations (ASEAN) member states, including the Philippines, Malaysia, Indonesia, Thailand, and Singapore, most occupations were at risk due to technological innovations (Chang et al., 2016). Undoubtedly, technological developments tend to spread over time, as they represent a highly complex process that operates market mechanisms to meet the social and political needs of their era (Nübler, 2016; Manga & Tuna, 2023: 559).

Cirera and Sabetti analysed data from 15,000 enterprises in underdeveloped countries between 2013 and 2015. They found that technological advancements, while introducing new products to the market, also increased business profitability, which in turn led to higher employment (Cirera & Sabetti, 2016).

Falk and Hagsten examined the impact of product innovation on employment growth in industrial and service sectors for eight European countries. They analysed enterprise-level data from 25 industries in Denmark, France, the Netherlands, the United Kingdom, Norway, Italy, Finland, and Austria for the years 2002-2010. Their study examined the relationship between changes in revenue after introducing new products and the number of employees proficient in information technology. The results showed that increased product innovation raised employment by about 1.6 percentage points, while service-sector employment was insensitive to product innovation (Falk & Hagsten, 2017).

In a study by Daron Acemoğlu and Pascual Restrepo examining competition between robots equipped with artificial intelligence and human labour, they found that a single robot directly involved in production could replace six workers (Acemoğlu & Restrepo, 2017).

In 2017, Piva and Vivarelli conducted a study using data from 1998 to 2011 for 11 European countries, focusing on employment levels, R&D expenditures, and gross fixed capital formation. The study examined the impact of technological innovations on employment levels using panel data analysis. The results indicated that capital accumulation had a negative effect when evaluated together with employment. Overall, there was a positive relationship between R&D expenditures and employment, but this favourable outcome originated from medium- and high-tech sectors (Piva & Vivarelli, 2017: 1).

In their study on the increasing use of artificial intelligence in working life, Frey and Osborne examined the risks this posed to different industries in the United States and how it could lead to income inequality. They concluded that 47% of current job definitions could potentially be replaced by artificial intelligence due to technological advancements (Frey & Osborne, 2017: 254).

In 2016, the World Bank published a report examining AI's impact on employment. The study found that 57% of existing occupations in OECD countries could be performed by robots equipped with artificial intelligence (The World Bank, 2016). Conversely, some economists argue that adopting newly introduced products and services will increase demand, thereby boosting employment. However, when new technologies aimed at raising productivity levels in the production process are introduced, unemployment will rise in the short term (Manga & Tuna, 2023: 561).

In the United States, in 2018, Krousie conducted a study examining research and development expenditures, education expenditures, gross domestic product, minimum wage, unionisation, crime rates, unemployment benefits, and poverty rates between 2002 and 2013. Using ordinary least squares, the results indicated that a one-million-dollar increase in research and development spending led to a 0.0001 increase in unemployment (Krousie, 2018: 87).

In Türkiye, Aydın (2018) used data from 1981 to 2015, covering employment from primary education to higher education, the number of researchers, and communication technology exports. Using the ARDL method, the study examined how technological progress affected employment. The findings showed that technological change increased the share of higher-education graduates in total employment (Aydın, 2018: 461).

In Türkiye, for the period 1989-2017, Varıcı analysed data on total employment, employment with higher education, female labour force employment, and technology exports in 2019. Using the ARDL method, the study found that technology negatively affected total employment and female labour force employment, while its impact on the employment of educated labour was statistically insignificant (Varıcı, 2019).

Selci conducted a study using data from 2000 to 2015 on gross domestic product, research and development, female labour force employment, migration, patents, poverty, education rates, and debt for European Union countries and Türkiye. The study used dynamic panel data analysis. The findings showed that technological innovations positively affected female labour force employment in both the European Union and Türkiye (Selci, 2019).

In 2019, Mehmet Uğur conducted a meta-regression analysis examining the relationship between technological development and unemployment, using numerical data from different countries and periods and drawing on the results of 35 empirical studies. The analysis found that process and product innovations did not have a sufficiently strong effect on employment from a business perspective. For developed countries, technological innovations affected employment more than in developing countries. Moreover, innovation had the greatest impact on employment levels in the manufacturing sector (Uğur, 2019: 1-23).

In 2020, Costantiello and Leongrande examined the effects of technological change on innovation in medium- and high-technology businesses versus low-technology businesses. According to the authors, medium- and high-technology businesses tend to have monopolistic structures and therefore place greater emphasis on developing new products to increase profitability. In such businesses, innovation positively affects employment. On the other hand, industries with more intense competition typically include low-technology businesses, which aim to increase profitability by reducing costs. As a result, process improvement efforts in these sectors negatively affect employment in the short term. However, in the long run, as costs decrease, profitability and productivity rise, which in turn positively affect employment (Costantiello & Leongrande, 2020: 166).

In 2020, Cengiz and Şahin examined research and development (R&D) expenditures, unemployment, and economic growth in Türkiye between 1990 and 2018. The study found a negative relationship between R&D expenditures aimed at technological advancement and unemployment. The study used quantile regression to measure the impact of technological development on employment. A 1% increase in R&D expenditures reduced unemployment by 5.7%. In contrast, the study found no significant relationship between unemployment and economic growth (Cengiz & Şahin, 2020: 160).

According to the findings of a study conducted in 2020 by Kılınç, which examined Türkiye's employment rate, labour productivity, the ratio of R&D expenditures to gross domestic product, and real labour wage returns for the years 2004-2018, an increase in R&D expenditures negatively affects the level of employment (Kılınç, 2020).

İğdeli and Sever (2020) examined the effect of technology on employment in Türkiye's NUTS-2 regions between 2004 and 2017 by analysing youth unemployment, patent applications, population, and gross domestic product. The panel ARDL method was used to determine the impact of innovation on employment. According to the study's results,

in the long term, population growth increases youth unemployment, while per capita income and innovation reduce youth unemployment. In the short term, however, population and innovation have an insignificant effect on youth unemployment (İğdeli & Sever, 2020: 771).

In 2020, Bulut and Yenipazarlı conducted a panel data analysis of the effects of Industry 4.0 and technology on employment, examining high-tech exports, R&D expenditures, employment levels, labour force participation rates, and national income levels in 81 countries, including Türkiye, from 1998 to 2017. According to the findings, technological advancements increase employment levels through new product development, whereas technological progress in the production process decreases employment levels (Bulut & Yenipazarlı, 2020: 15).

In 2020, Civelek and Pehlivanoğlu developed a Technological Unemployment Anxiety Scale to measure employees' anxiety levels regarding technological unemployment. The scale consists of three dimensions: lack of technical skills, continuity of technological advancements, and disruptive technological advancements (Civelek & Pehlivanoğlu, 2020).

In a 2021 study, Dağlı and Kösekahyaoğlu examined the effects of technological developments on employment levels, aiming to contribute to the macro-level empirical literature. Using statistical data from 22 European Union countries and Türkiye for 2005-2018, the authors analysed the relationship between technological innovation and unemployment. Contrary to expectations, the study found that technology had a positive effect on unemployment. However, this positive effect was temporary and disappeared over time. Based on their dynamic panel data analysis, the authors concluded that technological development does not negatively affect employment levels because compensatory mechanisms in technological change offset the effects (Dağlı & Kösekahyaoğlu, 2021: 1237).

In 2023, Serkan Manga and Abdülkadir Tuna examined the relationship between technological development and unemployment in emerging market economies using dynamic panel data analysis. According to the study's results, the relationship between technological change and employment levels in emerging market economies was negative but not strong (Manga & Tuna, 2023: 555-570).

In their 2023 study, Naz and Altay analysed the impact of technological progress on unemployment in Türkiye using data from 1990 to 2021. According to the empirical results, real gross domestic product and patent applications have a long-term causal effect on unemployment. Business communication networks do not affect unemployment in the long term. Furthermore, the number of researchers and R&D expenditures do not affect unemployment in the short term (Naz & Altay, 2023: 93-106).

4. A Field Study on The Relationship Between Technological Adaptation and Employment Among Workers in The Manufacturing Industry

4.1. Subject of the Study

This study investigates the adaptation of workers who migrated from rural areas to the urban manufacturing sector in the city of Zonguldak for employment, specifically their adaptation to technological developments and urban life. For newly employed individuals in urban areas, adopting urban values and participating in the urban labour market are essential to successfully integrating into the cities they have settled in. This study aims to determine how, and to what extent, these workers have adapted to urban life and a labour market shaped by technological innovations as part of the urbanisation process.

With the emergence of Industry 4.0, automation has continued to evolve. In manufacturing, machines based on digital motion mechanisms and automatic control systems have replaced older tools. Some manufacturing businesses use automation systems and computers to run the entire production process without human labour, increasing efficiency. Computer systems can also support task tracking and office services (Berksun, 1973: 238; Bozkurt, 2012: 174; Orhan & Savuk, 2014: 18).

The main characteristics of information technologies can be summarised as follows (Bozkurt, 2012: 174; Orhan & Savuk, 2014: 18):

- Since newly emerging technologies have a wide range of applications, they lead to significant reductions in operational costs. Information technologies ensure that communication channels within enterprises operate effectively and efficiently. They also have a considerable impact on production, sales and marketing, administrative, and technical services.
- New technologies enable businesses to easily adapt to continuously changing customer needs and bring flexibility to production.
- Emerging technologies improve the quality of goods and services. They allow businesses to use production factors more efficiently and economically.
- New technologies allow for the replacement of machines used in the production process in line with changing needs and support the development of small and medium-sized enterprises (SMEs).
- These technologies make it necessary for both existing employees and newly hired workers to acquire new skills.
- New technologies not only impact products and services but also bring about significant changes in the management and organisational structures of businesses. Alongside horizontal structuring, they ensure effective and efficient communication among departments in knowledge management.

As enterprises constantly evolve with new technologies, it is increasingly important for both current employees and prospective workers to adapt to urban environments and new

technologies. If urban regions have a workforce that is technologically adaptable and equipped with the necessary knowledge and skills, technology-induced unemployment will not arise.

4.2. Methodology

A quantitative research method has been used as the most appropriate approach to analyse the adaptation of workers - those who have migrated from rural to urban areas and either work or wish to work in businesses with technological innovations - to technological changes and urban environments.

In the social sciences, researchers use quantitative research techniques to operationalise and analyse certain unobservable aspects of human behaviour in social events. Quantitative research uses statistical methods as its basis, guided by the principles and limitations of the positivist paradigm, without exceeding those boundaries. Typically, researchers use probabilistic sampling methods that allow them to study large populations. In quantitative research, which aims to achieve controlled, objective findings through working with a sample, researchers must test the validity and reliability of the data obtained. In this way, researchers analyse the collected numerical data using statistical software and draw conclusions based on these findings. Choosing the most suitable quantitative research method depends on the nature of the topic. It is also crucial for the researcher to be informed about possible errors that may arise during the research process. All these stages are vital for the researcher to design and carry out the quantitative research most accurately and reliably (Garip, 2023: 2).

In our study, we adapted the Technological Unemployment Anxiety Scale, developed in 2020, to account for factors such as place of residence, educational level, and adaptation to using technological tools and devices (Civelek & Pehlivanoğlu, 2020). After obtaining permission from the relevant researchers to use the scale and securing ethical approval, we administered the survey to participants selected through simple random sampling and interpreted the findings accordingly. In our study, we assessed the technological unemployment anxiety of 400 workers in the manufacturing industry in Zonguldak province, considering their educational levels, places of residence, and levels of technological device usage.

We conducted a correlation analysis among the sub-dimensions of the technological unemployment anxiety scale. Based on this, we created three separate models by comparing the impact of sub-dimensions such as *lack of technological skills* and *ongoing technological developments* on *disruptive technological changes* across urban centres, district centres, and village settlements. Additionally, the study established a general model for geographical settlement types.

4.3. Sample Size of the Study

The study used simple random sampling to select the sample. In this method, each unit in the population has an equal and independent chance of being selected, and the selection is made impartially (Balcı, 2007). The study population was defined as workers employed in the manufacturing industry in the central district of Zonguldak. The total population (sampling frame) was identified as 20,379. Because we had no prior knowledge of the population mean or variance within the scope of the study, we calculated the sample size using the proportion estimation method for a homogeneous population. The formulation for this method is presented below (Özdemir et al., 2015):

$$n=\frac{N*p*q*Z_{\alpha/2}}{(N-1)*d^2+Z_{\alpha/2}*p*q}=\frac{20379*0,5*0,5*(1,96)^2}{(20,379-1)*(0,05)^2+0,5*0,5*(1,96)^2}=\frac{19571.99}{51.91}\cong 378$$

According to the sample size calculation above, the study requires at least 378 samples to ensure reliability and validity.

Here is the explanation of the symbols used in the formula:

n: Sample size

N: Population size

Zα/2: Z-table value at the 0.05 significance level

d: Margin of error (precision)

p*q: Variance related to the proportion of a homogeneous population

4.4. Hypotheses and Assumptions of the Study

In developing the technological anxiety scale, the study considered factors such as geographical location, educational level, and proficiency with technological tools. It investigated how the existing scale dimensions lack of technical skills and constant technological developments - influence disruptive technological changes, depending on geographical location, education level, and access to technological tools. Within this framework, the following hypotheses and assumptions were formulated:

Main Hypotheses:

- Employees working in rural areas have a negative perception of technological developments.
- Employees working in the city centre have a positive perception of technological developments.
- As employees' age increases, their technical skill level decreases.
- As employees' education and experience levels increase, their perception of technological developments becomes more positive.

- Employees who own technological devices have lower levels of technological anxiety.

- **Assumptions Related to Technological Unemployment Anxiety**
  - There is no significant relationship between employees' gender and their level of technical skills.
  - As employees' education levels increase, their technical skill levels also increase.
  - Those who have lived in rural areas or city centres for less than one year have lower levels of technical skills.
  - Employees who have lived in the city centre for more than five years adapt better to technological innovations.
  - Those who possess technological communication tools have higher levels of technical skills.
  - Employees who have access to the internet adapt better to technological innovations.
  - Those who use information technologies for communication and information gathering have higher levels of technical skills.
- **Assumptions Related to Ongoing Technological Developments and Disruptive Technological Changes**
  - As the length of employment increases, the likelihood of becoming technologically unemployed also increases.
  - There is no significant relationship between employees' gender and technological unemployment.
  - As the duration of employment increases, anxiety about becoming unemployed due to technological reasons also increases.
  - Employees living in the city centre have lower levels of anxiety about technological unemployment compared to those living in rural areas.

The Technological Unemployment Anxiety Scale developed by Mustafa Emre Civelek and Çağrı Pehlivanoğlu was further refined by relating it to factors such as geographical location, education level, and proficiency in using technical tools and equipment. After obtaining permission from the original authors to use the scale and receiving ethical board approval, the researchers initiated the research phase.

4.5. Statistical Analysis of the Data

To evaluate the study findings, the researchers conducted statistical analyses using SPSS 26.0 and LISREL 8.7. In this study, which included 400 participants, the researchers descriptively examined participants' sociodemographic characteristics.

After ensuring scale validity and reliability, we tested the proposed model using structural equation modelling. We assessed scale normality using univariate normality testing (Shapiro-Wilk) and multivariate normality testing (Henze-Zirkler).

Based on the normality test results, we used non-parametric tests and methods to analyse variables that did not follow a normal distribution.

We also examined relationships between variables using Spearman's rho correlation analysis and evaluated results within 95% and 99% confidence intervals at $p<0.05$ and $p<0.01$ significance levels.

Table: 1
Descriptive Statistics of the Participants

	Frequency	Percentage (%)
Education		
High School	169	42.50
University	222	55.80
Master's Degree	7	1.80
Total	398	100.00
Gender		
Female	175	45.50
Male	210	54.50
Total	385	100.00
Company Employee Count		
1-100 Employees	112	28.90
101-250 Employees	204	52.70
+250 Employees	71	18.30
Total	387	100.00
Work Experience		
1-5 Years	90	23.20
6-10 Years	160	41.20
+10 Years	138	35.60
Total	388	100.00
Place of Residence		
City Centre	280	70.00
District Centre	61	15.30
Village	59	14.80
Total	400	100.00
If your answer to the first question was A, how long have you lived in the city centre?		
Less than a year	81	28.60
1-5 years	91	32.20
5-10 years	89	31.40
10 years	22	7.80
Total	283	100.00
Smartphone Ownership		
Yes	400	100.00
Tablet Ownership		
No	235	58.80
Yes	165	41.30
Total	400	100.00
Computer Ownership		
No	322	80.50
Yes	78	19.50
Total	400	100.00
Do you have internet access at home and/or on your smartphone?		
Yes	400	100.00
Do you use information technologies for communication or information purposes?		
Yes	286	71.50
No	114	28.50
Total	400	100.00

Table 1 presents the demographic characteristics of the study participants. Of the participants, 42.50% (n=169) have a high school education, 55.80% (n=222) have a university degree, and 1.80% (n=7) have a master's degree. Among the participants, 45.50% (n=175) are female, and 54.50% (n=210) are male. In terms of company size, 28.90%

(n=112) work in companies with 1-100 employees, 52.70% (n=204) in companies with 101-250 employees, and 18.30% (n=71) in companies with more than 250 employees. Regarding work experience, 23.20% (n=90) of the participants have 1-5 years, 41.20% (n=160) have 6-10 years, and 35.60% (n=138) have more than 10 years of experience. By place of residence, 70.00% (n=280) live in city centres, 15.30% (n=61) in district centres, and 14.80% (n=59) in villages. The duration of residence in city centres is as follows: 28.60% (n=81) have lived there for less than 1 year, 32.20% (n=91) for 1-5 years, 31.40% (n=89) for 5-10 years, and 7.80% (n=22) for more than 10 years. All participants used smartphones. In contrast, 41.30% (n=165) of participants have a tablet, while 58.80% (n=235) do not. Additionally, 19.50% (n=78) have a computer, whereas 80.50% (n=322) do not. All participants have internet access on their smartphones. While 71.50% (n=286) use information technologies for communication or information purposes, 28.50% (n=114) do not.

Table: 2
Confirmatory Factor Analysis (CFA) Results for the Technological Unemployment Anxiety Scale

Technological Unemployment Anxiety Scale	Items	B	Standardized B	Standart Error	t	p	R^2	AVE	CR	Cronbach's Alpha
Lack of Technological Skills	**TIK1**	1.57	0.98	0.009	167.82	0.000**	0.96	0.965	0.991	0.957
	TIK2	1.09	0.99	0.006	192.05	0.000**	0.97			
	TIK3	1.44	0.99	0.008	183.54	0.000**	0.98			
	TIK4	0.95	0.97	0.007	146.61	0.000**	0.95			
Continuous Technological Advancements	**TIK5**	1.33	0.98	0.007	201.15	0.000**	0.96	0.960	0.989	0.954
	TIK6	0.92	0.98	0.005	179.99	0.000**	0.95			
	TIK7	1.29	0.99	0.006	233.44	0.000**	0.98			
	TIK8	0.78	0.97	0.006	136.34	0.000**	0.95			
Disruptive Technological Developments	**TIK9**	1.23	0.98	0.008	148.36	0.000**	0.97	0.922	0.979	0.978
	TIK10	0.72	0.96	0.006	114.26	0.000**	0.93			
	TIK11	1.07	0.98	0.006	180.45	0.000**	0.96			
	TIK12	0.72	0.92	0.01	64.98	0.000**	0.85			

*** p<0.01, * p<0.05; Weighted Least Squares Estimation Method; Total Cronbach's Alfa: 0.978.*

Table 2 presents the confirmatory factor analysis, discriminant validity analysis, Cronbach's Alpha, and composite reliability values for the Technological Unemployment Anxiety Scale. The items of the Technological Unemployment Anxiety Scale did not follow a normal distribution, as determined by the Henze-Zirkler multivariate normality test ($p<0.001$). Therefore, we used the "Weighted Least Squares" estimation method to calculate regression coefficients in the confirmatory factor analysis.

The standardised coefficient values of the Technological Unemployment Anxiety Scale range between 0.92 and 0.99, indicating that all items are statistically significant ($p<0.01$). The scale's overall Cronbach's alpha was 0.978, indicating high internal consistency. For the Lack of Technical Skills sub-dimension, the AVE value is $0.964 \geq 0.50$, indicating sufficient convergent validity. According to the reliability results, CR is $0.991 \geq 0.70$, and Cronbach's Alpha is $0.957 \geq 0.80$, suggesting high reliability. For the sub-dimension Continuous Technological Advancements, the AVE value is $0.960 \geq 0.50$, indicating sufficient convergent validity. In terms of reliability, CR is $0.989 \geq 0.70$, and Cronbach's Alpha is $0.954 \geq 0.80$, also reflecting high reliability. For the sub-dimension

Disruptive Technological Developments, the AVE value is 0.922≥0.50, again indicating sufficient convergent validity. The reliability results - CR of 0.979≥0.70 and Cronbach's Alpha of 0.978≥0.80 - also demonstrate a high level of reliability.

Table: 3
Fit Indices of the Confirmatory Factor Analysis (CFA) Model for the Technological Unemployment Anxiety Scale

Fit Index	Good Fit	Acceptable Fit	Model Value
χ^2/df	$0 \leq \chi^2/df \leq 2$	$2 \leq \chi^2/df \leq 5$	2.62
CFI	0.97≤CFI≤1	0.95≤CFI≤0.97	1.00
NNFI	0.97≤NNFI≤1	0.95≤NNFI≤0.97	1.00
NFI	0.95≤NFI≤1	0.90≤NFI≤0.95	1.00
IFI	0.95≤IFI≤1	0.90≤IFI≤0.95	1.00
GFI	0.95≤GFI≤1	0.90≤GFI≤0.95	1.00
SRMR	0≤SRMR≤0.05	0.05≤SRMR≤0.08	0.068
RMSEA	0≤RMSEA≤0.05	0.05≤RMSEA≤0.08	0.064

Reference: Jöreskog & Sörbom, 1996; Scherelleh-Engel et al., 2003; Schumacker & Lomax, 2004.

Table 3 presents the fit indices of the Confirmatory Factor Analysis (CFA) model for the Technological Unemployment Anxiety Scale. The model's fit index values Chi-square/df (CMIN/df)=2.62, CFI=1.00, NNFI=1.00, NFI=1.00, IFI=1.00, GFI=1.00, SRMR=0.068, and RMSEA=0.064 fall within acceptable or good fit thresholds. Therefore, the model is valid.

Table: 4
Results of the Correlation Analysis Between the Sub-Dimensions of the Technological Unemployment Anxiety Scale

Variables	N	Mean ± S.s.	Median (Min-Max.)	Spearman's rho	Lack of Technological Skills	Continuous Technological Advancements	Disruptive Technological Developments	Technological Unemployment Anxiety
Lack of Technological skills	400	9.53 ± 4.13	8 (4-20)	r	1	0.891	0.864	0.951
				p		0.000**	0.000**	0.000**
Continuous Technological Advancements	400	9.95 ±4.12	9 (4-20)	r		1	0.902**	0.963
				p			0.000**	0.000**
Disruptive Technological Developments	400	10.03 ± 3.84	9 (4-20)	r			1	0.957
				p				0.000**
Technological Unemployment Anxiety	400	29.51 ±11.62	28 (12-60)	r				1
				p				

*** p<0.01, * p<0.05.*

Table 4 presents the correlation analysis results between the sub-dimensions of the Technological Unemployment Anxiety Scale. The sub-dimensions showed a statistically significant, strong positive relationship (p<0.01).

Table: 5
Comparison of the Effects of the Sub-Dimensions "Lack of Technical Skills" and "Continuous Technological Advancements" on "Disruptive Technological Developments" Across Groups

Model	Path	Beta	Std. Error	t	p	R^2	Fit Indices
Model 1(N=280) City Center	TBE → YTG	0.25	0.17	1.44	0.149	0.89	χ^2/df=2.29 NNFI=1.00 NFI=0.99 CFI=1.00 IFI=1.00 GFI=0.99 SRMR=0.15 RMSEA=0.068
	STG → YTG	0.70	0.17	4.08	0.000**		
Model 2(N=61) District Center	TBE → YTG	0.011	0.19	0.061	0.951	0.70	χ^2/df=1.64 NNFI=0.98 NFI=0.96 CFI=0.98 IFI=0.98 GFI=1.00 SRMR=0.064 RMSEA=0.10
	STG→ YTG	0.83	0.17	4.91	0.000**		
Model 3(N=59) Village	TBE → YTG	0.18	0.27	0.66	0.509	0.38	χ^2/df=1.32 NNFI=0.99 NFI=0.96 CFI=0.99 IFI=0.99 GFI=0.98 SRMR=0.15 RMSEA=0.074
	STG → YTG	0.38	026	1.43	0.155		
Model 4(N=400) Total	TBE → YTG	-0.072	0.17	-0.42	0.674	0.93	χ^2/df=2.61 NNFI=1.00 NFI=1.00 CFI=1.00 IFI=1.00 GFI=1.00 SRMR=0.068 RMSEA=0.064
	STG → YTG	1.03	0.17	6.11	0.000**		

*** p<0.01, * p<0.05; Weighted Least Squares Estimation Method and Diagonally Weighted Least Squares Estimation Method.*

Table 5 compares the effects of the sub-dimensions of lack of technical skills and continuous technological advancements on disruptive technological developments across groups. The effects of the sub-dimensions of lack of technical skills and continuous technological advancements on disruptive technological developments were examined both overall and by residential group (city centres, district centres, and villages). Figure 1 shows the general structural equation model for all participants.

In the research model for participants living in city centres, the effect of lack of technical skills on disruptive technological developments is not statistically significant ($p>0.05$). In contrast, continuous technological advancements have a statistically significant positive effect on disruptive technological developments ($\beta=0.70$; $p<0.01$). In addition, continuous technological advancements explain 89% of the variance in disruptive technological developments. According to the model test results in Table 5, although the SRMR (0.15) indicates poor fit, the values of Chi-square/df (CMIN/df)(2.29), NNFI(1.00), NFI(0.99), CFI(1.00), IFI(1.00), GFI(1.00), and RMSEA(0.068) fall within acceptable and good fit ranges; therefore, the model can be considered valid.

According to the research model for participants living in district centres, the lack of technical skills has no statistically significant effect on disruptive technological developments ($p>0.05$). In contrast, continuous technological advancements have a statistically significant positive effect on disruptive technological developments ($\beta=0.83$; $p<0.01$). Additionally, continuous technological advancements explain 70% of the variance in disruptive technological developments. According to the model test results in Table 5, although RMSEA (0.10) indicates poor fit, the values of Chi-square/df (CMIN/df)(1.64), NNFI(0.98), NFI(0.96), CFI(0.98), IFI(0.98), GFI(1.00), and SRMR(0.064) fall within acceptable and good fit ranges; therefore, the model can be considered valid.

According to the research model for participants living in villages, the effects of lack of technical skills and continuous technological advancements on disruptive technological developments are not statistically significant ($p>0.05$). According to the model test results in Table 5, although the SRMR value (0.15) indicates poor fit, the values of Chi-square/df (CMIN/df)(1.32), NNFI(0.99), NFI(0.96), CFI(0.99), IFI(0.99), GFI(0.98), and RMSEA(0.074) fall within acceptable and good fit ranges; therefore, the model can be considered valid.

According to the research model for participants living in city centres, district centres, and villages, the lack of technical skills does not have a statistically significant effect on disruptive technological developments ($p>0.05$). In contrast, continuous technological advancements have a statistically significant positive effect on disruptive technological developments ($\beta=1.03$; $p<0.01$). In addition, continuous technological advancements explain 93% of the variance in disruptive technological developments. According to the model test results in Table 5, the model fit indices Chi-square/df (CMIN/df)(2.61), NNFI(1.00), NFI(1.00), CFI(1.00), IFI(1.00), GFI(1.00), SRMR(0.068), and RMSEA(0.064) fall within acceptable and good fit ranges; therefore, the model can be considered valid. Figure 1 presents the model's path diagram.

Figure: 1
Path Diagram of the Structural Equation Model

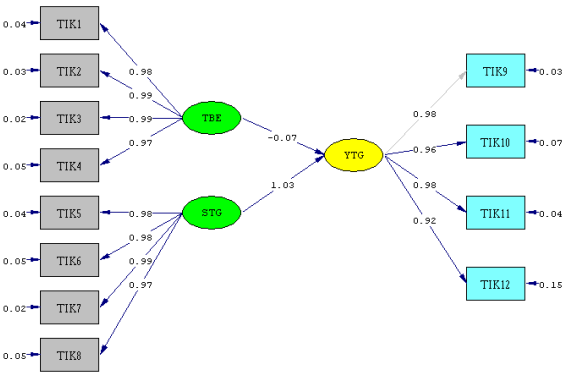


Table: 6
Structural Equation Model: The Comparison of Technological Unemployment Anxiety and Its Sub-dimensions Based on Demographic Characteristics

		Lack of Technical Skills				Continuous Technological Advancements				Disruptive Technological Advancements				Technological Unemployment Anxiety			
Variables	**N**	**Mean ± S.s.**	**Median (Min-Max.)**	**p**	**Pairwise Comparisons**	**Mean ± S.s.**	**Median (Min-Max.)**	**p**	**Pairwise Comparisons**	**Mean ± S.s.**	**Median (Min-Max.)**	**p**	**Pairwise Comparisons**	**Mean ± S.s.**	**Median (Min-Max.)**	**p**	**Pairwise Comparisons**
Education																	
High School[a]	169	13.03 ±3.17	12 (4-20)	0.000**	a>b a>c b>c	13.60 ±2.92	13 (4-20)	0.000**	a>b a>c b>c	13.37 ±2.81	13 (4-20)	0.000**	a>b a>c b>c	40.00 ±8.06	40 (12-60)	0.000**	a>b a>c b>c
University[b]	222	7.07 ±2.58	6 (4-20)			7.38 ±2.47	7 (4-18)			7.70 ±2.34	7 (4-18)			22.15 ±6.75	20 (12-49)		
Master's[c]	7	4.29 ±0.49	4 (4-5)			4.29 ± 0.76	4 (4-6)			4.57 ±1.13	4 (4-7)			13.14 ± 2.19	12 (12-18)		
Gender																	
Female	175	9.47 ±3.97	8 (4-20)	0.952	-	9.89 ± 4.04	9 (4-20)	0.743	-	9.87 ±3.62	9 (4-19)	0.581	-	29.23 ±11.20	27 (13-59)	0.787	-
Male	210	9.50 ±4.12	8.5 (4-20)			9.97 ± 4.08	9.5 (4-20)			10.11 ±3.90	9.5 (4-20)			29.58 ±11.60	28 (12-60)		
Employee Count																	
1-100[a]	112	10.03 ±4.09	10 (4-20)	0.040*	a>b	10.47 ±4.40	10.5 (4-20)	0.048*	a>b	10.78 ±3.95	11 (4-18)	0.018*	a>b	31.28 ±11.97	31.5 (12-58)	0.030*	a>b
101-250[b]	204	8.97 ±3.85	8 (4-20)			9.36 ±3.87	8 (4-20)			9.50 ±3.70	8 (4-20)			27.83 ± 10.96	24 (12-60)		
+250[c]	71	10.20 ±4.70	9 (4-20)			10.51 ±4.22	10 (4-20)			10.18 ±3.84	10 (4-20)			30.89 ± 12.26	31 (12-60)		
Work Experience																	
1-5 Years	90	10.29 ±4.41	11 (4-20)	0.079	-	10.86 ±4.54	11.5 (4-20)	0.080	-	10.79 ±4.27	12 (4-18)	0.066	-	31.93 ± 12.78	34.5 (12-58)	0.082	-
6-10 Years	160	9.23 ±3.74	8 (4-20)			9.57 ± 3.78	9 (4-20)			9.88 ±3.64	9 (4-19)			28.68 ± 10.67	27 (12-56)		
+10 Years	138	9.09 ±4.17	8 (4-20)			9.58 ± 4.07	8 (4-20)			9.46 ±3.61	8 (4-20)			28.14 ± 11.36	24 (12-60)		
Place of Residence																	
City Centre[a]	280	7.74 ±3.05	7 (4-16)	0.000**	b>a c>a c>b	8.06 ± 2.97	7 (4-16)	0.000**	b>a c>a c>b	8.29 ± 2.87	8 (4-18)	0.000**	b>a c>a c>b	24.09 ± 8.38	21(12-48)	0.000**	b>a c>a c>b
District Cetre[b]	61	12.36 ±2.39	12 (6-18)			13.34 ± 2.69	13 (6-19)			13.16 ± 2.40	13 (7-17)			38.87 ± 6.61	38(19-52)		
Village[c]	59	15.12 ±3.32	16 (7-20)			15.39 ± 2.69	16 (8-20)			15.05 ± 2.28	15 (10-20)			45.56 ± 7.01	46 (28-60)		
If your first answer was option A, how many years have you lived in the district centre?																	
Less than a year[a]	81	10.16 ±3.18	11 (4-16)	0.000**	b>d a>d b>c a>c a>b	10.73 ± 3.02	11 (4-16)	0.000**	a>d a>c a>b	10.90 ± 2.87	12 (4-16)	0.000**	c>d b>d a>d a>c a>b	31.79 ± 8.55	33 (12-46)	0.000**	b>d a>d b>c a>c a>b
1-5 Years[b]	91	7.46 ±2.55	7 (4-16)			7.34 ± 2.35	7 (4-16)			7.81 ± 2.36	7 (4-18)			22.62± 6.65	20 (12-48)		
5-10 Years[c]	89	6.45 ±2.24	6 (4-15)			6.89 ± 2.16	6 (4-15)			6.97 ± 1.78	7 (4-11)			20.30 ± 5.43	18 (12-37)		
More than 10 Years[d]	22	5.73 ±1.96	5.5 (4-12)			6.77 ± 2.71	7 (4-17)			6.64 ± 2.72	6 (4-16)			19.14 ±7.05	18 (12-45)		
Tablet Ownership																	
No	235	11.37 ±4.03	12 (4-20)	0.000**	-	11.82 ±4.00	12 (4-20)	0.000**	-	11.80 ± 3.63	12 (4-20)	0.000**	-	34.98 ±11.09	36(12-60)	0.000**	-
Yes	165	6.92 ± 2.58	6 (4-16)			7.29 ± 2.50	7 (4-16)			7.51 ± 2.49	7 (4-18)			21.72 ±6.98	20 (12-48)		
Computer Ownership																	
No	322	10.36 ±4.11	11 (4-20)	0.000**	-	10.84 ±4.04	11(4-20)	0.000**	-	10.83 ± 3.79	11 (4-20)	0.000**	-	32.03 ± 11.40	33 (12-60)	0.000**	-
Yes	78	6.10 ± 1.78	6 (4-15)			6.27 ±1.69	6 (4-15)			6.73 ± 1.70	7 (4-16)			19.10 ±4.61	18 (12-46)		
Do you use information technologies for communication or information purposes?																	
Yes	286	8.02 ±3.65	7 (4-20)	0.000**	-	8.34 ± 3.49	7 (4-20)	0.000**	-	8.54 ± 3.28	8 (4-20)	0.000**	-	24.89 ±9.92	21(12-60)	0.000**	-
No	114	13.32 ± 2.52	12 (6-20)			14.00 ± 2.45	14 (5-20)			13.77 ± .27	14 (6-19)			41.10 ±6.23	41 (17-57)		

*** p<0.01, * p<0.05.*

Table 6 presents the comparison of technological unemployment anxiety and its sub-dimensions by demographic characteristics. Participants' technological unemployment anxiety and its sub-dimensions differed significantly by educational status ($p<0.01$). It was found that participants with a high school education had significantly higher levels of technological unemployment anxiety and its sub-dimensions compared to those with a university or postgraduate education.

It was found that participants' technological unemployment anxiety and its sub-dimensions did not show statistically significant differences based on gender ($p>0.05$). However, technological unemployment anxiety and its sub-dimensions differed significantly by firm size ($p<0.05$). Participants in firms with 1-100 employees reported significantly higher levels of technological unemployment anxiety and its sub-dimensions than those in firms with 101-250 employees.

Work experience did not significantly affect participants' technological unemployment anxiety or its sub-dimensions ($p>0.05$). However, place of residence showed significant differences ($p<0.01$). Participants living in villages had significantly higher levels of technological unemployment anxiety and its sub-dimensions than those living in district or city centres.

Statistically significant differences also emerged by the number of years participants had lived in their current place of residence ($p<0.01$). Those who had lived in their current location for less than one year had significantly higher levels of technological unemployment anxiety and its sub-dimensions than participants who had lived there longer.

Tablet usage was significantly associated with technological unemployment anxiety and its sub-dimensions ($p<0.01$). Participants who did not use tablets had significantly higher levels of technological unemployment anxiety and its sub-dimensions compared to those who did.

Similarly, computer usage was significantly different ($p<0.01$). Participants who did not use computers had significantly higher levels of technological unemployment anxiety and its sub-dimensions compared to those who did.

Finally, participants' technological unemployment anxiety and its sub-dimensions differed significantly depending on whether they benefited from information technologies ($p<0.01$). Those who did not benefit from information technologies had significantly higher levels of technological unemployment anxiety and its sub-dimensions than those who did.

5. Conclusion

In our research, we examined the impact of a lack of technological skills and ongoing technological advancements on disruptive technological developments, considering workers' geographical location, education, and proficiency with technological tools and equipment in the manufacturing industry. We examined the urban aspects of technological

unemployment anxiety, developed a technological unemployment anxiety scale based on geographical location, and created statistical models specific to different settlement types, as well as a general model. Accordingly, the study also established a path diagram using structural equation modelling. The study administered a survey to 400 workers selected through simple random sampling among employees in the manufacturing sector across Zonguldak province. The findings were analysed. Zonguldak was chosen as the research area because it is the first province of Türkiye and an important industrial city.

Our study found that participants living in village centres and district centres had higher levels of technological unemployment anxiety than those living in provincial centres. The study also found statistically significant differences in participants' technological unemployment anxiety by place of residence and number of years lived in an urban area ($p<0.01$). Participants who had lived in urban areas for less than one year had significantly higher levels of technological unemployment anxiety and its subdimensions than those who had lived there longer. Furthermore, the study found statistically significant differences in participants' technological unemployment anxiety and its sub-dimensions based on their use of technological devices and the internet ($p<0.01$). Participants who were not proficient in using technological tools and devices showed significantly higher levels of technological unemployment anxiety and its sub-dimensions than those who were proficient in using technology and the internet. Our study also found that, among the dimensions of the technological unemployment anxiety scale, the "lack of technical skills" and "continuous technological developments" dimensions had a greater impact on the "disruptive technological developments" dimension. Differences in geographical location, level of education, and proficiency in internet and technology use more strongly influenced this impact.

Addressing the lack of technical skills, particularly among individuals living in villages, district centres, and urban areas for less than a year, can prevent continuous technological advancements from turning into disruptive technological developments. This can be achieved through a successful transition from the Industry 4.0 process to the Education 4.0 phase. In employee technology training, the focus is on learners, and instructors collaborate with them throughout the process. In general, the Education 4.0 system adopts a learner-centred approach to education. This allows learners to monitor their learning, choose the most suitable learning paths based on their interests, and use their skills most efficiently. Since technology is constantly evolving, continuous change and development in education will help prevent technological unemployment from turning into disruptive technological developments in cities. Moreover, implementing a learner-centred education system not only in urban areas but also in villages and district centres will help reduce the disruptive impact of technological advancements in different geographical regions. By adopting a learner-centred education model, it becomes possible to eliminate employees' lack of technical skills, thereby preventing continuous technological advancements from leading to technological unemployment across various geographic locations.

References

Acemoglu, D. & P. Restrepo (2017), "Robots and jobs: Evidence from U.S. labor markets", *NBER Working Paper*, 23285.

Ansal, H. & M. Cardullo (1997), "Impact of technology on employment", in: *Technology and Innovation Management: The key to global leadership* (45-48), Portland International Conference on Management of Management and Technology.

Aydın, E. (2018), "Projection of changes in the employment structure with technological progress in Turkey: An empirical analysis in the context of Industry 4.0", *Journal of Management Sciences*, 16(31), 461-471.

Bal, O. (2010), "Effects of technology on socio-economic structure", *Academic Review Journal*, (20), 1-22.

Balcı, A. (2007), *Research methods, techniques, and principles in social sciences* (6th ed.), Ankara: Pegem Akademi.

Berksun, S. (1973), "Economic and social problems of automation", *Istanbul University Journal of Business Faculty*, 2(2), 237-249.

Bogliacino, F. et al. (2012), "R&D and employment: An application of the LSDVC estimator using European microdata", *Economics Letters*, 116(1), 56-59.

Borrego, C.A. & D. Collado (2002), "Innovation and job creation and destruction", *Recherches Économiques de Louvain*, 68(1), 148-168.

Bozkurt, V. (2012), *Industrial and post-industrial transformation: Knowledge-economy-culture*, Bursa: Ekin Publishing.

Brynjolfsson, E. & A. McAfee (2014), *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*, New York: Norton.

Bulut, E. & A. Yenipazarlı (2020), "Industry 4.0 and the effect of technology on employment: Panel data analysis", *PJESS*, 7(2), 15-35.

Cengiz, S. & A. Şahin (2020), "The role and importance of technological progress in job creation: The case of Turkey", *Black Sea International Scientific Journal*, 1(45), 160-172.

Chang, J.H. et al. (2016), *The future of jobs at risk of automation*, International Labour Organization, Bureau for Employers' Activities, <https://www.ilo.org/actemp/publications/WCMS_579554/lang--en/index.htm>, 25.05.2025.

Cirera, X. & L. Sabetti (2016), "The effects of innovation on employment in developing countries: Evidence from enterprise surveys", *Industrial and Corporate Change*, The World Bank Group, Trade and Competitiveness Global Practice Group.

Civelek, M.E. & Ç. Pehlivanoğlu (2020), "Technological unemployment anxiety scale", *Technology Management*, <https://hdl.handle.net/11467/5253>, 44-61.

Costantiello, A. & A. Leongrande (2020), "The innovation-employment nexus in Europe", *American Journal of Humanities and Social Sciences Research*, 4(11), 166-187.

Dağlı, İ. & L. Kösekahyaoğlu (2021), "Technology-unemployment relationship in the context of science and technology policies: An empirical study", *Journal of Yaşar University*, 16(63), 1237-1255.

Evangelista, R. & A. Vezzani (2012), "The impact of technological and organizational innovations on employment in European firms", *Industrial and Corporate Change*, 21(4), 817-899.

Falk, M. & E. Hagsten (2017), "Employment impacts of market novelty sales: Evidence for nine European countries", *Ratio Working Papers* 293, The Ratio Institute.

Feldmann, H. (2013), "Technological unemployment in industrial countries", *Journal of Evolutionary Economics*, 23(5), 1099-1126.

Frey, C.B. & M.B. Osborne (2017), "The future of employment: How susceptible are jobs to computerisation?", *Technological Forecasting and Social Change*, 114, 254-280.

Fukuyama, F. (1999), *The end of history and the last man* (Trans. Z. Dicleli), İstanbul: Gün Publishing.

Garip, S. (2023), "A theoretical analysis of the quantitative research tradition in social sciences", *International Journal of Social Science Research*, 12(1), 1-19.

Greengard, S. (2017), *The internet of things*, İstanbul: Optimist Publishing.

Hall, B.H. et al. (2007), Employment, innovation, and productivity: Evidence from Italian microdata", *NBER Working Paper*, 13296.

Harrison, R. et al. (2008), "Does innovation stimulate employment? A firm-level analysis using comparable micro-data from four European countries", *NBER Working Paper*, 14216.

İğdeli, A. & E. Sever (2020), "The effect of innovation on youth unemployment: The case of Level II regions in Turkey", *Anemon Muş Alparslan University Journal of Social Sciences*, 8(3), 771-779.

Katz, R.L. et al. (2010), "The impact of broadband on jobs and the German economy", *Intereconomics*, 45(1), 26-34.

Kılınç, B.D. (2020), "Technological change and employment relationship: A macro analysis for the Turkish labor market", *Master's Thesis*, Ankara University.

Kocabaş, G. (2010), "The effects of technology on labor and production: A study of the manufacturing industry in Turkey", *Master's Thesis*, Çukurova University.

Krousie, C. (2018), "Technological unemployment in the United States: A state-level analysis", *Major Themes in Economics*, 20, 87-101.

Manga, E. & A. Tuna (2023), "Examining the relationship between technological development and unemployment in emerging market economies: A dynamic panel data analysis", *İstanbul Gelişim University Journal of Social Sciences*, 10(2), 555-570.

Naz, G. & B. Altay (2023), "The effect of technological progress on unemployment in Turkey", *Dumlupınar University Journal of Economics and Administrative Sciences*, 11, 93-106.

Nübler, I. (2016), *New technologies: A jobless future or golden age of job creation*, ILO Research Department.

Orhan, S. & F. Savuk (2014), "Labor-technology-unemployment relationship", *ÇSGB Journal of Working World*, 2(2), 9-24.

Öcal, F.M. & K. Altıntaş (2018), "Examining the possible effects of the Fourth Industrial Revolution on labor markets and solution proposals", *International Journal of Social Researches*, 8(15), 2066-2092.

Özdemir, Y.A. et al. (2015), *An introduction to sampling methods with solved examples* (1st ed.), Ankara: Seçkin Publishing.

Öztürk, M. & N. Altuntepe (2008), "Adaptation of migrants to urban life and working life in Turkey: A field study", *Journal of Yaşar University*, 3(11), 1587-1625.

Pini, P. (1995), "Economic growth, technological change and employment: Empirical evidence for a cumulative growth model with external causation for nine OECD countries, 1960-1990", *Structural Change and Economic Dynamics*, 6(2), 185-213.

Piva, M. & M. Vivarelli (2017), "Technological change and employment: Were Ricardo and Marx right?", *IZA Discussion Papers*, 10471.

Piva, M. et al. (2005), "The skill bias effect of technological and organisational change: Evidence and policy implications", *Research Policy*, 34(2), 141-157.

Rottmann, H. & S. Lachenmaier (2011), "Effects of innovation on employment: A dynamic panel analysis", *International Journal of Industrial Organization*, 29(2), 210-220.

Schumpeter, J.A. (1942), *Capitalism, socialism, and democracy* (3rd ed.), New York: HarperCollins.

Schwab, K. (2017), *The Fourth Industrial Revolution* (Trans. Z. Dicleli), İstanbul: Optimist Publishing.

Selci, F. (2019), "The effects of technological developments on women's employment: The case of EU countries and Turkey", *Master's Thesis*, Çankırı Karatekin University.

Taymaz, E. (1998), "Technological change and employment in Turkish manufacturing industry", in: T. Bulutay (ed.), *Technology and Employment* (1-36), Devlet İstatistik Enstitüsü.

Uğur, M. (2019), Innovation, technology adoption, and employment: Evidence synthesis. In K. F. Zimmermann (Ed.), *Handbook of labor, human resources and population economics* (pp. 1-23), Springer.

Varıcı, M. (2019), "The effects of technological development on employment: The case of Turkey", *Master's Thesis*, Atatürk University.

World Bank (2016), *Digital dividend*, <https://www.worldbank.org/en/publication/wdr2016>, 25.05.2025.

Zimmermann, K.F. (1991), "The employment consequences of technological advance, demand, and labor costs in German industries", *Empirical Economics*, 16(2), 253-266.

Sosyoekonomi

2026, Vol. 34(70), 377-391

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.16
Date Submitted: 08.09.2025
Date Revised: 30.12.2025
Date Accepted: 05.10.2026

Green Policies and Transport Decarbonization in the EU: The Role of Environmental Taxes and Renewable Energy Use[1]

Salih YILDIRIM *(https://orcid.org/0000-0003-1237-8214), Bursa Uludağ University, Türkiye; salihyildirim@uludag.edu.tr*

Yasemin KAYA *(https://orcid.org/0000-0002-4601-1341), Bursa Uludağ University, Türkiye; yaseminkahveci@uludag.edu.tr*

AB'de Yeşil Politikalar ve Ulaşımın Karbonsuzlaşması: Çevre Vergileri ve Yenilenebilir Enerji Kullanımının Rolü[2]

Abstract

Decarbonising the transport sector is a strategic policy priority in the European Union's (EU) targets to achieve net-zero emissions by 2050. Accordingly, this study examines the impact of environmental taxes and renewable energy use on transport-related CO_2 emissions (TCO_2). For 27 EU countries, we estimated a panel fixed-effects model using data from 2015 to 2023. The estimated results indicate that environmental taxes and renewable energy use reduce TCO_2. The results support increasing environmental taxes and renewable energy use in the EU to reduce transport emissions.

Keywords : Transport-Related CO_2 Emissions, Environmental Taxes, Renewable Energy Use, Transport Decarbonization, Net-Zero Transition.

JEL Classification Codes : Q54, Q42, H23.

Öz

Ulaştırma sektörünün karbonsuzlaşması, Avrupa Birliği'nin (AB) 2050 yılına kadar net sıfır emisyon hedefleri kapsamında stratejik bir politika önceliğidir. Bu doğrultuda, bu çalışmanın amacı, çevre vergileri ve yenilenebilir enerji kullanımının ulaşım kaynaklı CO_2 emisyonları (TCO_2) üzerindeki etkisini incelemektir. 27 AB ülkesi için, 2015 ile 2023 yılları arasındaki veriler kullanılarak panel sabit etkiler modeli tahmin edilmiştir. Tahmin edilen model sonuçları, çevre vergileri ve yenilenebilir enerji kullanımının TCO_2'yi azaltmada etkili olduğunu göstermektedir. Sonuçlar, AB'nin ulaştırma emisyonlarını azaltmak için çevre vergilerini artırmasını ve yenilenebilir enerji kullanımını artırmasını desteklemektedir.

Anahtar Sözcükler : Ulaşım CO_2 Emisyonları, Çevre Vergileri, Yenilenebilir Enerji Kullanımı, Ulaşımın Karbonsuzlaşması, Net Sıfır Geçişi.

[1] *This research has been supported by the European Union Erasmus+ Project (GREAT) under code 2024-1-TR01-KA220-HED-000245317. We thank the Turkish National Agency, the Council of Higher Education and Bursa Uludağ University for their support.*

[2] *Bu araştırma, 2024-1-TR01-KA220-HED-000245317 kodlu Avrupa Birliği Erasmus+ Projesi (GREAT) kapsamında desteklenmiştir. Desteklerinden dolayı Türkiye Ulusal Ajansı'na, Yükseköğretim Kurulu'na ve Bursa Uludağ Üniversitesi'ne teşekkür ederiz.*

1. Introduction

The transport sector plays a pivotal role in global CO_2 emissions. According to the International Energy Agency, the transport sector accounts for approximately 24% of global CO_2 emissions, with road transport being the dominant factor (IEA, 2023). In the EU, it accounts for about 25% of total greenhouse gas emissions, making it the largest sector (EEA, 2023). This reality poses a significant challenge to the EU's climate neutrality objective by 2050, as achieving net-zero emissions requires a substantial and sustained decline in total CO_2 output. Addressing this challenge necessitates comprehensive policy interventions that both reflect the environmental cost of emissions and incentivise low-carbon alternatives.

From a theoretical perspective, the decarbonization of the transport sector can be understood through the interaction of policy-induced incentives, energy structure transformation, and macroeconomic dynamics. In this regard, the pricing of long-term environmental risks - particularly through environmental taxation - plays a central role in correcting market failures associated with transport emissions. Rooted in Pigouvian taxation theory, environmental taxes internalise negative externalities by raising the relative cost of carbon-intensive transport activities, thereby influencing consumer behaviour, vehicle choice, and energy-efficiency decisions (Pigou, 1920).

In the transport sector, green policy instruments such as fuel and emission taxes operate through multiple channels. First, higher fuel prices discourage excessive vehicle use and promote modal shifts toward public and low-emission transport. Second, they incentivise firms and households to adopt cleaner vehicle technologies, including electric and hybrid vehicles. Third, environmental tax revenues can be recycled into green transport infrastructure and innovation, reinforcing long-term emission reductions. As Stern (2006) and the OECD (2022) emphasise, such market-based instruments are among the most effective tools for internalising environmental externalities and accelerating the low-carbon transition.

Nevertheless, fiscal instruments alone are not enough to achieve a sustainable and zero-emission transport system. A structural transformation in the transport sector's energy mix is equally essential. The increasing share of renewable energy - through biofuels, renewable electricity, and green hydrogen - directly reduces the carbon intensity of transport services by substituting fossil fuels with low-emission energy sources (Amin et al., 2020). Policy strategies such as the European Green Deal and the Sustainable and Smart Mobility Strategy explicitly acknowledge this mechanism, emphasising the joint role of fiscal instruments and renewable energy deployment in advancing transport decarbonization.

Innovative energy technologies, particularly electric vehicles powered by renewable electricity, biofuels with lower life-cycle emissions, and hydrogen-based transport solutions, represent key transmission channels linking renewable energy use to reductions in TCO_2 (Hackbarth and Madlener, 2016; Huo et al., 2009; Olsson and Johansson, 2017). However, these technologies' effectiveness depends critically on complementary policy support,

including infrastructure investments and targeted subsidies. In this context, environmental taxes and renewable energy policies are not substitutes but complementary green policy instruments that jointly shape transport-related emission outcomes.

Despite the growing importance of green policy instruments, few studies (Hussain et al., 2022; Dai et al., 2023; Amin et al., 2020; Kwilinski et al., 2024) have examined the role of environmental taxes and renewable energy use as key drivers of TCO_2. A research gap remains regarding the effect of environmental taxes and renewable energy use on TCO_2 reduction across 27 EU countries. To address this gap, the study provides the first empirical assessment of the joint effects of environmental taxes and renewable energy use on TCO_2 in the EU, contributing policy-relevant evidence to support transport decarbonization strategies.

This study addresses the following research questions: (i) Do environmental taxes and renewable energy use affect the reduction of TCO_2 in 27 EU countries? (ii) How do economic growth and trade openness influence TCO_2 in the EU? To answer these questions, this study examines the impact of environmental taxes and renewable energy use on TCO_2 in 27 EU countries, using panel fixed-effects models for 2015-2023.

The remainder of the study is organised as follows. Section 2 explains the related literature. Section 3 describes the data, model, and methodology employed. Section 4 presents the empirical results. Section 5 discusses the findings. Finally, Section 6 concludes the study and includes policy implications.

2. Literature

The literature broadly examines the determinants of TCO_2, with particular emphasis on environmental taxation, energy structure, economic growth, and trade openness. Environmental taxes are widely recognised as an effective policy instrument for internalising environmental externalities and reducing emissions. Empirical evidence from developed and developing economies suggests that environmental taxes generally help lower TCO_2, although their effectiveness varies across countries and time periods (Hlongwane, 2025; Wolde-Rufael & Mulat-Weldemeskel, 2023; Hussain et al., 2022). Zhu et al. (2023) found that the emissions-reducing effect of environmental taxes strengthens when accompanied by a higher share of renewable energy in the overall energy mix, highlighting the complementarity between fiscal instruments and clean energy deployment.

Energy use and energy structure constitute another central dimension in the transport emissions nexus. A large body of research confirms that fossil fuel dependence and rising energy intensity significantly increase TCO_2, while shifts toward cleaner energy sources mitigate environmental pressures (Timilsina & Shrestha, 2009; Rasool et al., 2019; Kartal et al., 2024). In this context, renewable energy use in the transport sector - through biofuels, renewable electricity, and hydrogen - has emerged as a critical driver of emission reductions. Empirical studies consistently report a negative relationship between renewable energy use

and TCO_2 across different country groups (Dai et al., 2023; Amin et al., 2020; Zahoor et al., 2023). Few studies emphasise the role of environmental technologies, renewable energy, and policy stringency in reducing TCO_2; most analyses focus on some of the EU countries or earlier periods (Georgatzi et al., 2020; Kwilinski et al., 2024). Within the EU, however, attention to the nexus between TCO_2 and green policy instruments remains limited.

According to Lin et al. (2021), during the early phases of growth, rapid economic growth promotes green energy use, strong environmental regulations, innovation, and advanced technologies that reduce air pollution. However, increased economic growth also increases transportation activity, which in turn drives up transportation emissions (Danish et al., 2019). Therefore, economic growth is identified as a key determinant of TCO_2. Some studies report a positive association between income growth and TCO_2, reflecting scale effects driven by increased mobility demand and energy consumption (Isik et al., 2020; Wang et al., 2018).

Trade involves exchanging goods and services, which naturally increases transportation activity within a country. Therefore, fossil fuel consumption increases with higher trade levels. While trade can support green technology, the significant transportation activities related to the trade of goods and services and the resulting emissions outweigh the potential benefits of trade in the transportation sector. As a result, international trade contributes to higher emissions in the transport sector (Dai et al., 2023). While some studies find that trade openness facilitates cleaner logistics and technology diffusion, thereby reducing emissions, others report a positive relationship because increased freight activity and energy use drive higher emissions (Fan et al., 2019; Churchill et al., 2021; Barut et al., 2023). These mixed findings indicate that the trade-emissions nexus is context-specific and sensitive to country characteristics and policy frameworks.

The existing literature emphasises the importance of green policy instruments, energy structure transformation, and macroeconomic factors in shaping TCO_2, while also revealing a lack of integrated analyses of EU countries that jointly assess environmental taxes and renewable energy use. This motivates the empirical analysis.

3. Data & Methodology

This study uses an unbalanced panel dataset covering 27 EU member states from 2015 to 2023. The dataset begins in 2015 to reflect the post-Paris Agreement period, during which the EU significantly reinforced its climate policy targets and transport decarbonization strategies. We sourced annual datasets from Eurostat and the World Bank. We log-transformed the data, allowing us to interpret the estimated coefficients as elasticities.

The dependent variable, TCO_2, represents the total carbon dioxide emissions from the transport (Mt) sector, encompassing road, rail, maritime, and air transport. According to IEA (2023), this measure accounts for CO_2 emissions from burning fossil fuels across all

transport modes. We incorporate two main explanatory variables to capture the role of green policies. Environmental taxes (ENV) refer to total environmental tax revenues, including energy, transport, pollution, and resource taxes, expressed as a percentage of GDP. Environmental tax revenues in the EU amounted to around €330 billion in 2023, with a substantial share stemming from energy and transport-related taxes (Eurostat, 2025). The share of renewable energy in transport (RES) is the proportion of renewable energy, such as biofuels, renewable electricity, and green hydrogen, in gross final energy consumption in the transport sector.

We used economic growth (GDP) and trade openness (TRADE) as control variables. GDP is measured in real terms at constant 2015 US dollars. This variable captures the scale effect of economic activity on transport-related emissions and is widely used in environmental economics research (Wang et al., 2018: 127-132; Isik et al., 2020: 210-219). TRADE variable was used as the sum of exports and imports of goods and services as a percentage of GDP. The variable can exert a dual impact on transport emissions: increased trade volumes may stimulate freight activity and fuel consumption (Barut et al., 2023: 1011-1022), while it can also facilitate the diffusion of low-emission technologies and green logistics infrastructure.

It is acknowledged that although potential endogeneity between environmental taxes, renewable energy use, and transport-related CO_2 emissions cannot be entirely ruled out, the adopted empirical strategy mitigates this concern by employing Panel-Corrected Standard Errors (PCSE) and Common Correlated Effects Mean Group (CCEMG) estimators, which account for unobserved common factors, cross-sectional dependence, and country-specific heterogeneity.

This study uses two estimators within the fixed effects model (FEM) framework: the PCSE developed by Beck and Katz and the CCEMG estimator, which provide robust standard errors that are resilient to key panel data issues. Specifically, these techniques address heteroskedasticity, serial correlation, and cross-sectional dependence, which are often observed in datasets with relatively large unit and time dimensions. These estimators are particularly well suited to empirical studies involving macro panel datasets, where traditional estimators may produce biased or inefficient results if such correlations are ignored (Beck & Katz, 1995: 634-647; Pesaran, 2006).

The PCSE model is particularly suitable for datasets with a relatively small number of time periods and a larger number of units. A typical PCSE model can be expressed as:

$$TCO_{2it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 RES_{it} + \beta_3 GDP_{it} + \beta_4 TRADE_{it} + \varepsilon_{it} \quad (1)$$

In this model, the error term is defined below:

$$\varepsilon_{it} = \mu_i + \nu_{it} \quad (2)$$

The PCSE model is based on FEM, and it corrects for panel-specific heteroskedasticity and contemporaneous correlation of the error terms across panels. It achieves this by estimating the cross-sectional covariance matrix of the disturbances, allowing more accurate standard error calculations than conventional FEM when error terms are non-spherical. PCSE model provides more reliable estimates, especially in unbalanced or short panels (Beck & Katz, 1995; Plümper & Troeger, 2007: 124-139).

To account for unobserved common factors and cross-sectional dependence in the panel data, we employed the CCEMG estimator developed by Pesaran (2006). This method augments individual equations with cross-sectional averages of the dependent and explanatory variables, capturing global shocks and unobserved common trends. The CCEMG model can be expressed as:

$$TCO_{2it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 RES_{it} + \beta_3 GDP_{it} + \beta_4 TRADE_{it} + \varepsilon_{it} \quad (3)$$

In this model, the error term is defined below:

$$\varepsilon_{it} = \lambda' f_t + \mu_{it} \quad (4)$$

The CCEMG model also allows heterogeneous slope coefficients across countries, which is particularly appropriate in the EU, where member states differ in their institutional and economic structures. Thus, the model provides consistent and robust estimates even with multifactor error structures, cross-sectional correlation, and parameter heterogeneity.

Following the model specification in Eq. (1) and Eq. (3), we carried out three diagnostic tests, namely the Wald test (Baltagi, 2005) to assess the presence of heteroskedasticity, the Baltagi-Wu LBI test (Baltagi & Wu, 1999) for first-order autocorrelation in panel data, and the Pesaran cross-sectional dependence (CD) test (Pesaran, 2004), which evaluates the existence of contemporaneous correlation across cross-sectional units. These tests improve the reliability of the estimation results by ensuring that model assumptions are not violated and using appropriate robust standard errors when necessary.

4. Empirical Findings

The empirical features of the panel data are presented, beginning with descriptive statistics of the variables used in the analysis, as shown in Table 1. The computed mean and median values suggest positive levels of economic and green indicators across the observed countries. Importantly, the differences between mean and median values are relatively small, indicating limited skewness in the central tendency for most variables. However, notable disparities are observed between the minimum and maximum values of RES and GDP. These disparities are also reflected in the standard deviation, which is highest for GDP, followed by RES, signalling considerable dispersion across units. To assess the distributional properties of the variables, skewness and kurtosis statistics were calculated. The results suggest departures from normality in most cases; specifically, RES shows strong positive skewness and high kurtosis, indicating a concentration of lower values with a few

high-end outliers. This non-normality justifies using robust panel estimators in subsequent model specifications.

Table: 1
Descriptive Statistics

Variables	*Mean*	*Maximum*	*Minimum*	*Standard deviation*	*Skewness*	*Kurtosis*
TCO_2	2.593	5.097	-0.531	1.278	-0.032	2.923
ENV	2.637	5.60	1.230	0.771	0 .825	3.345
RES	8.343	33.645	0.413	5.269	2.378	10.544
GDP	26.019	28.939	23.152	1.467	0.126	2.191
TRADE	4.806	5.977	3.988	0.437	0.365	2.823

It is important to assess the potential multicollinearity, which arises when independent variables are highly or perfectly correlated. This can be explained by analysing the correlation matrix presented in Table 2. The analysis indicates no evidence of multicollinearity among the independent variables.

Table: 2
Correlation Matrix

Variable	*TCO_2*	*ENV*	*RES*	*GDP*	*TRADE*
TCO_2	1.000				
ENV	-0.091	1.000			
RES	0.125	-0.312	1.000		
GDP	0.949	-0.152	0.287	1.000	
TRADE	-0.639	-0.246	-0.150	-0.572	1.000

To determine the appropriate model specification, we conducted both the F test for fixed effects and the Breusch-Pagan Lagrange Multiplier (LM) test for random effects. The null hypothesis (H_0) in both tests posits the absence of fixed and time effects, whereas the alternative hypothesis (H_1) indicates their presence. Table 3 shows that the F test rejects the null hypothesis at conventional significance levels, confirming fixed effects, while detecting no significant time effects. Similarly, the Breusch-Pagan LM test also rejects the null hypothesis, indicating random effects. However, consistent with the F test results, the LM test does not suggest significant time effects. Therefore, the panel structure includes cross-sectional (unit) effects but not period (time) effects under both fixed- and random-effects assumptions.

Table: 3
Model Selection Tests

F test		*Breusch-Pagan lm test*	
Value	Comment	Value	Comment
206.380	H_0 is rejected	792.090	H_0 is rejected
(0.000)	The classic model is not suitable	(0.000)	The classic model is not suitable

Note: p-value is in parentheses.

After identifying a one-way error component panel regression model, the next step is to select the appropriate estimation strategy. In practice, the choice between random effects and fixed effects estimators depends on the correlation between the individual effects and the explanatory variables. If the unobserved individual effects are uncorrelated with the

regressors, the random effects model is preferred; if correlation exists, the fixed effects model is more appropriate (Greene, 2003). However, because this decision cannot be based on theoretical background, it is necessary to apply the Hausman test formally. The H_0 hypothesis ($H_0: E(\varepsilon_{it}|X_{it}) = 0$) shows the absence of correlation between explanatory variables and unit effect, and the H_1 hypothesis ($H_1: E(\varepsilon_{it}|X_{it}) \neq 0$) posits the presence of correlation between explanatory variables and unit effect. Table 4 presents the Hausman test results.

Table: 4
Hausman (1978) Specification Test

Hausman test	***Coef.***
Chi-square value	13.450
P-value	0.009

As shown in Table 4, the Hausman test results support rejecting the null hypothesis (H_0), indicating correlation between the explanatory variables and unobserved unit effects. In other words, the random effects estimator is inconsistent and therefore unsuitable for this model. Consequently, the fixed effects estimator is the optimal specification for the panel regression. After identifying the optimal estimation strategy, we assess whether the model suffers from key specification issues, namely heteroskedasticity, serial correlation, and cross-sectional dependence. To do so, we used three diagnostic tests: the Modified Wald test for groupwise heteroskedasticity, the Baltagi-Wu LBI test for serial correlation, and the Pesaran CD test for cross-sectional dependence (Baltagi, 2005; Baltagi & Wu, 1999; Pesaran, 2004). The outcomes of these tests are reported in Table 5.

Table: 5
Diagnostic Tests

D. Wald test	***Baltagi-WU test***	***Pesaran test***
29.950 (0.000)	1.061 (0.000)	10.029 (0.000)

Note: p-value is in parentheses.

Based on the results reported in Table 5, we reject the null hypothesis (H_0) for all three diagnostic tests. The Modified Wald test indicates heteroskedasticity across cross-sectional units, as variance is not constant across entities. Similarly, the Baltagi-Wu LBI test yields a test statistic below the critical threshold of 2, confirming first-order serial correlation within the panel structure. In addition, the Pesaran CD test identifies statistically significant cross-sectional dependence, suggesting that shocks affecting one unit may influence others within the sample.

These findings imply that the initially selected FEM is affected by heteroskedasticity, autocorrelation, and cross-sectional dependence. Therefore, to obtain robust and reliable coefficient estimates under these conditions, the analysis estimates a one-way error component panel model using a robust estimation technique. Within the fixed effects framework, the Beck-Katz PCSE estimator is particularly suitable, as it accounts for heteroskedasticity across units, contemporaneous correlation, and serial correlation over

time in panel data. For this reason, we used the FEM-PCSE estimator to estimate the model. Table 6 presents the estimation results.

Table: 6
FEM-PCSE Estimation Results

Variable	*Coefficient (β)*	*Std. error (ε_{it})*	*z*	*P>|z|*
ENV	-0.213	0.026	0.800	0.422
RES	-0.246***	0.004	-6.190	0.000
GDP	0.815***	0.016	51.460	0.000
TRADE	-0.261***	0.078	-3.350	0.001
Constant	-1.7212***	0.774	-22.240	0.000
	Value			
R^2	0.95			
Rho	0.77			
Wald chi^2	7014.30 (0.000)			
Number of obs.	243			

*Note: p-value is in parentheses. *, ** and *** denote significance at 10%, 5% and 1% levels, respectively.*

According to the PCSE estimation, a 1% increase in ENV results in a 0.213% decrease in TCO_2 by -0.213%, ceteris paribus, but ENV is statistically insignificant (p=0.422). RES has a statistically significant negative effect on TCO_2 emissions (β=-0.246, p<0.01), suggesting that increasing RES helps mitigate TCO_2. RES effectively reduces TCO_2. Specifically, a 1% increase in RES reduces TCO_2 by 0.246%, ceteris paribus. In simple terms, increased use of renewable energy in transport is associated with lower transport emissions. GDP has a highly significant positive relationship with TCO_2 (β=0.815, p<0.01), indicating that higher economic activity is associated with greater environmental pressure from the transport sector. The coefficient for TRADE is also statistically significant but negative (β=-0.261, p<0.01). Accordingly, a 1% increase in TRADE significantly reduces TCO_2 by 0.26%, ceteris paribus. This implies TRADE may facilitate access to cleaner technologies and more efficient logistics, thereby reducing transport emissions. The estimation results show a highly significant Wald statistic (χ^2=7014.30, p<0.001), and the rho value (p=0.77) indicates strong panel-level correlation, justifying robust standard errors. After obtaining the empirical results, we test the model's robustness by employing the FEM-CCEMG estimator. Accordingly, Table 7 presents the empirical results.

Table: 7
FEM-CCEMG Estimation Robustness Results

Variable	*Coefficient (β)*	*Std. error (ε_{it})*	*z*	*P>|z|*
ENV	-0.190***	0.044	4.280	0.000
RES	-0.183***	0.004	-4.140	0.000
GDP	0.962***	0.119	8.030	0.000
TRADE	0.092	0.104	0.880	0.378
Constant	-2.904***	2.884	-7.940	0.000
	Value			
RMSE	0.023			
Wald chi^2	146.73 (0.000)			
Number of obs.	243			

*Note: p-value is in parentheses. *, ** and *** denote significance at 10%, 5% and 1% levels, respectively.*

As presented in Table 7, the CCEMG estimation, which accounts for unobserved common factors and cross-sectional dependence, largely confirms the baseline results. Notably, ENV becomes statistically significant (β=-0.190, p<0.01), indicating that when

unobserved heterogeneity is properly controlled for, ENV is associated with lower TCO_2. Specifically, a 1% increase in ENV is associated with a 0.19% decrease in TCO_2, ceteris paribus. These results align with the PCSE estimates and show that RES effectively reduces TCO_2. RES (β=-0.183, $p<0.01$) has a statistically significant negative effect on TCO_2. In this model, RES robustly reduces TCO_2. This result implies that renewable energy helps achieve a low-carbon transport sector and supports the green transition. The robustness test confirms that GDP (β=0.962, $p<0.01$) has a statistically significant positive effect on transport emissions. In contrast, TRADE was positive but statistically insignificant (p=0.378). This finding supports the idea that increased freight activity and energy use can increase TCO_2. The overall model remains statistically valid, with a robust Wald statistic (χ^2=146.73, $p<0.001$) and a low RMSE (0.023), indicating a good model fit.

5. Discussion

The empirical findings from both the PCSE and CCEMG estimations are largely consistent in sign and interpretation. Environmental taxes are an instrument for environmental protection and green policy, but the variable is initially statistically insignificant in the PCSE model. This outcome may reflect the gradual and heterogeneous nature of environmental taxation policies across EU countries, where differences in tax design, coverage, and enforcement can dilute the average period effect on TCO_2. After applying a robustness test, the variable became highly significant under the CCEMG model, which explains a significantly negative effect on TCO_2. Environmental tax revenues are intended to create economic incentives for polluters to reduce emissions and invest in cleaner technologies. Increases in environmental tax revenues can fund green transportation infrastructure, such as improved public transportation, expanded bicycle lanes, and EV charging stations. This supports both emissions reduction and green job creation. This result aligns with previous empirical studies that highlight the emissions-reducing impact of environmental taxes (Hussain et al., 2022; Zhu et al., 2023; Georgatzi et al., 2020). More recently, Savranlar et al. (2024) show that higher environmental tax revenues are associated with a statistically significant reduction in TCO_2 in the EU. In addition, Ahmad et al. (2024) show a pronounced negative correlation between environmental taxes, green transport deployment, and TCO_2. The relationship between environmental taxes and TCO_2 suggests that it may support the transition to clean energy and green investments (Hlongwane et al., 2025; Hussain et al., 2022; Zhu et al., 2023).

The findings consistently underscore that a higher share of renewable energy in transport is associated with significant reductions in TCO_2. Several mechanisms explain this. First, higher shares of renewable energy directly substitute fossil fuels in transport energy consumption, reducing the carbon intensity of mobility. Second, expanding renewable energy strengthens the emission-reducing potential of transport electrification, as electric vehicles and rail-based transport systems increasingly run on low-carbon electricity. This insight aligns with prior studies (Dai et al., 2023; Zahoor et al., 2023). Specifically, Busu and Nedelcu (2021) state that a higher share of renewable energy leads to lower emissions for the EU. Jianu et al. (2022) reinforce these findings, showing a stable negative relationship

between renewable energy share and greenhouse gas emissions in the EU. Earlier empirical work, including Kwilinski et al. (2024) and Amin et al. (2020), also reports that higher renewable energy penetration mitigates transport emissions in the EU. These results reinforce the argument that transitioning towards cleaner energy sources in transportation plays a crucial role in reducing TCO_2.

Moreover, the findings also indicate that economic growth is positively associated with CO_2 emissions from the transport sector, suggesting that rising income levels tend to intensify transport activity, energy demand, and mobility-related emissions. This finding is consistent with prior studies emphasising the scale effect of economic growth, whereby increased industrialisation, urbanisation, and demand for transport services contribute to higher environmental pressure (Rasool et al., 2019; Godil et al., 2021; Kwilinski et al., 2024). This outcome underscores that economic growth alone does not translate into transport-sector emission reductions.

The estimated coefficient of trade openness shows mixed effects across the models. The PCSE estimates indicate a statistically significant negative relationship between trade openness and TCO_2. This finding supports the idea that trade may support technology diffusion, efficiency gains, and greener logistics. Although this finding is consistent with economic expectations in the estimated CCEMG model, it was not statistically significant. This finding implies that trade volumes can stimulate freight activity and fuel consumption. In this direction, this finding is aligned with prior empirical evidence showing mixed environmental outcomes of trade openness (Barut et al., 2023; Churchill et al., 2021).

6. Conclusion

This study examines the effectiveness of environmental taxes and renewable energy use in reducing transport-related CO_2 emissions in 27 EU countries. To this end, we estimated panel fixed-effects models using PCSE and CCEMG data from 2015 to 2023. The results indicate a negative and statistically significant effect of environmental taxes on transport-related CO_2 emissions, suggesting that higher environmental tax levels are associated with lower emissions. This implies that environmental taxes can serve as an effective green policy instrument to discourage fossil fuel-intensive transport activities and promote cleaner alternatives.

The estimation results also demonstrate a negative and significant effect of renewable energy use on transport-related CO_2 emissions. Accordingly, renewable energy use significantly reduces transport emissions. As renewable energy use increases, these emissions decrease. Expanding renewable energy use in the transport sector can accelerate the electrification of transport systems. In this regard, the transition from conventional fossil fuel-based transport to electrified and alternative fuel technologies appears to be effective only when supported by a sufficiently high share of renewable energy in the energy mix. Moreover, developing renewable energy infrastructure tailored to the transport sector can help reduce transport emissions and achieve the EU's long-term carbon reduction targets.

Economic growth positively affects transport-related CO_2 emissions, reflecting the scale effect associated with increased mobility demand and energy consumption. At the same time, economic growth may facilitate investments in green energy and cleaner transport technologies. Policy incentives aimed at promoting green energy adoption - such as tax incentives and price-based support for electric vehicles - can encourage a reduction in transport-related CO_2 emissions and help mitigate pollution from the transport sector. In addition, the diffusion of hybrid vehicles may help lower transport emissions in the EU by reducing reliance on fossil fuels.

Trade openness negatively affects transport-related CO_2 emissions. Accordingly, trade stimulates these emissions in the EU; therefore, governments may focus on green trade that requires fewer energy resources during production and use to reduce them. Conversely, trade volumes can increase transport activity and fuel consumption, contributing to higher transport sector emissions.

The results yield important policy implications. Environmental taxes and renewable energy use reduce transport-related emissions by improving environmental conditions and easing environmental pressure. By internalising the negative externalities of fossil fuel consumption, environmental taxes shift the cost burden toward carbon-intensive activities, incentivising a transition to cleaner transport systems. Accordingly, policymakers should consider restructuring tax frameworks to ensure that the revenues generated are earmarked for investments in green transport infrastructure. In addition, tax reductions and other targeted fiscal incentives can further promote the adoption of electric and hybrid vehicles.

Regarding the study's limitations, the sample period includes the COVID-19 pandemic, which imposed unprecedented mobility restrictions and led to temporary declines in transport demand and CO_2 emissions. The fixed effects models employed do not explicitly account for potential structural breaks associated with this period. Methodologically, another limitation concerns potential endogeneity between environmental policy variables and transport-related emissions. Future research could extend the analysis by employing dynamic modelling approaches and causality tests, either for the EU or for alternative country groups.

References

Ahmad, M. et al. (2024), "Linking green transportation and technology, and environmental taxes for transport carbon emissions", *Transportation Research Part D: Transport and Environment*, 136(104450).

Amin, A. et al. (2020), "Analyzing the determinants of carbon emissions from transportation in European countries: the role of renewable energy and urbanization", *Clean Technologies and Environmental Policy*, 22, 1725-1734.

Baltagi, B.H. & P.X. Wu (1999), "Unequally spaced panel data regressions with AR(1) disturbances", *Econometric Theory*, 15(6), 814-823.

Baltagi, B.H. (2005), *Econometric Analysis of Panel Data* (Third Edition), John Wiley.

Barut, A. et al. (2023), "How do economic and financial factors influence green logistics? A comparative analysis of E7 and G7 nations", *Environmental Science and Pollution Research*, 30, 1011-1022.

Beck, N. & J.N. Katz (1995), "What to do (and not to do) with Time-Series Cross-Section Data", *The American Political Science Review*, 89(3), 634-647.

Busu, M. & A.C. Nedelcu (2021), "Analyzing the renewable energy and CO_2 emission levels nexus at an EU level: A panel data regression approach", *Processes*, 9(1), 130.

Churchill, S.A. et al. (2021), "Transport infrastructure and CO_2 emissions in the OECD over the long run", *Transportation Research Part D: Transport and Environment*, 95, 102857.

Dai, J. et al. (2023), "Transport infrastructure, economic growth, and transport CO_2 emissions nexus: Does green energy consumption in the transport sector matter?", *Environmental Science and Pollution Research*, 30, 40094-40106.

Danish et al. (2019), "Toward achieving environmental sustainability targets in Organization for Economic Cooperation and Development countries: The role of real income, research and development, and transport infrastructure", *Sustainable Development*, 28(1), 83-90.

Das, P.K. et al. (2024), "Decarbonising transportation: empirical insights into electric vehicles, carbon emissions and energy consumption", *International Journal of Energy Sector Management*, 18(6), 2059-2085.

European Commission (2020), *Sustainable and Smart Mobility Strategy - putting European transport on track for the future*, COM(2020) 789 final.

European Environment Agency (2022), "Trends and projections in Europe 2022", EEA *Report* 10/22.

European Environment Agency (2023), "Transport and Environment Report 2022, Digitalisation in the mobility system: challenges and opportunities", EEA *Report* 07/2022.

Eurostat (2025), *Environmental tax revenue shows slight increase in 2023*, <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20250722-1?>, 06.09.2025.

Fan, B. et al. (2019), "Trade openness and carbon leakage: Empirical evidence from China's industrial sector", *Energies*, 12(6), 1101.

Georgatzi, V.V. et al. (2020), "Examining the determinants of CO_2 emissions caused by the transport sector: Empirical evidence from 12 European countries", *Economic Analysis and Policy*, 65, 11-20.

Godil, D.I. et al. (2021), "Investigate the role of technology innovation and renewable energy in reducing transport sector CO_2 emission in China: a path toward sustainable development", *Sustainable Development*, 29(4), 694-707.

Greene, W.H. (2003), *Econometric Analysis* (Fifth Edition), Prentice Hall.

Hackbarth, A. & R. Madlener (2016), "The environmental impact of electric vehicles: A literature review", *Renewable and Sustainable Energy Reviews*, 57, 56-74.

Hlongwane, N.W. (2025), "The Impact of Environmental Taxes on the Level of Greenhouse Gas Emissions in Poland and Sweden", *International Journal of Economics and Financial Issues*, 15(4), 80-94.

Huo, H. et al. (2009), "Life-cycle assessment of energy use and greenhouse gas emissions of soybean-derived biodiesel and renewable fuels", *Environmental Science & Technology*, 43(3), 750-756.

Hussain, Z. et al. (2022), "Effect of economic development, income inequality, transportation, and environmental expenditures on transport emissions: evidence from OECD countries", *Environmental Science and Pollution Research*, 29(37), 56642-56657.

International Energy Agency (2023), *Tracking Transport 2023*, <https://www.iea.org/reports/tracking-transport-2023>, 06.09.2025.

Isik, M. et al. (2020), "Driving forces of Turkey's transportation sector CO_2 emissions: An LMDI approach", *Transport Policy*, 97, 210-219.

Jianu, I. et al. (2022), "Greenhouse Gas Emissions and its Main Drivers: a Panel Assessment for EU-27 Member States", *American International Journal of Business Management* (AIJBM), 5(04), 138-146.

Karmakar, S. & M. Zahan (2021), "Biofuels and their environmental impacts in the transport sector: A review", *Environmental Science and Pollution Research*, 28(16), 20563-20582.

Kartal, M.T. et al. (2024), "Examining Determinants of Transport-Related Carbon Dioxide Emissions by Novel Super Learner Algorithm", *Transportation Research Part D: Transport and Environment*, 136, 104429.

Kwilinski, A. et al. (2024), "Reducing transport sector CO_2 emissions patterns: Environmental technologies and renewable energy", *Journal of Open Innovation: Technology, Market, and Complexity*, 10, 100217.

Lin, X. et al. (2021), "Linking innovative human capital, economic growth, and CO_2 emissions: An empirical study based on Chinese provincial panel data", *International Journal of Environmental Research and Public Health*, 18, 8503.

OECD (2022), "Pricing Greenhouse Gas Emissions: Turning Climate Targets into Climate Action", *Report*, OECD Series on Carbon Pricing and Energy Taxation.

Olsson, M. & B. Johansson (2017), "Hydrogen fuel cells in the transport sector: A review of potential and challenges", *International Journal of Hydrogen Energy*, 42(27), 17106-17118.

Pesaran, M.H. (2004), "General Diagnostic Tests for Cross Section Dependence in Panels", Cambridge *Working Papers* in Economics (0435).

Pesaran, M.H. (2006), "Estimation and Inference in Large Heterogeneous Panels with a Multifactor Error Structure", *Econometrica*, 74(4), 967-1012.

Pigou, A.C. (1920), *The Economics of Welfare*, Macmillan.

Plümper, T. & V.E. Troeger (2007), "Efficient Estimation of Time-Invariant and Rarely Changing Variables in Finite Sample Panel Analyses with Unit Fixed Effects", *Political Analysis*, 15(2), 124-139.

Rasool, Y. et al. (2019), "Determinants of carbon emissions in Pakistan's transport sector", *Environmental Science and Pollution Research*, 26, 22907-22921.

Savranlar, B. et al. (2024), "The role of environmental tax on environmental quality in EU countries: evidence from a panel vector autoregression approach", *Environmental Science and Pollution Research*, 31, 35769-35778.

Stern, N. (2006), *The Economics of Climate Change: The Stern Review*, Cambridge.

Olsson, M. & B. Johansson (2017), "Hydrogen fuel cells in the transport sector: A review of potential and challenges", *International Journal of Hydrogen Energy*, 42(27), 17106-17118.

Timilsina, G.R. & A. Shrestha (2009), "Factors affecting transport sector CO_2 emissions growth in Latin American and Caribbean countries: An LMDI decomposition analysis", *International Journal of Energy Research*, 33, 396-414.

Wang, B. et al. (2018), "Determinants analysis of carbon dioxide emissions in passenger and freight transportation sectors in China", *Structural Change and Economic Dynamics*, 47, 127-132.

Wolde-Rufael, Y. & E. Mulat-Weldemeskel (2023), "Effectiveness of environmental taxes and environmental stringent policies on CO_2 emissions: the European experience", *Environment, Development and Sustainability*, 25(6), 5211-5239.

Zahoor, A. et al. (2023), "The carbon neutrality feasibility of worldwide and in China's transportation sector by E-car and renewable energy sources before 2060", *Journal of Energy Storage*, 61, 106696.

Zhu, Y. et al. (2023), "The role of environmental taxes on carbon emissions in countries aiming for net-zero carbon emissions: Does renewable energy consumption matter?", *Renewable Energy*, 218, 119239.

Sosyoekonomi

2026, Vol. 34(70), 393-418

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.17
Date Submitted: 11.06.2025
Date Revised: 06.10.2026
Date Accepted: 07.10.2026

Indication of Economic Populism Through Public Finance Measures: An Empirical Study of the Largest Cities in Czechia and Türkiye

Cenay BABAOĞLU *(https://orcid.org/0000-0002-2935-0579), Niğde Ömer Halisdemir University, Türkiye; cenaybabaoglu@gmail.com*

Robert BAŤA *(https://orcid.org/0000-0002-8865-2534), University of Pardubice, Czechia; robert.bata@upce.cz*

Jan FUKA *(https://orcid.org/0000-0003-2218-8318), University of Pardubice, Czechia; jan.fuka@upce.cz*

Altuğ Murat KÖKTAŞ *(https://orcid.org/0000-0002-0911-2143), Ankara University & Middle East Technical University, Türkiye; altugmkoktas@gmail.com*

Onur KULAÇ *(https://orcid.org/0000-0002-5135-0356), Pamukkale University, Türkiye; okulac@pau.edu.tr*

Pavel ZDRAŽIL *(https://orcid.org/0000-0003-0815-404X), University of Pardubice, Czechia; pavel.zdrazil@upce.cz*

Oğuzhan ERDOĞAN *(https://orcid.org/0000-0003-3809-6688), Burdur Mehmet Akif Ersoy University, Türkiye; oerdogan@mehmetakif.edu.tr*

Kamu Mali Verileriyle Ekonomik Popülizmin Ölçülmesi: Çekya ve Türkiye'deki En Büyük Şehirler Üzerine Görgül Bir Çalışma

Abstract

This study applies the novel Mixed Populism Indication approach to examine and compare economic populism in the largest cities of Czechia and Türkiye. Using standard financial measures and their relationship with interest rates, we tracked potential symptoms of economic populism within local government public finance from 2011 to 2021. The pooled panel expansion of our analytical framework verifies the relevance of our method. It also assesses whether broader political or macroeconomic factors could explain the observed relationships. Based on the cointegration and correlation analysis results, we found no pronounced symptoms of populism in either Czechia or Türkiye. However, our results suggest possible populist behaviour in two Turkish cities, in particular Istanbul and Izmir. In these cities, increases in interest rates are associated with higher debt and debt costs, indicating a less restrained fiscal policy approach. This behaviour aligns with definitions of economic populism in the literature, as it prioritises short-term gains over long-term fiscal sustainability. In Czechia, suspicions of populism concern the cities of Prague and Pilsen, though the symptoms are less evident in financial data. Moreover, Czech cities generally take a more cautious fiscal approach, avoiding significant increases in debt costs, which makes signs of populism less discernible.

Keywords : Populism, Economic Populism, Financial Measures, Local Government, Czechia, Türkiye.

JEL Classification Codes : D72, H72.

Öz

Bu çalışma, Çekya ve Türkiye'nin en büyük şehirlerinde ekonomik popülizmi incelemek ve karşılaştırmak amacıyla özgün bir yöntem olan *Karma Popülizm Göstergesi* yaklaşımını kullanmıştır. 2011-2021 yılları arasında yerel yönetimlerin kamu maliyesi verileri temel alınarak, standart finansal göstergeler ile faiz oranları arasındaki ilişkiler üzerinden ekonomik popülizmin belirtileri izlenmiştir.

Eş bütünleşme ve korelasyon analizlerinin sonuçlarına göre, Çekya'da belirgin popülizm belirtilerine rastlanmamıştır. Bununla birlikte, Türkiye'de özellikle İstanbul'da ve İzmir'de olası popülist davranışlara işaret eden bulgular elde edilmiştir. Bu şehirlerde faiz oranlarında ve borçlanma maliyetlerinde birlikte artış görülmektedir; bu durum, mali disiplinin görece zayıf olduğu bir maliye politikası yaklaşımına işaret etmektedir. Bu tür bir davranış, kısa vadeli kazançların uzun vadeli mali sürdürülebilirliğin önüne konulması bağlamında ekonomik popülizm literatüründeki tanımlarla örtüşmektedir. Çekya'da ise Prag ve Pilsen şehirleri hakkında bazı popülizm emareleri bulunmakla birlikte, bu belirtiler finansal verilerde daha az belirgin biçimde ortaya çıkmaktadır. Ayrıca, Çek şehirleri genel olarak daha temkinli bir mali yaklaşım sergilemekte ve borçlanma maliyetlerinde belirgin artışlardan kaçınmaktadır, bu durum popülizm belirtilerini tespit etmeyi daha da zorlaştırmaktadır.

Anahtar Sözcükler : Popülizm, Ekonomik Popülizm, Finansal Göstergeler, Yerel Yönetim, Çekya, Türkiye.

1. Introduction

Populism is an approach that offers "attractive", often cosmetic and dysfunctional proposals instead of focusing on solving the real problems of citizens. Palonen (2009) claims that populism has been associated with nationalism or anti-elitism in the past and is now a more common form of political behaviour. However, populism is shifting and spreading to other areas and levels of governance.

Kyle and Meyer (2020) argue that there are almost five times as many populist politicians and parties in power today as in the early 1990s and three times as many as at the turn of the century. It should also be stressed that populism occurs not only at the level of central governments, but is also present in regional and urban environments, as pointed out by Drápalová and Wegrich (2021). This aligns with Fischer (2014) and Ron (2014), who argue that populism can occur wherever organised, institutionalised communities exist.

From a public finance perspective, populist policies are destructive because they postpone solutions to social and economic problems (Dornbusch & Edwards, 2007). Steele and Homolar (2019) also support the claim that these policies have become a global problem today. The link between populism and the management of public finances - economic populism - has then been explored by several authors at the national or international level (Pereira & Dall'Acqua, 1991; Andersen et al., 2017; Asladinis, 2015; Gnan & Masciandaro, 2020; Rybacki, 2021). Although populist practices, which are prominent in national policies in different countries, can be assumed to spill over to local governments, this area remains underexplored. Paxton (2022) and Drápalová and Wegrich (2021) confirm this, arguing that research on populism at the local level is neglected.

This study will examine and compare populist practices in local government, which is becoming increasingly important in governance (Hlavacek et al., 2023), using examples from two countries. In particular, it is Czechia, a European Union (EU) member state and

part of the former Eastern bloc, and Türkiye, a non-EU country with ties to the EU (Zdražil & Applová, 2017).

In Czechia, populism is a significant issue evident at both the central (Scheiring, 2021) and regional levels of government (Drápalová & Wegrich, 2021). Populism has risen notably since 2010 (Havlík, 2019), with populist themes mirroring those in other European countries, such as criticism of traditional political parties, accusations of corruption and incompetence among elites, migration issues, and the political exploitation of the war in Ukraine. According to the research of Havlík (2019) and Kim (2020), Czech populism is represented by two major political parties and several local political groups.

In Türkiye, populist tendencies are not confined to a specific party or political ideology (Çarkoğlu et al., 2022). For instance, with the liberalisation of international capital movements, the coalition government is seen as having made populist choices (Boratav et al., 2001). The expansion and corruption of the state's economic activities, driven by interest groups' attempts to capture public resources through rent-seeking activities, are viewed as consequences of the populist order (Gökalp & Avci, 2002).

This study aims to identify and compare the symptoms of economic populism in two different local government environments. To meet this challenge, we follow the principles of the novel Mixed Populism Indication approach (Pernica et al., 2025) to indicate economic populism at the local government level. In this context, economic populist policies will be examined through budget practices in selected examples of Czechia and Türkiye, i.e., two different environments that have been significantly affected by populism in recent years (O'Dwyer, 2021).

However, this approach enables international comparison, which the original approach does not offer. Moreover, this study contributes to the literature by developing the Mixed Populism Indication approach, which goes beyond static evaluations of individual indicators to examine their dynamics and potential causal relationships. Additionally, this study incorporates an international perspective, extending beyond the scope of Pernica et al. (2025).

2. Literature Review

2.1. Populism

Although a common definition is difficult to agree on, populism generally concerns decision-makers and agencies and creates tensions between citizens and them (Schippers, 2020). Devinney and Hartwell (2020) argue that public institutions play an essential role in shaping populism. Therefore, politicians and decision-makers can use public power to channel citizens' demands in ways that serve their self-interest. It can also be assumed that if politicians include populist themes in their programs, they will promote them once in power. Global economic, social, or political crises also reinforce this trend (Manucci &

Weber, 2017; Steele & Homolar, 2019). Populism can also be understood in different dimensions, not only as a political approach. For example, Kyle and Meyer (2020) identify three forms: cultural, socio-economic, and anti-establishment populism. We follow Mudde (2004), who argues that populism can create tensions in democracy at all levels of governance. Mudde (2004) further argues that populists use simple and opportunistic solutions. Examples include pre-election tax cuts or promises of financial benefits.

Paxton (2022) and Drápalová and Wegrich (2021) discuss populism at the local level of government. The authors argue that research on local populism has been neglected. Peace and Paxton (2023), Drápalová and Wegrich (2021), and O'Dwyer (2021) studied local populism in European cities. Pragmatic governance styles and technocracy are identified as characteristics of such populism, with a technocratic narrative framing populist politics. O'Dwyer (2021) examines Prague, the capital of Czechia, and argues that populists there exploit municipal reforms. Populist policies in Türkiye have been shown to bring problems such as economic instability, high budget deficits, debt burden and high inflation due to the application of fiscal policy instruments (Polat & Yasin, 2017).

The above studies show that populism is associated with dividing society, harming, and favouring groups or individuals. In the cited authors' work, populists also govern pragmatically at the local level. Whatever form populist politics takes, its implementation is linked to managing public finances. Thus, populist governance is linked to economic populism.

Equations and formulas should not be given as pictures. Please use the format below for equations.

2.2. Economic Populism

Political leadership is a vehicle for managing society and the economy through action and regulation. These activities and regulations link together values and goals with outcomes (Torfing, 2014). Khemani and Wane (2008) researched the effect of policy measures on "fiscal profligacy". They examined the role of political coalitions and situations where a single party rules. Their results suggest that coalitions could use public funds less populistically than single-party governments. Franko and Witko (2018) conclude that the federal government in the US shows less interest in responding to economic problems, even when society demands it. The authors define populism as the government's passivity in addressing societal inequalities.

Mukhopadhyay (2019) examined the financial reforms implemented in India and their effects. Accordingly, economic populism is a critical political factor that profoundly affects fiscal reforms, with empirical results remaining uncertain. Another study on India found that since the 1980s, the country's economic policies have been closely tied to electoral cycles, government change, and economic populism (Nandy et al., 2020). In this context, Davidson (2018) argues that economic populism is linked to financial illusion.

In the EU, where member states' political direction is determined largely by government policies regarding European legislation (Fuka & Baťa, 2024), Voss (2018) examines the labour market, its dualization, and demand for right-wing and left-wing populism. Rybacki (2021) discusses the stigmatisation of populist governments by international institutions and argues that this is not occurring. Ádám (2019) proposes a (Hungary setting) theory of the political transaction costs of populism and shows a shift from democracy to authoritarian populism. Although economic populism is researched through different approaches, takes different forms, and appears in different environments, the populist economic agenda can be argued to have typical features.

Andersen et al. (2017) argue that economic populism is characterised by short-termism, denial of intertemporal budget constraints, failure to evaluate options' advantages and disadvantages, and a disregard for trade-offs between policies. Simplified solutions and the search for the culprit of economic problems replace serious economic policy. Gnan and Masciandaro (2020) defined five general features of economic populism. Similarly to Andersen et al. (2017), these include short-termism, distrust of liberal politics and institutions, nationalism and distrust of globalisation, an extreme focus on elections, and ignorance of minorities and disregard for facts and analysis. Populists pursue their aims by managing public finances. These aims deny accountability, are short-term, manipulate the public, and often come at the expense of budget deficits.

Studies on economic populism are limited in the literature (not to mention economic populism at the level of local governments), so the topic has attracted researchers' attention in recent years. Because populist policies are closely related to public finances and can potentially distort the economic structure, some studies focus on specific aspects and effects of economic populism. Examples include governments that implement short-term populist policies for a specific purpose.

There are also aware of some limitations. Economic populism tends to fulfil the wishes of "ordinary people", which costs money. However, it would be incorrect to claim that populism is the only pressure on public spending. In the 1990s, researchers analysed macroeconomic populism in Latin America. The studies argued that populism is related to the poor state of the economy, but also stated that it is not the only or even the main reason (Pereira & Dall´Acqua, 1991; Dornbusch & Edwards, 2007). Roberts (1995) even claims that populism should be separated from a specific phase of economic development. Currently, in the context of research on economic populism, it is also necessary to mention Aslanidis (2022), who points out possible conceptual and methodological shortcomings. In this study, we examine the symptoms that may indicate populism in the communal settings of two different countries and acknowledge the complexity of the link between economic populism and economic policy.

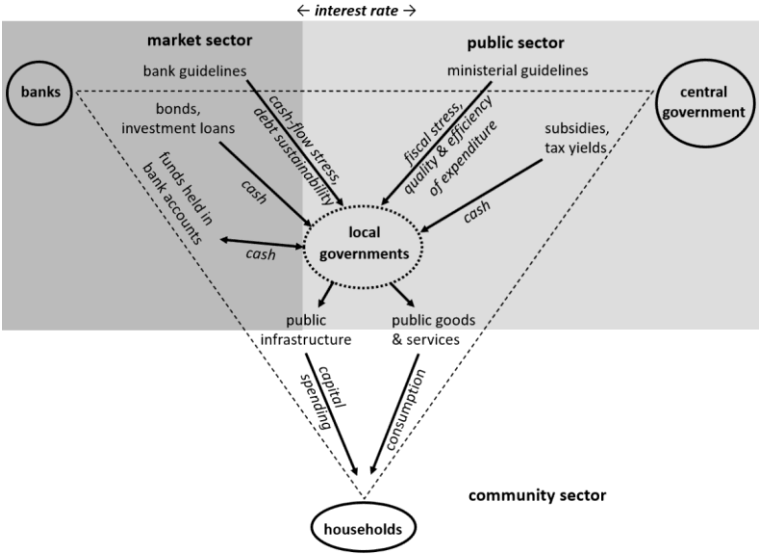
3. Analytical Framework

As the literature review demonstrates, populist policies can be partially implemented through fiscal policy by prioritising local initiatives; budgetary policy remains a particularly potent instrument in this regard. Therefore, we assume that populists manage public finances in executing their policies. This scenario presents an opportunity to apply an innovative approach that is not yet fully explored in the literature - namely, researching populism through a quantitative methodology using economic analysis tools. It has already been demonstrated that symptoms of economic populist practices can be detected through the analysis of budget data (Pernica et al., 2025). Therefore, research has confirmed the theoretical features of economic populism.

To comprehend the position of local governments in market economies, it has been used an arena model inspired by the Pestoff triangle (1992) to outline the connections among the main actors in the environment and the governing principles; see Fig. 1. An arena model, often referred to as a polity, is commonly employed to examine the relationships, interests, and agendas among households (electorate), business (markets), and the government (public power). Many studies, for example, Benáček (2006), provide insightful applications of this model. Considering the financial variables available at the level of local governments, our application of the model emphasises:

- Interest rates are a significant indicator that influences investment strategies and impacts the overall economic environment.
- Central government holds legislative power, collects taxes, and establishes fiscal federalism by distributing tax revenues and subsidies to enhance the welfare of households.
- Local governments are responsible for addressing the needs of households residing in municipalities and managing public funds in compliance with budget laws and banking regulations.
- Banks maintain current accounts for local governments and provide funding for infrastructure projects aimed at the provision of public goods and services. Although not part of the government, financial institutions play an important role in socio-economic populism, as Kyle and Meyer (2020) argue.

Figure: 1
The Arena Model of Market Economies



The central government and banks provide cash to local governments and assume responsibility for managing financial risks. While private banks and the central government may use different financial indicators under institutional guidelines, they typically prioritise indicators that align with the neoliberal economic paradigm. In particular, banks prioritise repaying their funds while minimising the risk of financial loss (Lucas & McDonald, 1992). This means they place significant importance on evaluating their business partners' cash-flow stress and creditworthiness. However, the central government aims to allocate taxpayers' money to local governments to ensure higher efficiency and effectiveness (Smith, 2006). This means it does not support leakages from the public finance system, such as interest expense payments or the accumulation of funds in current accounts.

Therefore, local government behaviour falls under the scrutiny of both public (central government) and market (banks) oversight. This oversight is further supported by households and community-sector entities demanding transparency, combating corruption, advocating for fair budgeting, etc. (Burger & Owens, 2010).

As mentioned in previous sections, the analysis built on the innovative Mixed Populism Indication approach. This quantitative approach assumes that symptoms of populism can be identified based on specific patterns in the evolution of public finance indicators. Although this approach to analysing populism is relatively straightforward, Pernica et al. (2025) used qualitative analysis to show that it produces robust results. Their

study highlights the effectiveness of using open public finance data to yield reliable insights into the complexities of economic populism.

3.1. Variables

To operationalise our approach to economic populism, inspired by the Mixed Populism Indication approach (Pernica et al., 2025), we used the variables discussed below. These variables are either publicly available or can be easily derived from publicly accessible sources in Czechia and Türkiye. Given data accessibility, an arena model illustrating relationships among actors (Fig. 1), and the existing literature on economic populism, we apply a quantitative approach to evaluate connections among financial variables.

It has been utilised an interest rate as an exogenous variable in our analysis. The National Bank sets the interest rate (IR), which is transmitted to the financial market through the banking sector. IR refers to the profitability of investment. Therefore, it reflects the price and availability of money in the national economy and is independent of local governments' will. In fact, favourable financing conditions allow populists to implement their policy and stay in power, and vice versa. (Feldmann & Popa, 2022; Andersen et al., 2017).

Additionally, there are three indicators of municipal financing. The indicators examined are the Debt-Service Coverage Ratio (DSCR), the Total-Debt-to-Total-Assets Ratio (TDAR), and the Total Liquidity Indicator (TLI). These indicators are well-known financial metrics in international business management and can assess how effectively a municipality manages public funds. Using these metrics, governments/banks can compare one municipality's leverage with that of other municipalities (local governments). In fact, after the financial crisis of 2008, many countries began applying such indicators to assess both the health of fiscal structure and the financial responsibility of local governments (Iacuzzi, 2022). The Czech Ministry of Finance relies on these indicators to assess municipalities' financial condition. Similarly, in Türkiye, the Turkish Court of Accounts uses such data in its audits of local governments.

Debt-Service Coverage Ratio (DSCR) evaluates a municipality's capacity to repay its loans and finance future development. It also reflects a long-term perspective on financial management. Banks and investors use it extensively to assess a municipality's creditworthiness and potential. There is no hard-and-fast threshold; however, DSCR below 1 indicates negative cash flow, while a ratio of 2 or higher is generally considered healthy. Greganova et al. (2015), for example, apply this metric at the local government level.

Total-Debt-to-Total-Assets Ratio (TDAR) indicates the extent to which the total property covers the liabilities. This information can indicate a municipality's financial stability. A higher ratio indicates greater risk to a municipality's sustainable development. According to the Czech Ministry of Finance, crossing the 25% threshold is considered highly risky for a municipality's short- and long-term financial stability (MFCR, 2018). Pridgen

and Wilder (2013) argue that this metric is relevant for municipal government financial reporting.

The Total Liquidity Indicator (TLI) is similar to the acid test, a well-known financial management measure that indicates short-term liquidity. However, it is also a critical financial indicator for local governments (Hughes & Katwal, 2011). In general, an organisation with an acid-test ratio below 1 cannot fully settle its current liabilities (Tracy, 2004).

Because these indicators reflect the balance between short-term and long-term liquidity and solvency, they are also useful for assessing the symptoms of economic populism. In particular, populists neglect economic constraints and increase debt (Andersen et al., 2017; Gnan & Masciandaro, 2020), short-termism is a major feature of populism (Saint-Paul, 2020; Guiso et al., 2017), populist movements pander to certain demand conditions and disregard future consequences (Masciandaro & Passarelli, 2020; Saint-Paul, 2020), populism manifests itself in voluntaristic overspending and economic irresponsibility (Weyland, 2021; Benczes, 2022).

It has been followed Pernica et al. (2025) and argue that these symptoms can be tracked through financial metrics. Based on economic theory and the studies above, connections between interest rates and municipal finance variables can be seen as a potential symptom of populism. These connections do not necessarily imply populism itself, but rather serve as markers. However, if multiple markers are present for certain entities, their occurrence may indicate populism.

3.2. Data

The analysis covers 2011-2021, while the range of volumes depends, on the one hand, on the unavailability of historical data and, on the other hand, on our intention to avoid extreme crisis-related fluctuations starting in 2022. It assesses the four largest municipalities in Czechia, i.e., Prague, Brno, Ostrava, and Pilsen, and the four largest municipalities in Türkiye, i.e., Istanbul, Ankara, Izmir, and Bursa.

Information on municipal finance in Czechia was retrieved from the Monitor database, operated by the Ministry of Finance of the Czech Republic (MFCR, 2023), while interest rates were retrieved from the Czech National Bank (2023). Similarly, information on municipalities in Türkiye was retrieved from annual activity reports, and interest rates from the Central Bank of Türkiye (2023). Interest rates, however, change during the year; for this reason, average annual interest rates have been calculated using the simple 30/360 method (Mayle, 1993) - treating a month as 30 days and a year as 360 days.

To account for the diverse nature of the variables analysed, we applied a standardisation process that scaled all variables between 0 and 1 in the populism analysis. This transformation maintained the rank order and relative differences between values,

thereby preserving valuable information regarding dynamics. This approach helped determine cointegration residues for specific variable pairs, as described below.

3.3. Methodology

Effective decision-making requires accurate data and analysis (Bať a & Fuka, 2018). It has been utilised a combination of the cointegration approach and correlation analysis to investigate relationships between variables. The cointegration approach helped us overcome spurious regression, which often arises in economic time series analysis due to trends (Nelson & Plosser, 1982). Unlike regression analysis, which focuses on whether time series move together, the cointegration approach assesses the stability of the variance of the difference between their means. When two random time series have an equilibrium relationship, the variables are cointegrated. Second, we further analysed the relationships between the interest rate (IR) and the financial metrics using correlation analysis to understand better their intensity and significance in relation to the research on economic populism.

It has been used the Engle-Granger two-step method (1987) for our cointegration analysis, which tests the residuals from a static regression for unit roots. Specifically, we examined the individual time series X(t) and Y(t) to verify their non-stationarity and confirm that both have an order of integration (ooi) equal to 1. In other words, ooi refers to the number of differences required to achieve a stationary series. If these conditions were met, we estimated the cointegrating relationship (1) using ordinary least squares. This 1-step is outlined in an algorithm presented in Appendix 1.

$$Y_{(t)} = \beta X_{(t)} + e_{(t)} \quad (1)$$

The 2-step assesses whether the OOI of the cointegrating residuals e(t) equals 0, indicating stationary behaviour of their time series. If the residuals were stationary, characterised by a constant mean, constant variance, and autocorrelations that depend only on the time lag between variables in the series, we concluded that the X(t) and Y(t) series were cointegrated (Wooldridge, 2006). Appendix 2 presents the 2-step algorithm.

To assess the series' stationarity, we used the augmented Dickey-Fuller test (ADF) with an intercept (Said & Dickey, 1984) in both steps. It tests the null hypothesis of a unit root (non-stationarity) against the alternative of stationarity. For our analysis, we used the Akaike information criterion to determine the appropriate lag length, with a maximum lag of 2, as recommended for annual data (Wooldridge, 2006).

In the correlation analysis part, we used the standard Pearson's product-moment coefficient (ρ). It is defined as the ratio of the covariance of two variables (cov (X, Y)) to their standard deviations (σ_X and σ_Y); see (2). Since the test procedure is well known, we should probably reference only Zar's statistical handbook (2010), where one can find comprehensive explanations of Pearson's product-moment correlation and its limitations.

$$\rho = \frac{\text{cov}(X,Y)}{\sigma_X \sigma_Y} \quad (2)$$

3.4. Limitations and Robustness Check

There are several alternative stationary and unit root tests, as well as correlation coefficients, each with its own pros and cons, that could have been used in our analysis. However, we chose the ADF and ρ because both provide a standardised and versatile approach. The ADF test is available through free software solutions such as Gretl and has demonstrated satisfactory performance in diverse conditions (Banerjee et al., 1993). The ρ is well known for time-series testing (Zar, 2010) and is also available in academic community-wide software solutions, e.g., MS Excel. One of our intentions is to show a methodological solution that is easily reproducible and can therefore spread through the academic community.

Several limitations of the study should be acknowledged. First the statistical power of the analytical framework is limited, and the results should be interpreted as indicative rather than conclusive evidence. However, this method of analysis has been deliberately chosen despite the shorter time series. In particular, unlike the more commonly used panel approaches for such a case, it allows us to identify symptoms of economic populism at the level of individual cities - something a panel approach would not allow. This local-level analysis of symptoms of economic populism is one of the paper's main contributions. Finally, we consider our method to be an initial phase in the analysis of populism, which should subsequently be verified through an in-depth analysis of the cases we have identified.

Given the limitations above and the short span of our municipal datasets (2011-2021), it has been conducted additional robustness checks. The pooled panel expansion of our analytical framework serves two purposes. First, it verifies the relevance of our method; second, it assesses whether broader political or macroeconomic factors could explain the observed relationships. Following conventional econometric techniques, we estimated municipality fixed-effects panel regressions separately for Czech and Turkish municipalities. Empirical research often uses fixed-effects panel models to control for unobserved time-invariant heterogeneity across observational units and assess the robustness of estimated relationships in panel data settings (Wooldridge, 2006).

The primary analysis used three financial indicators (DSCR, TDAR, and TLI) as dependent variables (Y(i,t)). In addition to interest rates (IR), the models included annual inflation rates (INFR) and a municipal election-year dummy (EY), equal to one in municipal election years and zero otherwise. It has been incorporated municipality fixed effects (μ(i)) to account for unobserved time-invariant differences between cities. In particular, the following panel data model (3) was estimated

$$Y_{(i,t)} = \alpha + \beta_1 IR_{(t)} + \beta_2 INFR_{(t)} + \beta_3 EY_{(i,t)} + \mu_{(i)} + e_{(i,t)} \quad (3)$$

for municipality (i) in year (t), and e(i,t) is the error term. The panel dataset consisted of four municipalities observed over 11 years in each country (44 observations per country).

The inflation rate has been included as a macroeconomic control variable because inflationary environments and accompanying monetary tightening may directly affect local government borrowing costs, debt servicing, and overall fiscal health. Recent research has highlighted the importance of inflation and interest-rate developments for municipal financing conditions and debt dynamics (Martell, 2024). The election-year control variable was included because a substantial body of literature argues that elected officials may adjust fiscal policies before elections to improve electoral prospects, a phenomenon commonly referred to as the political budget cycle (Rogoff, 1990). Empirical evidence suggests that such effects can occur not only at the national level but also in local governments, where electoral incentives may influence borrowing, expenditures, and budgetary performance (Andonoska & Alda, 2025).

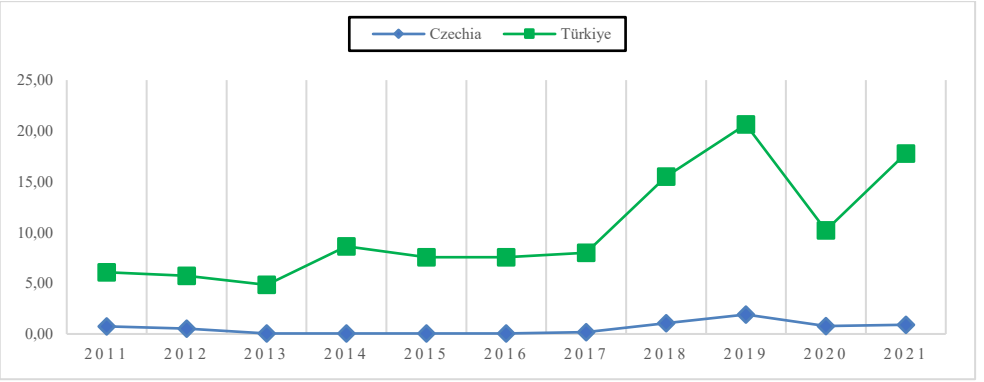
Finally, adding more controls to the robustness checks is not meant to replace the (main) city-level cointegration analysis but to assess whether the observed relationships persist after accounting for the political and macroeconomic factors highlighted in previous research.

4. Results and Discussion

4.1. Dynamics of Variables in Czechia and Türkiye

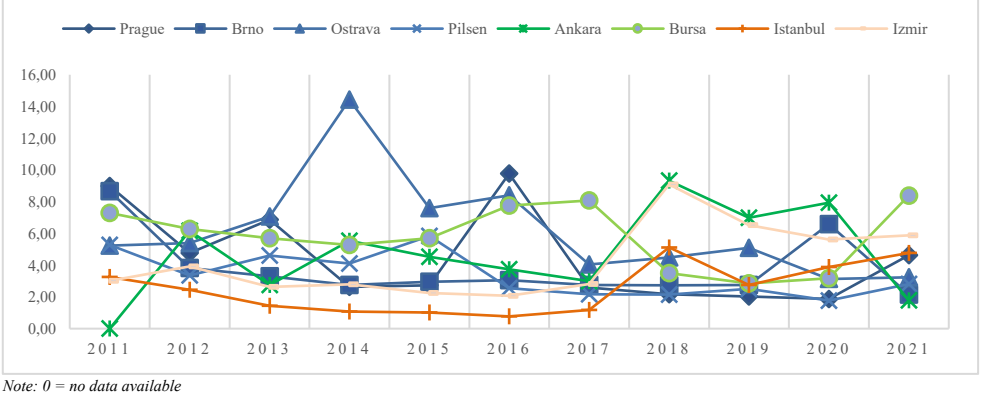
As shown in Fig. 2, interest rates in Czechia and Türkiye differed significantly in level throughout 2011-2021. At the same time, however, some similarities are visible: relative stability in 2011-2017 and, by contrast, a more dynamic period in 2018-2021. These dynamics reflect developments in both global and European markets. Although the figure shows a larger absolute change for the Turkish economy, in relative terms, given Czechia's minimum interest rates in the previous period, the dynamics of both economies were similar. Methodologically, the different interest rate levels pose no fundamental problem. In fact, the paper focuses on a dynamic that is not fundamentally different.

Figure: 2
Interest Rate



For the Debt-Service Coverage Ratio (DSCR), see Fig. 3: the positions of the two countries (their largest cities) have reversed over time. Turkish cities showed lower values, i.e., lower capacity to repay their liabilities, during the years of stable interest rates (2011-2017). In Istanbul, cash flow was negative for a short time (DSCR below 1). However, DSCR values increased significantly in the following years for most Turkish cities. In the largest Czech cities, DSCR levels have decreased over time, which may indicate a potential barrier to future development. At the same time, however, DSCR values in both Czech and Turkish cities have remained healthy throughout (values greater than 2), with some exceptions.

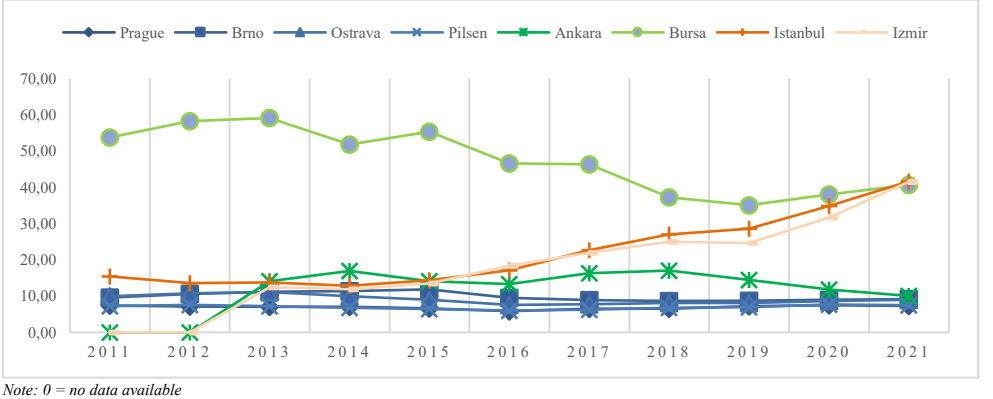
Figure: 3
Debt-Service Coverage Ratio



Note: 0 = no data available

The Total-Debt-to-Total-Assets Ratio (TDAR), shown in Fig. 4, shows a different picture. For Czech cities, financial stability is good; similarly, for Turkish Ankara. However, for other Turkish cities, we identified high risk in ensuring financial stability (TDAR crossing the 25 threshold is considered high risk). At the end of the period under review, the position of three Turkish cities is about 40.

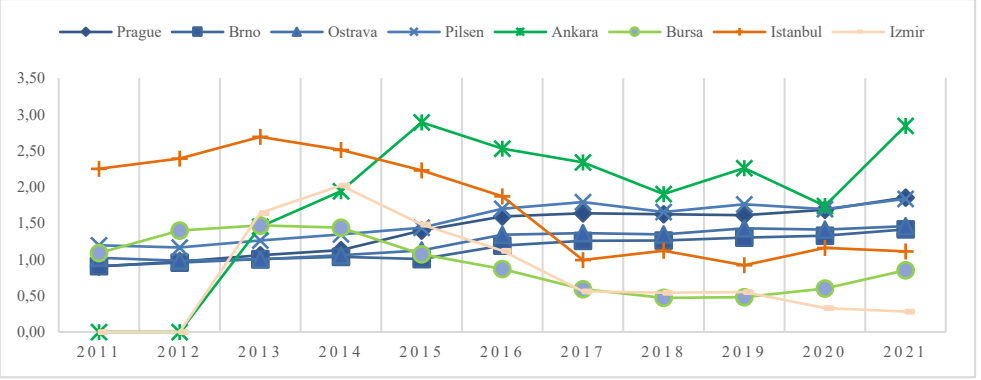
Figure: 4
Total-Debt-to-Total-Assets Ratio



Note: 0 = no data available

For the Total Liquidity Indicator (TLI), see Fig. 5; values below 1 indicate an undesirable condition. The largest Czech cities show relative stability, with TLI values above 1 and upward trends. For Turkish cities, the situation is more dynamic, with only Ankara not at risk of liquidity shortages. As shown in Fig. TLI, Istanbul, Izmir, and Bursa are relatively safe in the first half of the period but then fall below 1, indicating a poor short-term outlook.

Figure: 5
Total Liquidity Indicator



Note: 0 = no data available.

4.2. Analysis of Populism

In general, the results of the analysis procedure, as visualised in Appendix 1 and Appendix 2, are ambiguous. The analysis found significant cointegration relationships, as indicated by the ADF test p-values ($\alpha = 0.05$). Table 1 shows that in all cities (except Ostrava), IR, as an independent variable exogenously influenced by the central bank, significantly affects DSCR. However, this impact is weak in practice, as shown by the correlation analysis results. In particular, significantly positive correlation coefficients (critical value is 0.5529, for $\alpha = 0.05$) were found only for the Turkish cities of Izmir and Istanbul. Only for these two cities has it been confirmed that the cost of debt (DSCR) rises when IR rises and vice versa.

This suggests that worsening credit conditions do not appear to prevent Istanbul and Izmir from engaging in activities that further increase their cost of debt. Simply put, these cities do not save in bad times, which may reflect their leaders' reckless approach. Similarly, this finding may reflect economic populism.

Table: 1
Relationship between IR and DSCR

	ADF (p-value)	ρ	Cointegration	Correlation
Prague	0,0269	-0,2832	**yes**	**no**
Brno	0,0276	-0,1533	**yes**	**no**
Ostrava	0,1245	-0,4297	**no**	**no**
Pilsen	0,0210	-0,4444	**yes**	**no**
Ankara	0,0005	0,2093	**yes**	**no**
Bursa	0,0276	-0,4445	**yes**	**no**
Istanbul	0,0059	0,6133	**yes**	**positive**
Izmir	0,0007	0,7850	**yes**	**positive**

Table 2 also shows significant cointegration links between IR and TDAR for most cities. However, even here, the observed linkages are only limited in practical terms. Specifically, Prague, Pilsen, Istanbul, and Izmir increased their own debt when debt conditions worsened. In contrast, when interest rates were low, they reduced debt financing. Therefore, they are not behaving efficiently, and the question remains whether this is "only" due to the incompetence of their leaders or whether it may be a symptom of economic populism, i.e., systematic spending beyond these cities' long-run means. In this context, Fig. 4 shows that, especially for Izmir and Istanbul, the debt burden has risen sharply in recent years.

Following these findings, it is also worth noting that in some cities in Türkiye (Izmir and Istanbul), higher interest rates increase both debt (TDAR) and the cost of debt (DSCR). However, we have not identified a similar effect in Czechia.

Table: 2
Relationship between IR and TDAR

	ADF (p-value)	ρ	Cointegration	Correlation
Prague	0,0329	0,7523	**yes**	**positive**
Brno	0,3016	-0,1123	**no**	**no**
Ostrava	0,0108	0,3098	**yes**	**no**
Pilsen	0,0065	0,7929	**yes**	**positive**
Ankara	0,0672	-0,2121	**no**	**no**
Bursa	0,0108	-0,7901	**yes**	**negative**
Istanbul	0,0065	0,6885	**yes**	**positive**
Izmir	0,0404	0,6755	**yes**	**positive**

The results of the last relationship studied are quite clear in the case of cointegration, as a significant relationship was found only in Istanbul, as presented in Table 3. Therefore, the interest rate, which is actually the price of money, generally does not affect the level of liquidity held in Czech or Turkish cities. This conclusion is somewhat surprising because it is not compatible with the classical macroeconomic maxima: "When money is expensive, there is no willingness to hold money" (Chorafas, 2009). Therefore, this behaviour of governments of the largest cities can also be considered very inefficient. However, this finding could be seen as another weak symptom of potential populism.

Table: 3
Relationship between IR and TLI

	ADF (p-value)	ρ	Cointegration	Correlation
Prague	0,1495	0,4484	**no**	**no**
Brno	0,0602	0,5290	**no**	**no**
Ostrava	0,2253	0,4449	**no**	**no**
Pilsen	0,2711	0,4116	**no**	**no**
Ankara	0,2199	0,2477	**no**	**no**
Bursa	0,0633	-0,4787	**no**	**no**
Istanbul	0,0128	-0,7653	**yes**	**negative**
Izmir	0,0834	-0,5421	**no**	**no**

4.3. Panel Robustness Checks

To assess the robustness of our results, we estimated municipality fixed-effects panel regressions separately for Czech and Turkish municipalities, incorporating inflation and election-year controls. The pooled panel results, summarised in Table 4, provide partial evidence that interest rates (IR) remain significantly associated with debt (TDAR) in both countries and with the cost of debt (DSCR) in Türkiye. These robustness checks are broadly consistent with the main findings. In particular, statistically significant relationships between interest rates and indebtedness indicators remain visible in Türkiye, where the populism analysis previously identified Istanbul and Izmir as municipalities with the strongest indications of economic populism. Conversely, Czech municipalities generally exhibit weaker and less consistent associations.

Table: 4
Country-Specific Fixed-Effects Panel Robustness Checks

	Czech Municipalities			Turkish Municipalities		
Variable:	**Debt-service coverage ratio (DSCR)**	**Total-Debt-to-Total-Assets Ratio (TDAR)**	**Total Liquidity Indicator (TLI)**	**Debt-service coverage ratio (DSCR)**	**Total-Debt-to-Total-Assets Ratio (TDAR)**	**Total Liquidity Indicator (TLI)**
Interest Rate (IR)	-0.291 *(p = 0.065)*	0.394 *(p = 0.016)*	0.103 *(p = 0.089)*	0.041 *(p = 0.030)*	0.385 *(p = 0.028)*	-0.040 *(p = 0.375)*
Inflation (INFR)	-0.777 *(p = 0.023)*	0.082 *(p = 0.623)*	0.047 *(p = 0.276)*	0.148 *(p = 0.455)*	0.955 *(p = 0.302)*	-0.029 *(p = 0.573)*
Election Year (EY)	-0.772 *(p = 0.522)*	0.020 *(p = 0.958)*	0.020 *(p = 0.738)*	-0.599 *(p = 0.403)*	-1.293 *(p = 0.744)*	0.286 *(p = 0.308)*
Municipality Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	44	44	44	44	44	44
R^2	0.311	0.700	0.418	0.385	0.747	0.660

Note: p = p-value.

Moreover, Table 4 also suggests the election-year dummy (EY) was not statistically significant in any specification, suggesting that electoral cycles do not systematically affect municipal indebtedness indicators in the analysed sample. Similarly, inflation (INFR) is insignificant in five of the six estimated models. The only statistically significant result is observed for Czech municipalities, where inflation is negatively associated with DSCR. Overall, these controls do not indicate that inflationary developments or municipal election cycles primarily explain the observed fiscal patterns. In fact, this expansion does not materially alter the interpretation of our main results.

4.4. Discussion

Upon reviewing the literature, it has been found no long-established, recognised analytical framework for economic populism. Therefore, the principles of the innovative Mixed Populism Indication approach has been used (Pernica et al., 2025), which was recently used to analyse economic populism in Czechia. We then built on existing research and definitions of economic populism (see Dornbusch & Edwards, 2007; Gnan & Masciandaro, 2020; Benczes, 2022). The most significant attributes of economic populism, as derived from these definitions, can be approximated through specific financial variables

(Masciandaro & Passarelli, 2020). At this point, we draw on a broad discourse among numerous scholars (e.g., Andersen et al., 2017; Feldmann & Popa, 2022; Guiso et al., 2017; Weyland, 2021). Building on these definitions and principles, the analysis revealed several key findings. However, we cannot compare our results with a wide range of other studies, as similar studies on economic populism at the local government level remain scarce. Therefore, this section is limited to a discussion with a small number of studies.

The analysis did not reveal strong symptoms of populism in either Czechia or Türkiye. On the other hand, we found several clues suggesting economic populism might be a strategy in some of the cities in scope. In particular, the cointegration analysis revealed relationships between interest rates and debt management in most cities. However, these links are weak and often not accompanied by correlation. Their effect is therefore ambiguous.

Moreover, we found no relationship between interest rates and liquidity volume. Several economic models and theories explore the relationship between interest rates and liquidity, offering valuable insights into how these two variables interact. Furthermore, empirical studies and data analysis can provide real-world evidence of how changes in interest rates affect liquidity under different economic conditions (Shousha & Ferreira, 2020). Because the existence of cointegrating relationships between interest rates and liquidity has not been confirmed, this may be attributed to other exogenous factors (Iyke, 2017; Milošević-Avdalović & Kalaš, 2016). In recent years, empirical studies on this issue have attracted attention (Mohammed et al., 2022; Acolin & Walter, 2023).

The question is whether city governments are less likely to behave in a populist way, or whether this behaviour is less obvious, for various reasons. One reason may be the focus on the largest cities, which are highly visible and subject to intense media and public scrutiny. As Villanueva (2020) and Gildemyn (2014) highlighted, robust civil society and active media play critical roles in monitoring and evaluating urban governance, potentially constraining large cities from engaging in unscrupulous populist behaviour. This scrutiny likely forces city leaders to adopt more cautious fiscal policies, thereby masking or mitigating overt symptoms of populism. Second, central governments in Czechia (Pernica et al., 2025) and Türkiye (Günaydın & Eser, 2009) have legislative rules to combat significant inefficiency (as well as populism) in public-fund use. In fact, our results align with Pernica et al. (2025), who scrutinised almost 6,000 local governments in Czechia and found the "clear" symptoms of populism only in dozens of municipalities.

The study finds that Czech and Turkish cities show similar patterns in how interest rates affect their debt management strategies. However, the data suggest that Czech cities manage their debt more prudently. While cities in both countries adjust their debt levels in response to changing interest rates, Czech cities avoid visible increases in debt costs. This might indicate a more strategic approach by local politicians in Czechia, who possibly mitigate overt signs of financial mismanagement to maintain public trust and political

stability. This raises questions such as: Are Czech populists smarter/modest about not showing their economic populism so much? A relevant answer to this question is beyond the scope of this study. However, local specifics and attitudes also matter; for example, O'Dwyer (2021) argues that populists exploit municipal reforms in Czechia, especially in Prague.

Economic populism is more evident in Turkish cities, particularly Istanbul and Izmir. In these cities, increases in interest rates correlate with higher debt and debt costs, suggesting a less restrained fiscal policy approach. This behaviour aligns with the definitions of Dornbusch and Edwards (2007), Pereira and Dall´Acqua (1991), Andersen et al. (2017), and Gnan and Masciandaro (2020), who describe economic populism as prioritising short-term gains over long-term fiscal stability. In contrast, while suspicions of populist behaviour exist in Czech cities like Prague and Pilsen, these indications are weaker.

Another important question is whether the identified borrowing patterns merely reflect broader macroeconomic or political conditions. Our robustness check analysis indicates that neither municipal election years nor inflation consistently explain variation in the examined debt indicators. These findings further support the interpretation that fiscal behaviour is not driven solely by electoral incentives or macroeconomic fluctuations.

5. Conclusion

Drawing on established definitions of populism, this study conceptualises economic populism at the local government level as a starting point for examining populism in the cities of Czechia and Türkiye. In particular, this study builds upon the theoretical frameworks of scholars such as Mudde (2004) and Aslanidis (2015). It also applies the principles of the novel Mixed Populism Indication approach proposed by Pernica et al. (2025). This approach utilises established definitions of populism and applies financial analysis to quantify and compare potential symptoms of populism in the four largest cities in Czechia (Prague, Brno, Ostrava, Pilsen) and Türkiye (Ankara, Bursa, Istanbul, Izmir).

To establish the analytical framework, the arena model was used to explain the position of cities and the relationships among the indicators in the financial analysis. Debt-Service Coverage Ratio, Total-Debt-to-Total-Assets Ratio, Total Liquidity Indicator, and Interest Rate. After presenting the environmental dynamics and comparing the development of the cities under examination, we analysed the symptoms of populism. Cointegration and correlation analyses were conducted to examine the relationships among the variables.

Analysing the period from 2011 to 2021, some relationships suggest the possibility of populist behaviour in certain cities, particularly Istanbul and Izmir. Their behaviour aligns with definitions of economic populism that emphasise prioritising short-term gains over long-term fiscal sustainability. In Czechia, the focus is on Prague and Pilsen, but the symptoms of populism are less obvious. In general, Czech and Turkish cities show

comparable patterns in how interest rates affect their debt management strategies. However, Czech cities take a more prudent approach, avoiding significant increases in debt costs.

Given the limited evidence of populism in the findings, a further question is whether city governments genuinely refrain from populist practices or whether these practices are simply less visible. One possible explanation is our focus on the largest cities, which face significant media and public scrutiny. Additionally, legislative frameworks in both countries aim to prevent inefficient and populist use of public funds. Local specifics and attitudes also shape the dynamics of financial variables and patterns of populist behaviour.

Finally, several limitations of the study should be acknowledged. In particular, the available data provide relatively short volumes, which may limit the statistical power of cointegration procedures. Moreover, many factors may affect municipal fiscal outcomes, including macroeconomic conditions and political incentives. To address this issue, we estimated supplementary fixed-effects panel regressions incorporating inflation and election-year controls. The results indicate that these factors do not substantially alter the interpretation of our findings. Nevertheless, the empirical evidence identifies fiscal patterns consistent with economic populism (i.e., an indication of populism) rather than establishing definitive causal relationships. This presents a challenge for future research to verify the accuracy of our conclusions with longer time series, larger municipal samples, and additional econometric techniques.

References

Acolin, A. & R.J. Walter (2023), "Mortgage loan costs: Magnitude and drivers of variation", *Housing Policy Debate*, 34(6), 814-833.

Ádám, Z. (2019), "Explaining Orbán: A political transaction cost theory of authoritarian populism", *Problems of Post-Communism*, 66(6), 385-401.

Andersen, T. et al. (2017), "Economic policy and the rise of populism - It's not so simple", *EEAG Report on the European Economy*, 16, 50-66.

Andonoska, L. & E. Alda (2025), "Political budget cycle and opportunistic local government revenue policies", *Public Administration Quarterly*, 50(2), 120-131.

Aslanidis, P. (2016), "Is populism an ideology? A refutation and a new perspective", *Political Studies*, 64(1), 88-104.

Aslanidis, P. (2022), "The red herring of economic populism", in: M. Oswald (ed.), *The Palgrave Handbook of Populism* (245-261), Palgrave Macmillan.

Banerjee, A. et al. (1993), *Co-integration, error correction and the econometric analysis of non-stationary data*, Oxford University Press.

Baťa, R. & J. Fuka (2018), "Modelling of biofuel potential as a tool for public managers", *Sustainability*, 10(12), 4380.

Benáček, V. (2006), "Three dimensions of modern social governance: Markets, hierarchies, and kinships", in: A. Rosenbaum & J. Nemec (eds.), *Democratic Governance in the CEECs* (407-428), NISPAcee.

Benczes, I. (2022), "Taking back control over the economy: From economic populism to the economic consequences of populism", *European Policy Analysis*, 8(1), 109-123.

Boratav, K. et al. (2001), "Turkey: Globalization, distribution and social policy, 1980-1998", in: L. Taylor (ed.), *External Liberalization, Economic Performance and Social Policy* (317-364), Oxford Academic.

Burger, R. & T. Owens (2010), "Promoting transparency in the NGO sector: Examining the availability and reliability of self-reported data", *World Development*, 38(9), 1263-1277.

Central Bank of Türkiye (2023, November 28), *Interest Rate Statistics*, <https://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Statistics/Interest+Rate+Statistics>, 25.05.2025.

Chorafas, D. (2009), "The Cost of Money", in: D. Chorafas (ed.), *Capitalism Without Capital* (68-88), Palgrave Macmillan.

Czech National Bank (2023, November 28), *How did the two-week repo rate develop?*, <https://www.cnb.cz/cs/casto-kladene-dotazy/Jak-se-vyvijela-dvoutydenni-repo-sazba-CNB>, 25.05.2025.

Çarkoğlu, A. et al. (2022), "Popülizm teorileri ışığında Türkiye'de popülizmin tarihsel gelişimi: Siyasi partiler üzerine bir inceleme", *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, 22(1), 323-348.

Davidson, S. (2018), "Populism and fiscal illusion", *Australian Economic Review*, 51(3), 418-425.

Devinney, T.M. & C.A. Hartwell (2020), "Varieties of populism", *Global Strategy Journal*, 10(1), 32-66.

Dornbusch, R. & S. Edwards (2007), *The Macroeconomics of Populism in Latin America*, University of Chicago Press.

Drápalová, E. & K. Wegrich (2021), "Technocratic populism and subnational governance", *Government and Opposition*, 56(4), 640-660.

Engle, R.F. & C.W.J. Granger (1987), Co-integration and error correction: Representation. *Econometrica*, 55(2), 251-276.

Feldmann, M. & M. Popa (2022), "Populism and economic policy: Lessons from Central and Eastern Europe", *Post-Communist Economies*, 34(2), 219-245.

Ferreira, T. & S. Shousha (2020), "Scarcity of Safe Assets and Global Neutral Interest Rates", International Finance *Discussion Papers* No. 1293.

Fischer, F. (2014), "Participatory governance: From theory to practice", in: D. Levi-Faur (ed.), *The Oxford Handbook of Governance* (457-471), Oxford University Press.

Franko, W. & C. Witko (2018), *The New Economic Populism: How States Respond to Economic Inequality*, Oxford University Press.

Fuka, J. & R. Baťa (2024), "The role of public sector policy in sustainable energy efficiency: An application of dynamic modelling", *Territory, Politics, Governance*, 12(5), 690-709.

Gildemyn, M. (2014), "Understanding the influence of independent civil society monitoring and evaluation at the district level: A case study of Ghana", *American Journal of Evaluation*, 35(4), 507-524.

Gnan, E. & D. Masciandaro (2020), *Populism, Economic Policies and Central Banking*, SUERF.

Gökalp, M. & M. Avcı (2002), "Türkiye ekonomisi'nde mali disiplinsizlik olgusu", *Muğla Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 7, 7-21.

Greganova, R. et al. (2015), "The debt service of the municipalities and its impact on the financial management of the municipalities in Slovakia", in: P. Jedlicka (ed.) *Hradec Economic Days 2015* (216-222), Gaudemamus.

Guiso, L. et al. (2017), "Demand and supply of populism", *Bankpedia Review*, 7(1-2), 7-8.

Günaydın, İ. & L. Eser (2009), "Maliye politikasında yeni trend: Mali kurallar", *Maliye Dergisi*, 156, 51-65.

Havlík, V. (2019), "Technocratic populism and political illiberalism in Central Europe", *Problems of Post-Communism*, 66(6), 369-384.

Hlavacek, P. et al. (2023), "Differentiation of developmental priorities of different-sized municipalities in the period of acceleration of developmental changes - an example of a mining region", *GeoScape*, 17(2), 195-205.

Hughes, J. & M. Katwal (2011), "Use of key financial indicators by local, national and international governments", *Journal of Government Financial Management*, 60(3), 46-50.

Iacuzzi, S. (2022), "An appraisal of financial indicators for local government: a structured literature review", *Journal of Public Budgeting, Accounting & Financial Management*, 34(6), 69-94.

Iyke, B. (2017), "On the term structure of South African interest rates: cointegration and threshold adjustment", *International Journal of Sustainable Economy*, 9(4), 300-321.

Khemani, S. & W. Wane (2008), "Populist Fiscal Policy", *Policy Research Working Paper*, No. 4762, World Bank.

Kim, S. (2020), "Between illiberalism and hyper-neoliberalism: competing populist discourses in the Czech Republic", *European Politics and Society*, 21(5), 618-633.

Kyle, J. & B. Meyer (2020), *High tide? Populism in power, 1990-2020*, Tony Blair Institute for Global Change.

Lucas, D. & R. McDonald (1992), "Bank Financing and Investment Decisions with Asymmetric Information about Loan Quality", *The RAND Journal of Economics*, 23(1), 86-105.

Manucci, L. & E. Weber (2017), "Why the big picture matters: Political and media populism in Western Europe since the 1970s", *Swiss Political Science Review*, 23(4), 313-334.

Martell, C. (2024), "The impact of inflation on local government fiscal health", *Journal of Public Budgeting, Accounting & Financial Management*, *36*(2), 234-252.

Masciandaro, D. & F. Passarelli (2020), "Populism, political pressure and central bank (in)dependence", *Open Economies Review*, 31, 691-705.

Mayle, J. (1993), *Standard securities calculation methods: Fixed income securities formulas for price, yield and accrued interest*, Securities Industry Association.

MFCR (2018), *Monitoring of Municipal Economy*, <https://www.mfcr.cz/cs/verejny-sektor/uzemni-rozpocty/hospodareni-obci/monitoring-hospodareni-uzemnich-samosprava>, 25.05.2025.

MFCR (2023, November 25), *Monitor*, <https://monitor.statnipokladna.cz/analyza/#>, 25.05.2025.

Milošević-Avdalović, S. & B. Kalaš (2016), "Determinants of deposit potential as inverse liquidity indicator of commercial banks in Serbia", *Industrija*, 44(3), 61-76.

Mohammed, S. et al. (2022), "The impact of credit facilities on Tanzanian SMEs' growth", *Journal of Positive School Psychology*, 6(9), 4184-4191.

Mudde, C. (2004), "The Populist Zeitgeist", *Government and Opposition*, 39(4), 541-563.

Mukhopadhyay, H. (2019), "Political economy of fiscal reform in indian states", in: S. Bandyopadhyay & M. Dutta (eds.), *Opportunities and challenges in development: Essays for Sarmila Banerjee* (229-242), Springer.

Nandy, A. et al. (2020), "Persistent fiscal deficits and political economy transitions in India: An empirical investigation", *Economic and Political Weekly*, 55(8), 34-41.

Nelson, C. & C. Plosser (1982), "Trends and random walks in macroeconomic time series: Some evidence and implications", *Journal of Monetary Economics*, 10(2), 139-162.

O'Dwyer, C. (2021), "What is to be done? Framings of urban populism in Prague and Warsaw", *Urbana*, 22, 40-62.

Palonen, E. (2009), "Political polarisation and populism in contemporary Hungary", *Parliamentary Affairs*, 62(2), 318-334.

Paxton, F. (2022), "With a little help from their friends: The consequences of populists in national government for policymaking in local government", *Government and Opposition*, 57(4), 630-655.

Peace, T. & F. Paxton (2023), "Populist pragmatism: the nationalisation of local government strategies by the Rassemblement National", *Acta Politica*, 59, 264-288.

Pereira, L. & F. Dall'Acqua (1991), "Economic populism versus Keynes: Reinterpreting budget deficit in Latin America", *Journal of Post Keynesian Economics*, 14(1), 29-38.

Pernica, B. et al. (2025), "Nervi rei publicae: Local governments as economic populists?", *Policy Studies*, 46(4), 628-651.

Pestoff, V.A. (1992), "Third sector and cooperative services: An alternative to privatization", *Journal of Consumer Policy*, 15, 21-45.

Polat, A. & E. Yasin (2017), "Krizlerle Mücadelede Mali Kuralların Uygulanabilirliğinin Anayasal İktisat Perspektifinden Değerlendirilmesi", *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 2017, 370-394.

Pridgen, A.K. & W.M. Wilder (2013), "Relevance of GASB No. 34 to Financial Reporting by Municipal Governments", *Accounting Horizons*, 27(2), 175-204.

Reporters Without Borders (2024, April 30), *2023 World Press Freedom Index*, <https://rsf.org/en/2023-world-press-freedom-index-journalism-threatened-fake-content-industry?data_type=general&year=2023>, 25.05.2025.

Roberts, K. (1995), "Neoliberalism and the transformation of populism in Latin America: The Peruvian case", *World Politics*, 48(1), 82-116.

Rogoff, K. (1990), "Equilibrium political budget cycles", *American Economic Review*, 80(1), 21-36.

Ron, A. (2014), "Modes of democratic governance", in. D. Levi-Faur (ed.), *The Oxford Handbook of Governance* (472-484), Oxford University Press.

Rybacki, J. (2021), "Fiscal deficit forecasts in Europe: Evidence for a double standard?", *Baltic Journal of Economics*, 21(1), 26-42.

Said, S.E. & D.A. Dickey (1984), "Testing for unit roots in autoregressive-moving average models of unknown order", *Biometrika*, 71(3), 599-607.

Saint-Paul, G. (2020), "From microeconomic favoritism to macroeconomic populism", *Journal of Finnish Economic Association*, 1(1), 2-24.

Scheiring, G. (2021), "Varieties of dependency, varieties of populism: Neoliberalism and the populist countermovements in the Visegrád Four", *Europe-Asia Studies*, 73(9), 1569-1595.

Schippers, B. (2020), *The Routledge handbook to rethinking ethics in international relations*, Routledge.

Smith, B. (2006), *Living with Leviathan: Public spending, taxes, and economic performance*, Institute of Economic Affairs.

Steele, B.J. & A. Homolar (2019), "Ontological insecurities and the politics of contemporary populism", *Cambridge Review of International Affairs*, 32(3), 214-221.

Torfing, J. (2014), "Governance networks", in: D. Levi-Faur (ed.), *The Oxford Handbook of Governance* (101-112), Oxford University Press.

Tracy, J. (2004), *How to read a financial report: Wringing vital signs out of the numbers*, John Wiley & Sons.

V-DEM Varieties of Democracy (2024, May 1), *Civil society participation index*, <https://www.v-dem.net/data/dataset-archive/>, 25.05.2025.

Villanueva, P.A.G. (2020), "Why civil society cannot battle it all alone: The roles of civil society environment, transparent laws and quality of public administration in political corruption mitigation", *International Journal of Public Administration*, 43(6), 552-561.

Voss, D. (2018), "The political economy of European populism: Labour market dualisation and protest voting in Germany and Spain", SSRN, *LEQS Paper* No. 132.

Weyland, K. (2021), "Populism as a Political Strategy: An Approach's Enduring - and Increasing - Advantages", *Political Studies*, 69(2), 185-189.

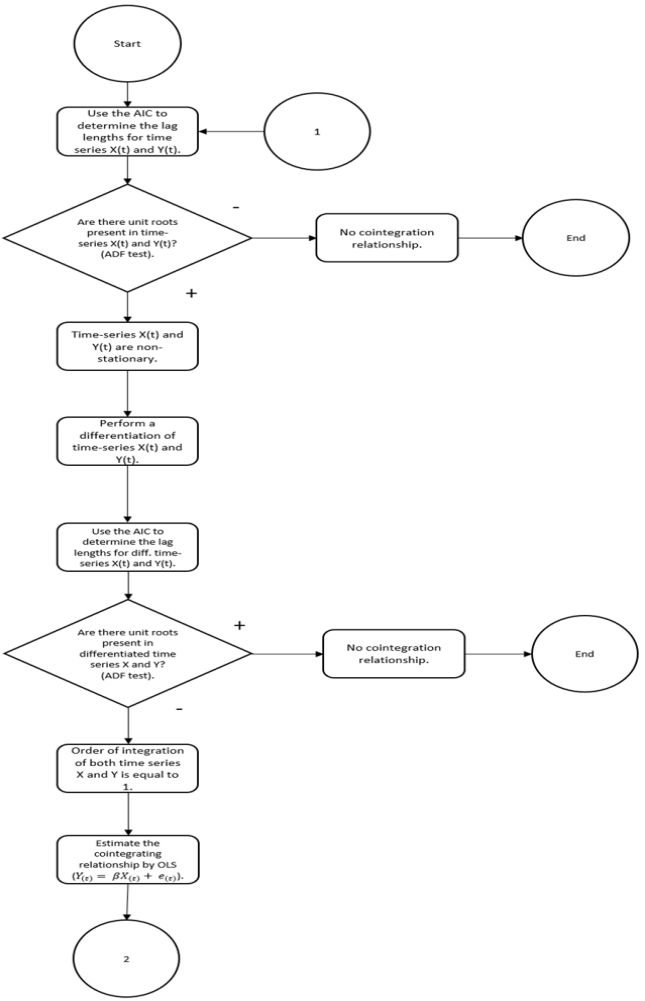
Wooldridge, J. (2006), *Introductory econometrics: A modern approach*, Thomson.

Zar, J. (2010), *Biostatistical Analysis*, Prentice Hall.

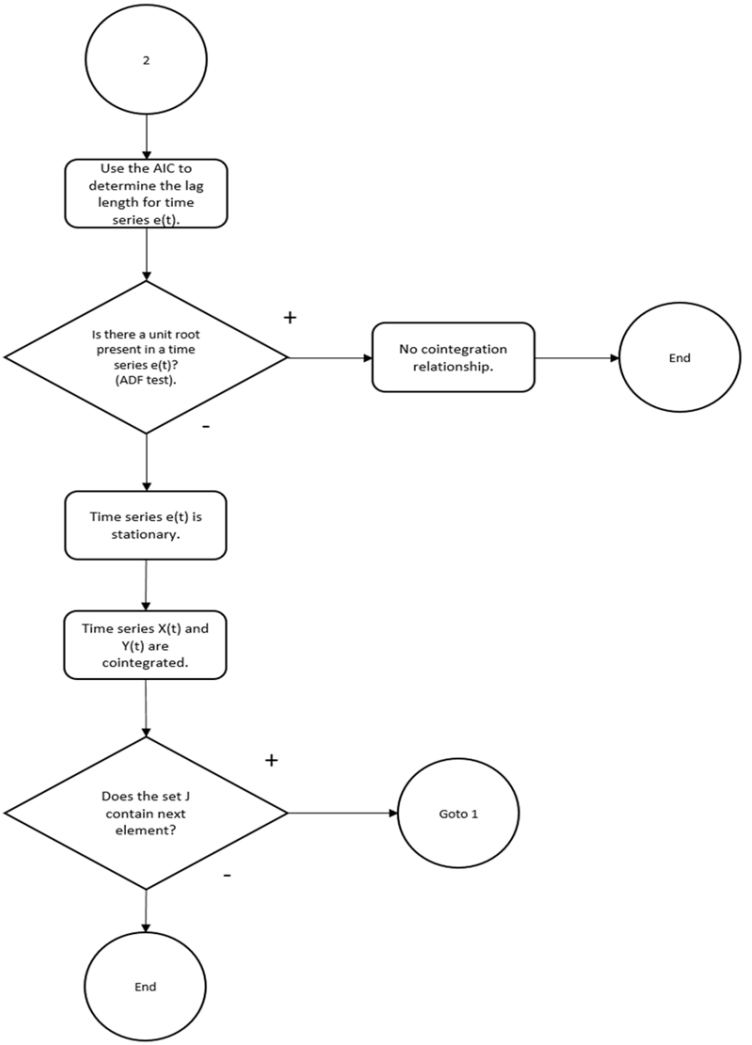
Zdražil, P. & P. Applová (2017), "The impacts of the 2007-2013 programming period of EU regional policy on development of Czech micro-regions", in: V. Klímová & V. Žítek (eds.), *20th International Colloquium on Regional Sciences* (75-82), Masaryk University.

Appendices

Appendix: 1
Our application of the Engle-Granger two-step method - Step 1



Appendix: 2
Our application of the Engle-Granger two-step method - Step 2



Sosyoekonomi

2026, Vol. 34(70), 419-439

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.18
Date Submitted: 08.07.2025
Date Revised: 09.11.2025
Date Accepted: 24.07.2026

Türk Dünyasında Sosyal Yardımların Etkileri ve Karşılaştırmalı Analizi

Alparslan Abdurrahman BAŞARAN *(https://orcid.org/0000-0003-1027-8375), Hacettepe University, Türkiye; aab@hacettepe.edu.tr*

Erdem Utku EKE *(https://orcid.org/0000-0002-9602-6242), Niğde Ömer Halisdemir University, Türkiye; utkueke@ohu.edu.tr*

Effects and Comparative Analysis of Social Assistance in the Turkic World

Abstract

This research conducts a comparative analysis of the evolution, transformation, scope, legal frameworks, funding mechanisms, and responsible institutions of social assistance in the Turkic States post-1990, contextualised within poverty and income inequality indicators. The impact of these changes on coverage, poverty rates, and income inequality is evaluated using data from the World Bank's ASPIRE (Atlas of Social Protection Indicators of Resilience and Equity). Although similarities in social assistance programs reflect the social, cultural, and familial dynamics of the Turkic States, notable disparities exist in social assistance coverage and its effects on poverty and income inequality. These analyses aid in the formulation of a unified social assistance model for the "Organization of Turkic States".

Keywords : Turkic World, Poverty and Income Inequality, Social Assistance, Impact Analysis, ASPIRE.

JEL Classification Codes : H55, I32, I38.

Öz

Bu çalışma, 1990 sonrası Türk devletlerinde sosyal yardımların gelişimi, dönüşümü, kapsamı, yasal çerçeveleri, finansman mekanizmaları ve sorumlu kurumlarını yoksulluk ve gelir eşitsizliği göstergeleri bağlamında karşılaştırmalı olarak analiz etmektedir. Sosyal yardımlardaki bu değişikliklerin kapsamı, yoksulluk oranları ve gelir eşitsizliği üzerindeki etkisi, Dünya Bankası'nın ASPIRE (Dayanıklılık ve Eşitliğe İlişkin Sosyal Koruma Göstergeleri Atlası) verilerinden yararlanılarak değerlendirilmektedir. Sosyal yardım programlarındaki benzerlikler, Türk devletlerinin sosyal, kültürel ve ailevi dinamiklerini yansıtsa da, sosyal yardımların kapsamı ile yoksulluk ve gelir eşitsizliği üzerindeki etkileri açısından kayda değer farklılıklar mevcuttur. Bu analizler, "Türk Devletleri Teşkilatı" için ortak bir sosyal yardım modelinin oluşturulmasına yardımcı olmaktadır.

Anahtar Sözcükler : Türk Dünyası, Yoksulluk ve Gelir Eşitsizliği, Sosyal Yardımlar, Etki Analizi, ASPIRE.

1. Giriş

Günümüzde sosyal koruma denildiğinde, kapsamı açısından özellikle hangi faydaları kapsayacağı ve hangi plan ve programların sosyal korumanın bir parçası olarak kabul edileceğine dair evrensel bir görüş literatürde yer almamaktadır. Ülkelerin sosyal koruma anlayışları yalnızca gelişmiş ve gelişmekte olan ülkeler açısından değil, dünyanın farklı bölgelerinde ve coğrafi kesimlerinde yer alan farklı devletler açısından da değişiklik göstermektedir.

Bazı uluslararası örgütler sosyal koruma programlarının yarattığı fayda ve hizmetleri sınıflandırmak için kriterler belirleseler de uluslararası kabul görmüş bir sınıflandırma metodolojisi bulunmamaktadır.

Örneğin, Eurostat, Ekonomik İşbirliği ve Kalkınma Örgütü (OECD) ve Uluslararası Çalışma Örgütü (ILO), sosyal yardımları; yasal statü, kurumun niteliği, katkılı veya katkısız olması, zorunlu veya gönüllü olması ve kapsadığı sosyal koruma alanına göre ayrımlara tabi tutmaktadır. Dünya Bankası (DB) ise sosyal koruma politikalarını, bireylerin ve toplumların risk ve kırılganlığı yönetmelerine yardımcı olan ve dayanıklılığı, eşitliği ve fırsatları artıran araçlar yoluyla bireyleri yoksulluk ve açlıktan korumayı amaçlayan politikalar olarak tanımlamaktadır (Yemtsov et al., 2018a: 20).

Sosyal koruma programları ve bunların bir parçası olan sosyal güvenlik ve yardım uygulamaları, idari örgütlenme ve yönetim, fon kaynakları, programların koşulları ve kapsamı ile hukuki çerçevesi açısından ülkeden ülkeye farklılık göstermektedir. Fakat bu farklılıklar üç temel kriter çerçevesinde ihtiyaç sahiplerini belirlemede ortak bir noktada buluşmaktadır (Grosh et al., 2022: 1).

İlk kriter, tüm ülkeler açısından Birleşmiş Milletler'in (BM) hedefleri doğrultusunda yoksulluğu ve eşitsizliği azaltma ihtiyacını ve "evrensel sosyal koruma"ya doğru yönelimi içerir. Bu anlayışı, son yirmi yılda sosyal koruma programlarının tüm ülkelerde hızla genişlemesinden ve bazı ülkelerin anayasalarına dahil edilmesinden görmek mümkündür (Kanbur & Lustig, 2001). İkinci kriter ise birçok ülkede programlar çeşitlilik gösterse de faydayı refah düzeyine göre farklılaştıran ve en az bir adet yüksek profilli, yoksulluk hedefli temel programın mevcudiyetidir. Örneğin, birçok ülkede biyolojik veya sosyal olarak savunmasız, yoksul olma olasılıklarının daha yüksek olduğu düşünülen çocukları, yaşlıları ve hanehalklarını kapsayan özel programlar mevcuttur. Üçüncü ve son ortak kriter ise bu programların uygulanması esnasında bireylerin ve grupların hedeflenmesinde kavramsal ve uygulama zorluklarının yaşanması nedeniyle sosyal yardım programlarında gözlenen hatalar ve bunun sonucunda yüksek maliyetler ile başarı veya başarısızlığın ölçülmesini içeren revizyonist yönetim anlayışıdır (Grosh et al., 2022: 2-3).

DB'ye benzer şekilde, Asya Kalkınma Bankası (AKB) da sosyal korumayı üç alt bileşende kategorize etmektedir. Bu bileşenler sosyal sigorta, işgücü piyasası ve çalışmamızın ana başlığını oluşturan sosyal yardımlardır. AKB tarafından yapılan tanıma

göre, yoksulluğun azaltılmasını amaçlayan, yoksullara ve yoksunluğa karşı savunmasız olanlara yönelik, katkı payı gerektirmeyen ayni ve nakdi kamusal transfer programları, sosyal yardımların kapsamı içinde yer almaktadır (Edes, 2011: 5).

Sosyal yardımların miktar ve çeşidinde 20. yüzyılın başından itibaren artış yaşanmaktadır. Özellikle son 20 yılda sosyal yardımlar yoksulluk ve hane halkının kırılgan yapısı ile mücadelede yeni bir boyut kazanmaya başlamıştır. 2000 yılından günümüze, alt ve orta gelir düzeyine sahip 130 ülkede sosyal yardım programı sayısı 80'den 180'in üzerine çıkmıştır (Zarazua, 2019: 3).

Sosyal yardım programlarının son yirmi yılda hızlı artış göstermesi sadece kurumsal, finansal ve hukuki değişimi beraberinde getirmemekte, aynı zamanda bu programların etkililik, ekonomiklik ve verimlilik kriterleri çerçevesinde sık sık gözden geçirilerek değişen ekonomik ve toplumsal koşullara uyum sağlamasını da zorunlu kılmaktadır. Bu bakış açısıyla bu çalışma bir sonraki bölümde Türkiye ve Türkistan'daki Türk devletlerinde sosyal yardımların 1990 ve özellikle 2000 yılı sonrasındaki gelişimini, kapsamını, koşullarını, hukuki çerçevesini, fon kaynaklarını ve sorumlu kurumlarını karşılaştırmalı olarak, yoksulluk oranları ve gelir eşitsizliği göstergeleri çerçevesinde incelemektedir. Sonraki bölüm ise ASPIRE verilerinden yararlanarak analize dahil ülkelerde sosyal sigortanın, sosyal yardımların ve sosyal yardım türlerinin kapsama oranlarını, farklı gelir grupları için analiz edip sosyal yardım türlerinin yoksulluk oranı ile gelir eşitsizliği üzerindeki etkilerini ortaya koymaktadır. Bu karşılaştırmalar ışığında Türk Dünyası Sosyal Koruma Programı'nın yol haritası için politik önermeler de sonuçta yer almaktadır.

2. Türk Devletleri'nde Sosyal Yardımların Yapısı ve Gelişimi ile Yoksulluk ve Gelir Eşitsizliği

1990'lı yılların başında bağımsızlığını kazanan Türkistan'daki Türk Devletleri'nde piyasa ekonomisine geçiş, sosyal güvenlik ve sosyal yardım programlarının kapsamının, türlerinin, hukuki dayanaklarının, kurumsal yapılarının ve finansman kaynaklarının hızlı bir şekilde değiştirilmesi ihtiyacını beraberinde getirmiştir. Ekonomik sistemde, Türkistan'da yer alan Türk Devletleri'ndeki köklü değişime benzer olmamakla birlikte, Türkiye 1980'li yılların başından itibaren piyasa ekonomisine yönelimini artırarak sosyal koruma ağlarını güçlendirmede sosyal yardımlarını da benzer yapısal değişimlere tabi tutmuştur. Özellikle BM tarafından ortaya konulan ve 2030 yılına kadar ulaşılması hedeflenen "Sürdürülebilir Kalkınma Amaçları" çerçevesinde, düşük ve orta gelir seviyesindeki gelişmekte olan ülkelerin yoksullukla mücadelede en büyük sorun olarak karşılaştığı konu, sosyal yardımların yönetimi ve uygulanması olmuştur (Gassmann, 2018: 133). Bu nedenle, hakkında güncel herhangi bir veriye ulaşamadığımız Türkmenistan haricinde, Türk Devletleri açısından incelenmesi, Türk Dünyası sosyal yardım programlarının entegrasyonu, ülkeler arası iş birliğinin yaygınlaştırılması ve ilgili akademik literatüre katkı açısından önemli olduğu söylenebilir.

2.1. Kazakistan

Kazakistan Cumhuriyeti, 1990'ların başından itibaren bağımsızlığın kazanılmasıyla birlikte, yoksullukla mücadele kapsamında sosyal yardım politikalarının geliştirilmesini içeren yeni bir yasal çerçeve oluşturma ve yeni bir anayasa yapma yoluna gitmiştir (Agrawal, 2008: 92). 1990'lı yıllardaki bu değişim, kalkınma hedefleri ve politikaları açısından olumlu gelişmeleri beraberinde getirse de özellikle sosyal yardımların dağıtımı noktasında kötü organizasyon yapısı bir dizi acil değişikliğin hayata geçirilmesini mecbur kılmıştır. Hak sahibi olmaması gereken kesimlerin yardım sisteminden yararlanmasının da önünü kesmek adına 1999 yılından itibaren sosyal yardım sisteminin işleyişinde değişiklikler hedeflenmiş ve 2000 yılı sonrasında mevcut sistem farklı bir yapıya dönüşmüştür (Maltseva, 2012: 198). Ayrıca 2012 yılında kabul edilen, dünyanın en gelişmiş 30 ülkesi arasına girmeyi amaçlayan "Kazakistan 2050" projesi kapsamında, sosyal güvenlik sisteminde birçok reformu içeren yeni bir vizyon ortaya konmuş ve bu sayede sosyal yardımların etkinliği ve etkililiği artırılmaya çalışılmıştır (Barro & Cornell, 2022: 13).

Bu reformlar sayesinde Kazakistan'da son yirmi yılda yoksulluğun azaltılmasında önemli bir ilerleme sağlanmıştır. DB'nin uluslararası karşılaştırılabilir yoksulluk oranını belirleyen günlük satın alma gücü paritesine göre 2,15$'dan az gelirle yaşayan nüfusun oranı 2006 yılı ile 2018 yılları arasında %51'den %14'e düşmüştür. COVID-19 pandemisi sonrası bu oran 2020 yılında tekrar %26'lara yükselse de 2023'te %14,7'ye düşmüştür. Aynı dönem içerisinde gelir eşitsizliği göstergelerinden biri olan Gini endeksi ise %30,2'den %29,4 düzeyine gerilemiştir (Nebiler, 2024).

Kazakistan, bağımsızlık sonrası hızlı yapısal değişimin sosyal yardımlar üzerinde yarattığı olumsuz etkileri ortadan kaldırmak için 2000 yılında tüm sosyal yardımları üç kategori altında toplama yoluna gitmiştir. Bu kategoriler sosyal yardımlar, maddi tazminatlar ve hedeflenmiş sosyal yardımlar (HSY)[1] şeklindedir. Sosyal yardımlar: engellilik yardımını, ailenin geçimini sağlayan kişinin ölümü halinde geriye kalan aileye bakmakla yükümlü kişilere ödenen sosyal ödemeleri ve yaşlılık yardımlarını içermektedir. Maddi tazminatlar ise konut bakımı, yakıt, telefon, ilaç ve toplu taşıma yardımı gibi kamusal hizmetlere erişimi sağlayan yardımlardır (Maltseva, 2012: 201).

Hedeflenmiş sosyal yardımlar ise hükümetin daha iyi hedefleme mekanizmaları benimseyerek ve yardımın boyutunu hane halkının bireysel koşullarına göre ayarlayarak iyileştirmeye çalıştığı yardım kategorisini oluşturmaktadır. Yoksulluk sınırının altında yaşayan kişileri veya aileleri kapsayan bu sosyal yardım türü şartsız ve şartlı yardımlar olarak uygulanmaktadır. Şartsız nakdi yardımlar, herhangi bir ek koşul aranmaksızın yaşlılık, engellilik veya hastalıkla bağlantılı olarak çalışma fırsatı sınırlı olan düşük gelirli bireyleri veya aileleri, şartlı nakdi yardımlar ise düşük gelirli fakat sağlıklı kişilerin istihdam

[1] *Kazakistan Cumhuriyeti'nde uygulanan "hedeflenmiş sosyal yardım", Kazak Türkçesinde "amaулы әлеуметтік көмек-atawlı älewmettik kömek" şeklinde 246 no'lu kanunun 6. maddesinde geçmektedir. Bu ifade hedeflenmişin ötesinde adlandırılmış, ada yönelik gibi daha spesifik bir sosyal yardımı tanımlamaktadır.*

teşvik programlarına katılması şart koşularak yapılan yardımları kapsamaktadır (Barro & Cornell, 2022: 60).

Şartsız nakdi yardımlar; ilk olarak istihdam teşviklerinden yararlanma imkânı sınırlı olan ve tek başına yaşayan yalnız veya düşük gelirli kişilere; emeklilik yaşına ulaştıklarında sosyal güvenlik dışında kalan yaşlılara (erkeklerde 63 yaş, kadınlarda ise 60 yaş), engellilik derecesine göre birinci veya ikinci grup engelliliğe sahip bireylere ve iki aydan fazla süreli geçici iş göremezlik hâlinin oluşmasına neden olan hastalıklara sahip kişilere ödenmektedir. Ayrıca hayatta kalan hiçbir akrabası bulunmayan veya hayatta tek akrabası olup üç yaşından küçük çocuk, engelli çocuk, birinci veya ikinci gruptaki engelli kişi, yaşlı veya bakıma ve yardıma muhtaç kişiye bakan düşük gelirli aileler şartsız nakdi yardım kapsamındadır. Bütün çocuklar için geçerli olan bir diğer şartsız nakdi yardım ise çocuk 1 yaşına gelene kadar aylık olarak yapılan bakım ödemesidir. Çocuk parasının miktarı "aylık hesaplanan gösterge" (MCI) uyarınca yıllık olarak Kazakistan Devlet Bütçe Kanunu'nda belirlenir (Ortiz et al., 2016: 3; Rakymzhanova et al., 2018: 33-34).

Şartlı nakdi yardımlar ise tek başına yaşayan düşük gelirli, sağlıklı kişileri veya sağlıklı ve çalışabilir aile bireyine sahip düşük gelirli aileleri kapsamaktadır. Bu kişilere iş bulma, eğitim alma veya iş kurma gibi konularda destek sağlanır. Şartlı nakdi yardım, başvurunun yapıldığı aydan itibaren 3 ay boyunca tahsis edilir ve aylık olarak ödenir (ISSA Kz, 2024: 20).

Kazakistan Cumhuriyeti vatandaşları, mülteciler, yabancılar, Kazakistan Cumhuriyeti'nde daimî ikamet eden ve kişi başına düşen geliri yoksulluk sınırını aşmayan vatansız kişiler HSY kapsamındadır (Qaz Stat, 2023: 43).

Yaşlılar, maluller ve aile reisinin ölümü sonrasında geride kalanlar için yapılan sosyal yardımlara yönelik hukuki düzenlemelerin ilki 1997 yılında çıkarılan 126 no'lu "Maluller ve Aile Reisinin Kaybına Yönelik Sosyal Fayda Temini"ne ilişkin kanundur. Aile ve hanehalkına yönelik uygulanan sosyal yardımlara ilişkin olarak 1997 yılında 94 no'lu "Konut İlişkisi Hakkında" kanun çıkarılmıştır. Sonrasında ise 2001 yılında 246 sayılı HSY Kanunu, 2005 yılında ise 63 sayılı "Çocuklu Ailelere Yönelik Devlet Yardımları" adlı kanun çıkarılmıştır. 2022 yılı itibarıyla HSY'den ulusal yoksulluk sınırının altında kişi başına gelire sahip Kazakistan Cumhuriyeti vatandaşları, Oralmanlar (yurt dışındaki etnik Kazaklar), mülteciler ve kalıcı olarak Kazakistan'da yaşayan vatansızlar dahil toplam 1 milyon kişi yararlanmaktadır (Human Rights Watch-HRW).

Kazakistan'daki sosyal yardımlar merkezi hükümet tarafından finanse edilmektedir. Merkezi hükümette "Devlet Sosyal Sigorta Fonu"nu bünyesinde barındıran "Sosyal Güvenlik ve Çalışma Bakanlığı" (SGÇB), yerelde ise "Bölgesel Departmanlar" bu programlardan sorumlu kuruluşlardır. (ISSA Kz 20). 2002'de yürürlüğe giren HSY uygulamasının organizasyonundan ve sunulmasından tamamen yerel yönetimler sorumlu tutulmuştur. Yerel yönetimlerin altında oluşturulan bölüm komisyonları, HSY alacak ailelerin belirlenmesini sağlamaktadır (UNDP ILO, 2003: 2). SGÇB bünyesindeki "Bilgi ve

Analiz Merkezi", oluşturduğu sosyal kartlar ile ailelerin gelir düzeyi ve kişi sayısını dijitalleştirerek HSY uygulamasında kolaylık sağlamıştır (UNDP ILO, 2003: 3).

2.2. Azerbaycan

Diğer Türk Cumhuriyetleri gibi, Sovyetler Birliği çatısı altında 1991 yılına kadar bir Sovyet Cumhuriyeti olan Azerbaycan'da sosyal yardımlar alanında köklü reformlar, ne yazık ki 2000'li yılların başına kadar görülmemiştir. 1990'lı yıllarda Sovyet tipi sosyal yardımların uygulamasına devam edilmiş (Habibov & Fan, 2006: 205) ve 1990'dan 2000 yılına gelindiğinde milli gelir yarıya düşmüş, reel ücretler %64 azalmış, gelir dağılımı ise Gini katsayısına göre %27'den %50'ye çıkarak ciddi boyutta bozulmuştur (Dobraganov, 2003: 8; Falkingham, 2004: 142). 2000'li yılların başından itibaren Azerbaycan'da ekonomik anlamda hızlı bir toparlanma süreci başlamış ve sosyal güvenlik ve yardımların yapısında da önemli iyileştirmeler hayata geçirilmiştir. Sosyal yardım ve sosyal sigorta şeklinde iki ayaklı oluşturulan yeni sistemde sosyal sigorta ilk olarak "Devlet Sosyal Güvenlik Fonu" (DSGF) altında, sosyal yardımlar ise "Çalışma ve Sosyal Güvenlik Bakanlığı" (ÇSGB) bünyesinde yürütülmüş; 2016 yılına gelindiğinde DSGF, bakanlığa dâhil edilmiştir (Rahmanov, 3). 2006 yılında çıkarılan kanunla hayata geçirilen "Unvanlandırılmış Sosyal Müavinetler"[2] (ÜSM), bir çeşit hedeflenmiş sosyal yardım uygulaması olarak kurgulanmıştır (DWCP, 2016: 7).

2000'li yıllardaki bu reformlar sayesinde günlük 2,15 $ olan yoksulluk eşiği altındaki nüfusun oranı, AKB'ye göre 2022 yılında %0,1 düzeyindedir. Ülkenin kendi belirlediği ulusal yoksulluk sınırı altında yaşayan nüfus oranı ise 2022 yılı için %5,5 olarak bildirilmiştir (ADB, 2024: 1). DB'ye göre Gini katsayısı ise 2019 yılı itibarıyla 0,38'e gerilemiştir (WB, 2024).

Azerbaycan ÇSGB'nca yönetilen "sosyal muavinet"ler hem gelir testi uygulanmak suretiyle "hedeflenmiş sosyal yardım" (ÜSM) halini almakta hem de koşulları sağlayan bireyler için gelir testi gerekmeksizin devletin sağladığı nakdi sosyal yardımlar olarak uygulanmaktadır. ÜSM, az gelirli ailelerin sosyal durumlarını iyileştirmek amacıyla yapılan parasal yardımdır. Ortalama aylık gelirleri her bir aile üyesi için hesaplanan minimum gelir düzeyinin altında kalması halinde aile az gelirli olarak kabul edilmektedir (ISSA Az, 2024: 3).

Gelir testine dayalı sosyal yardımlar kapsamında; emekli geliri olmayan vatandaşlara yapılan aylık ödemeler (erkelerde 65 ve kadınlarda 64 yaş üstü olma şartı ile), herhangi bir geliri olmayan engelli ödemeleri, aileye gelir getiren bireyi kaybeden 18 yaşına kadarki aile bireylerine yapılan ödemeleri, bir yaşına kadar çocuk sahibi olan az gelirli aileler ile yetim ve öksüz kalan çocuklara bakmakla yükümlü az gelirli ailelere yapılan ödemeleri ve beşten çok çocuğu olan kadınlara, çocukların sağ olması şartı ile çocuklar 18 yaşına ulaşana kadar

[2] *ÜSM, adrese dayalı spesifik ölçekte sosyal yardım modeli anlamındadır.*

her çocuk için ayrı ayrı yapılan aylık ödemeleri kapsar. Bu yardımlar düzenli ve devamlılık arz eden parasal yardımlardır.

Bunun dışında, gerekli koşullar sağlandığı takdirde bir defaya mahsus olmak üzere gerçekleştirilen ve gelir testi gerektirmeyen sosyal yardımlar da mevcuttur. Bunlar: radyasyon kazasından (Çernobil felaketi) etkilenen şahıslara ve 18 yaşına kadarki çocuklarına yönelik tedavi için yılda bir defa yapılan ödemeler, doğum yapan anneye herhangi bir başvuru şartı aranmaksızın tek seferlik yapılan yardımlar ve ailesini yitirmiş, yetim ve öksüzlerin ilk defa işe girmeleri veya iş kurmaları durumunda bir defaya mahsus ortalama ücretin beş katı tutarındaki yardımları kapsar.

Ailenin geçimini sağlayan bireyin ölmesi durumunda geride kalan çocuklara ödenen sosyal yardımlar ile bir defaya mahsus ödenen sosyal yardımlarda Azerbaycan vatandaşı olma şartı aranmakta iken, diğer tüm sosyal yardımlar için Azerbaycan Cumhuriyeti sınırları içerisinde bulunmak yeterlidir (Az Sosial).

Sosyal yardımlara yönelik hukuki düzenlemeler, 1997 yılında çıkarılan 250 sayılı Sosyal Sigorta Kanunu'yla ilk olarak ortaya çıkmış; sonrasında ise 2001 ve 2006 yıllarında çıkarılan emeklilik hakkı ve sosyal yardım düzenlemelerini içeren 54-55 sayılı kanunlarla daha ayrıntılı biçimde belirlenmiştir. Ailenin ve hanehalkının elde ettiği sosyal yardımlara ilişkin düzenlemelerin ilki ise 1998 yılında çıkarılan "sosyal sigorta düzenlemeleri"ni içeren 189 no'lu kanun ile başlamış; sonrasında ÜSM düzenlemesi, 2005 ve devamında 2006 yıllarında çıkarılan sırasıyla 1039 ve 55 sayılı kanunlarla hüküm altına alınmıştır (Az Sosial, 2024). Azerbaycan'da sosyal yardımların tümü kamu gelirleri ile finanse edilmektedir (ISSA Az, 2024: 8).

2.3. Kırgızistan

Sovyetler Birliği'nden dağılan cumhuriyetler ile kurulan "Bağımsız Devletler Topluluğu" içinde yer alan Kırgızistan, piyasa ekonomisine geçişi başlatan ilk devletlerden biri olma özelliğini de taşımaktadır. Bu hızlı geçiş, beraberinde savunmasız gruplar için sosyal sigorta ve HSY uygulamalarını ilk başlatan ülke olma özelliğini de getirmiştir (ILO Krg, 2023: 2).

1990 yılında, Kırgızistan nüfusunun yaklaşık yarısı ya emekli maaşı alarak sosyal güvenlik sisteminin bir parçası ya da aile yardımı alarak sosyal yardımların bir parçasıydı. 1991 yılında bağımsızlığın kazanılmasıyla birlikte, hızlı liberalizasyon politikaları sonucunda devlet teşebbüslerinin özelleştirilmesiyle sosyal yardıma muhtaç kesimde hızlı bir artış yaşanmış, yoksulluk şiddetlenmiştir (OECD, 2018: 68). 2021 yılı itibarıyla en az bir nakit yardım programından yararlanan kişi sayısı, toplam nüfusun %41,7'sidir. Katkı payı ödemeksizin yaşlılık yardımından yararlanan ve engelli ve ölüm sonrası geride kalan aile bireylerine verilen sosyal yardımların nüfus içindeki oranı ise aynı yıl için %17,7'dir (ILO Krg, 2023: 3).

Özellikle reform sonrası ikinci on yıllık süreç içerisinde sadece sosyal yardımlardan yararlananların sayısı, toplam nüfus içerisinde 2012-2021 yılları arasındaki dönem incelendiğinde %5-%6 arasında değişim göstermektedir. Fakat burada sosyal yardım türlerinin içeriğine bakıldığında, sosyal yardımlar içinde çocuklu ailelerin payının arttığı, buna karşılık doğrudan nakit yardımı alanların sayısının azaldığı görülmektedir. Bu durum özellikle gelir testine dayalı HSY politikalarının başarısı ile açıklanmaktadır (Solovyeva, 2023: 34).

Bağımsızlık sonrası otuz yıllık süre içerisinde ikinci on yıldaki reformlar özellikle 2000'li yıllar sonrasında Kırgızistan'ın yoksulluk ve gelir eşitsizliği göstergelerinde iyileşmeler sağlamıştır. Örneğin, 2006 yılında 0,38 olan Gini değeri 2021 yılı itibarıyla 0,29'a, 2022 yılı itibarıyla ise 0,27'ye inmiştir. Günlük 2.15 $'ın altında yaşayan nüfus oranı ise 2005 yılında %12 seviyelerinden 2021 yılına gelindiğinde %0,7'ye düşmüştür (Ismailakhunova, 2024).

Kırgızistan'da sosyal yardım programları[3] üç ana transfer programı çerçevesinde şekillenmiştir. Bunlar: sosyal yardımların en büyük payını oluşturan aylık ödenen sosyal yardımlar, düşük gelirli çocuklu aileler için yapılan sosyal yardımlar ve maddi tazminatlar şeklindedir. Bu üç transfer programı çerçevesinde yapılan sosyal yardımları "aile ve çocuklara yönelik" olanlar ile "yaşlılara, engellilere ve ölüm halinde yapılan sosyal yardımlar" şeklinde iki türe ayırmak mümkündür. (Solovyeva, 2023: 33; ISSA Krg, 2024: 2).

Aile ve çocukları kapsayan "Uy-bulogo komak"[4] adlı sosyal yardım, yoksul ailelerin 16 yaşından küçük çocukları için yapılan ödemeleri kapsamaktadır. Yardım, ailede kişi başına düşen toplam ortalama gelirin, her bir aile üyesi için "garanti edilen asgari gelir"den düşük olması koşuluyla gerçekleştirilen gelir testi ile sınanmaktadır (ILO Krg, 2023: 11). Bir diğer çocuk yardımı ise "balaga suyunchu"[5] adlı yeni doğan her bir çocuk için ailelere verilen nakdi yardımdır (ILO Krg, 2023: 13).

Engelli yardımları, 18 yaşından küçük, üç farklı engellilik derecesine göre çocukları ve sonradan bu gruplara dahil olan engelli bireyleri kapsarken, yaşlı aylıkları ise sosyal sigorta kapsamı dışında kalan yaşlıları (erkeklerde 65, kadınlarda 60 yaş) kapsar. Ailenin geçimini sağlayan kişinin ölümü halinde, 16 yaşına kadar olan çocuklara ve genel eğitim kurumlarındaki öğrencilere, eğitimlerini tamamlayıncaya dek 23 yaşına kadar aylık sosyal yardım sağlanmaktadır. Anne ve babayı kaybeden çocuklar için ödenen aylık tutar iki katına çıkarılır (ILO Krg, 2023: 18-22).

---

[3] *Kırgızistan Cumhuriyeti'nde diğer ülke uygulamalarına benzer* şekilde HSY, Kırgızistan Türkçesi'nde "Мамлекеттик жөлөкпулдарды *Mamlekettik jölökpuldardy" olarak ifade edilmektedir.*

[4] *Kırgızistan merkezi hükümetinin "eve dönme yardımı" şeklinde Türkiye Türkçesine çevrilebilecek olan bu uygulaması 2018 Ocak ayı itibarıyla daha önceki yoksul ailelere aylık yardım hakkındaki kanunun revize edilmesiyle uygulamaya konmuştur.*

[5] *"Çocuk Sevinci" adlı bu sosyal yardım uygulaması 1 Ocak 2019 tarihinden beri uygulanmaktadır.*

Yaşlı, engelli ve ölüm durumunda sağlanan sosyal yardımlar için Kırgızistan vatandaşlığı şartı aranmazken, aile ve çocuklar için yapılan sosyal yardımlarda Kırgızistan vatandaşı olma zorunluluğu vardır (ISSA Krg, 2024).

Kırgızistan Cumhuriyeti'nde sosyal güvenlik sistemi ve sosyal yardımlar 39 farklı yasa ile düzenlenmiştir. 2012 yılında kabul edilen ve 2026 yılına kadar nüfusun dezavantajlı gruplarının durumunu iyileştirmeye yönelik sosyal koruma sisteminin geliştirilmesini öngören "Ulusal Program"[6], önemli bir dönüm noktasını oluşturmaktadır (ILO Krg, 2023: 6). Sosyal yardımlara ilişkin hukuki yapıdaki değişim, 1996 yılında çıkarılan "20 no'lu Devlet Sosyal Sigorta Kanunu" ile başlamış; nihai halini ise 2017 yılında çıkarılan "163 no'lu Devlet Yardımlarına İlişkin Kanun" ile almıştır.

Kırgızistan'da uygulamaya konan tüm sosyal yardım harcamaları, Kırgızistan Cumhuriyeti Bakanlar Kurulu'na bağlı ve merkezi yönetim tarafından finanse edilen Kırgızistan Sosyal Fonu'ndan yapılmaktadır (ISSA Krg, 2024; ILO Krg, 2023: 9). İlgili sosyal yardımlarda sorumlu kurumlar, Kırgızistan Cumhuriyeti Çalışma ve Sosyal Güvenlik ve Göç Bakanlığı ile bakanlığın bünyesinde yer alan yerel yönetimlerde faaliyet gösteren ilçe ve şehir ofisleri ile lokal ofislerdir (ISSA Krg, 2024).

2.4. Özbekistan

Özbekistan, analize konu edilen Türkistan'daki diğer Türk devletlerinden farklı olarak 1990'lardan 2017 yılına kadar piyasa ekonomisine daha yavaş ve dereceli bir geçiş süreci yaşamıştır (Rashidovna, 42). Hem ekonomik hem de sosyal politika anlamında ülke, diğer bağımsızlığını kazanan Türk devletlerine nazaran 1990'lı yılları daha olumlu geçirmiştir (Coudouel & Marnie, 2000: 51). Bu dönemde "Mahalle" teşkilatı, yerel bilgileri kullanarak topluluktaki en muhtaç ailelere sosyal yardımları ulaştırabilmiştir. Ancak 2000'li yıllarla birlikte kamusal hizmetlerin kalitesi düşmüş, erişimi zorlaşmıştır. Ayrıca hak sahibi olmaması gerekenlerin sosyal yardım alması "Mahalla" yapılanmasında sorunları beraberinde getirmiştir (Micklewright & Marnie, 2000; Kamp, 2004: 29).

2017 yılında DB ve IMF programları ile liberalizasyon sürecine yönelen Özbekistan'da daha güvenli ve düzenli yoksulluk ve gelir eşitsizliği verilerine erişilebilmektedir. 2022 yılı itibarıyla 2,15 $ altındaki nüfus oranı %2,3'tür. Özbekistan Ekonomi Bakanlığı tarafından asgari ücret düzeyine bağlı olarak belirlenen ulusal yoksulluk eşiği altındaki nüfus oranı 2001 yılında %27,5 iken 2020 yılına gelindiğinde %17'ye, 2023 yılı itibarıyla ise %11'e kadar gerilemiştir. DB'ye göre Gini katsayısı 2000 yılından 2022'ye %36'dan %31,2 düzeyine gerilemiştir (Shagazatova, 2012: 7; Uochi, 2024).

Mevcut sosyal güvenlik sistemi, katkı payı gerektiren sosyal sigorta, işverenin sorumluluğunda olan bir defaya mahsus çocuk yardımı, annelik yardımı ve hastalık yardımı gibi sosyal haklar ile son olarak vergilerle finanse edilen sosyal yardımlardan oluşmaktadır

[6] *12 Ekim 2012 tarihli "Kırgız Cumhuriyeti'nin 2026 Yılına Kadar Ulusal Kalkınma Programı Hakkında Kararname"de yer almaktadır.*

(USATA, 2019: 6). Sosyal yardım türleri ise çocuklara, çalışma çağına gelmiş yetişkinlere ve yaşlılara yapılan sosyal yardımlar şeklinde üç alt kategoride incelenebilmektedir.

Çocuklara yönelik sosyal yardımlar; sosyal sigorta sistemi içinde yer almayan ve çalışmayan anneler için bir defaya mahsus doğum yardımı, iki yıla kadar çocuk bakım ödeneği yardımı, gelir testine dayanarak düşük gelirli aileler için 2-14 yaş arası çocuklara yönelik ödenek yardımı, engelli çocuk ödeneği, okul öncesi eğitim sübvansiyonu, ücretsiz kışlık giysi ve ders kitapları yardımı, ebeveyn bakımından mahrum çocuklar için yatılı bakım gibi sosyal yardımları ihtiva etmektedir (Papa et al., 16). Ayrıca 2 yaşından küçük çocuklar için, çocuk sayısına bakılmaksızın, aylık minimum asgari ücretin iki katı ödeme yapılmaktadır (Shagazatova, 2012: 17).

Çalışma çağındakilere yapılan yardımlar ise: engelli aylığı, ailenin kazanç sağlayabilecek bireyinin kaybı halinde ödenen aylık, gelir testine dayalı olarak belirlenen düşük gelir düzeyine sahip ailelere yapılan sosyal aylık ödemesi, engelli bireylere yönelik yatılı bakım hizmetleri, cenaze ödeneği ve hassas gruplar içinde yer alan bireylere yönelik kamusal hizmetlere erişim için ödenek tahsisleri şeklindedir (Papa et al., 16). Engellilere sağlanan sosyal yardımlarda birinci veya ikinci derece engelli grupta yer alma, çocukluktan beri engellilik durumuna sahip olma veya 16 yaşın altında engelli çocuğa sahip olma şartı vardır (ISSA Uzb, 2024: 4-6).

Özbekistan'da sosyal güvenlik sistemi çatısı altında, emeklilik aylığına (erkeklerde 60, kadınlarda 55 yaş) hak kazanamayan yaşlılara: yaşlı aylığı, evde bakım hizmeti, yatılı bakım hizmeti, ayni gıda yardımı, cenaze ödeneği ve kamusal hizmetlere erişimde parasal destek şeklinde sosyal yardımlar yapılmaktadır. Bu üç grup için ise ortak bir sosyal yardım türü olarak ücretsiz ilaç temini, engellilik kategorisine göre ortopedik ürün temini ve ulaşım desteği de sağlanabilmektedir (Papa et al., 2020: 16). Bu sosyal yardımlardan yararlanmada vatandaşlık zorunluluğu yerine Özbekistan sakini olmak yeterlidir (ISSA Uzb, 2024).

Özbekistan'da sosyal koruma politikalarına ve sosyal yardımlara erişimi düzenleyen temel yasalar ilk olarak 1993 yılında çıkarılan 938-XII sayılı "Vatandaşlara Devlet Emekliliğinin Sağlanması Hakkındaki Kanun" ile başlamıştır. 2008 yılında ise hem "çocuk haklarının güvence altına alınmasına ilişkin kanun" hem de "engelli bireylerin sosyal açıdan korunmasına ilişkin kanun" çıkarılmıştır. Önemli bir gelişme ise 2013 yılında Bakanlar Kurulu kararı olarak ortaya konan "düşük gelirli ailelere sağlanan sosyal yardımlar ve maddi destekler" hakkında tahsis ve ödeme kararıdır. Devamında ise 2014 tarihli ve 3PY-415 sayılı "Sosyal Ortaklıklar Kanunu" ile 2016 tarihli ve 3PY-415 sayılı "Yaşlılar, Engelliler ve Nüfusun Sosyal Açıdan Diğer Hassas Kategorilerine Yönelik Sosyal Hizmetler Kanunu" ile sosyal yardımın çerçevesi çizilmiştir (Papa et al., 2020: 27).

Özbekistan'da sosyal yardımlar vergilerle finanse edilir (ISSA Uzb, 2024). Maliye Bakanlığı, prim ödemesine dayalı emeklilik sistemi ile sosyal yardım politikalarının yürütülmesinden ve denetlenmesinden sorumludur. Sağlık yönünden sunulan sosyal yardımlarda Sağlık Bakanlığı, çocukların eğitimine yönelik sosyal yardımlarda ise Eğitim

Bakanlığı sorumludur (Papa et al., 2020: 28-40). Gelir testine dayalı olarak sosyal yardımların yerel düzeyde onaylanması ve yönetilmesinde merkezi kurumlara "Mahalla" teşkilatı yardımcı olmaktadır.

2.5. Türkiye

Türkiye, imparatorluk döneminden bu yana sosyal yardımlar konusunda zengin bir deneyime sahiptir. Vakıf kültürünün en önemli örneklerinin görüldüğü Osmanlı İmparatorluğu döneminde, yoksul ve muhtaç kişilere yönelik sosyal yardımlar mevcut vakıflar aracılığıyla gerçekleştirilirken, bu yardımların finansmanı da toplumun çeşitli kesimlerinden gelen bağışlarla sağlanmaktadır (Pamuk, 2005: 51).

Cumhuriyet'in ilanıyla birlikte sosyal yardımların daha sistematik ve kurumsal bir yapıda uygulanması yönündeki çabalar tecrübe edilmiştir. Vakıf sistemi erken dönemde devam etmiş; özellikle gönüllü yardımı sağlayan Kızılay ve Çocuk Esirgeme Kurumu gibi kuruluşların Osmanlı'dan devralınan hayırseverliğe ve gönüllülüğe dayalı sosyal yardımları sürdürdüğünü görmek mümkündür. Fakat 1940'lı ve 1950'li yıllarda ekonomik ve sosyal yapıdaki değişim ile ilk kurumsallaşma adımları atılmaya başlanmıştır. Sosyal güvenliğin gelişimi açısından 1946 yılında "İşçi Sigortaları Kurumu"nun kurulması ve 1957 yılında 65 yaş üstü vatandaşlara yaşlı aylığının bağlanmasına ilişkin kanunun kabul edilmesi, bu duruma örnek teşkil etmektedir. 1961 Anayasası ile sosyal devlet ilkesi benimsenerek sosyal yardım sağlama yükümlülüğü anayasal güvence altına alınmıştır. 1976 yılında çıkarılan "65 yaşını dolduran muhtaç Türk vatandaşlarına aylık bağlanması" hakkındaki kanun ile modern anlamda sosyal yardımın ilk uygulamasına geçilmiştir (İpek, 2015: 94).

1980'lerde sosyal yardımların kurumsallaşması hız kazanmış, 1986'da "Sosyal Yardımlaşma ve Dayanışmayı Teşvik Kanunu" çıkarılarak Sosyal Yardımlaşma ve Dayanışma Vakıfları (SYDV) kurulmuştur. Bu vakıflar, özellikle yerel düzeyde sosyal yardımların organize edilmesi ve dağıtılmasında önemli bir rol oynamaktadır. 1990'lı yıllarda sosyal yardımların çeşitliliğinde artış görülmektedir. 1992 yılında çıkarılan 3824 sayılı kanun ile eğitim, sağlık ve barınma gibi alanlarda çeşitli sosyal yardım programları hayata geçirilmiştir. 2000'li yıllara gelindiğinde ise sosyal yardımların bütünleşik bir yapıya kavuşturulması hedeflenmiştir. 2004 yılında bu hedef doğrultusunda ilk adım atılarak Sosyal Yardımlaşma ve Dayanışma Genel Müdürlüğü kurulmuş ve koordinasyon ile yönetim genel müdürlüğe devredilmiştir. 2011 yılında Aile ve Sosyal Politikalar Bakanlığı kurulmuş, 2018 yılında ise Çalışma ve Sosyal Güvenlik Bakanlığı ile birleşerek Aile ve Sosyal Hizmetler Bakanlığı (ASHB) adını almıştır (İpek, 2015: 94-95). Ancak 2018 yılında tecrübe edilmeye başlanan sosyal güvenlik ve sosyal yardımların tek bir bakanlık bünyesinde yürütülmesi, 2021 yılından itibaren ASHB'nin müstakil bir bakanlık hâline gelmesiyle günümüze ulaşmıştır.

2000'li yıllar sonrası Türkiye'nin sosyal güvenlik sisteminde bütünleşik yapıya geçme çabası sosyal yardımların etkinliğini artırarak olumlu sonuçlar vermiştir. 2021 yılı

itibarıyla 2,15 $ altındaki nüfus oranı %0,4'tür. Gelir adaletsizliği açısından bakıldığında, 2017 yılında 0,41 olan Gini indeksi 2021 yılında 0,44'e yükselmiştir (Perova, 2024).

2025 yılı itibarıyla Türkiye'de sosyal yardımlar: aile, barınma ve gıda, engelli ve yaşlı, sağlık ve eğitim yardımları olmak üzere 5 türde, 43 farklı program kapsamında uygulanmaktadır. Bu programlar, düzenli ve süreli yardımlar olarak da ayrıma tabi tutulduğunda, yaklaşık 4,4 milyon haneyi kapsamaktadır (SYGM, 2024).

Aile yardımları; barınma ve gıda yardımları, Sosyal Uyum Yardımı (SUY) ve Tamamlayıcı Sosyal Uyum Yardımlarını (TSUY) da kapsayarak 10 farklı yardımı; engelli ve yaşlı yardımları 4 farklı yardımı; sağlık yardımları 7 farklı yardımı ve eğitim yardımları 10 farklı yardımı kapsamaktadır[7].

Bu yardımlardan yararlanabilmek genellikle başvuruya tabidir; ayrıca yardımların önemli bir kısmı net asgari ücretin üçte birini eşik olarak kabul eden gelir düzeyini dikkate almaktadır. SUY, TSUY ve YŞEY yabancılara yönelik yardımlar olup, diğer tüm yardımlarda vatandaşlık esastır. Yaşlılara yönelik yardım programlarında kadın-erkek ayrımı olmaksızın 65 yaş sınırı söz konusu iken, Ulusal Vefa Programı'nda bu sınır 60 yaş olarak belirlenmiştir. Sosyal yardımların büyük çoğunluğu, yakacak yardımı gibi yardımlar dışında, nakittir. Ödemeler genellikle sürekli yardımlarda aylık olarak hesaplanıp iki ayda bir yapılmakta iken, tek seferlik ödemeler de söz konusudur (SYGM, 2024).

Sosyal yardımlara ilişkin hukuki düzenlemelerin ilk adımının 1976 yılında kabul edilen 2022 sayılı kanunla atıldığı ileri sürülebilir. Bu kanun, 65 yaşını doldurmuş vatandaşlara yaşlı aylığı bağlanmasını sağlamıştır. 1983 ve 1986 yıllarında yürürlüğe giren sırasıyla 2828 sayılı "Sosyal Hizmetler Kanunu" ile 3294 sayılı "Sosyal Yardımlaşma ve Dayanışmayı Teşvik Kanunu", tüm sosyal hizmetlerin ve yardımların temelini oluşturmaktadır. Engelli bireylerin ve çocukların sosyal yardımlardan yararlanmasına yönelik olarak 2005 yılında çıkarılan sırasıyla 5378 sayılı "Engelliler Hakkında Kanun" ve 5395 sayılı "Çocuk Koruma Kanunu" ile engelli bireylerin ve çocukların sosyal yardımlara erişmesi kolaylaştırılmıştır. Sağlık sistemindeki sosyal yardımların sosyal güvenlik sistemiyle entegrasyonunu sağlamak açısından önemli bir diğer kanun ise 2008 yılında yürürlüğe giren 5510 sayılı "Sosyal Güvenlik ve Genel Sağlık Sigortası Kanunu"dur.

Sosyal Yardımlaşma ve Dayanışma Fonu 2022 yılında sosyal yardımların yaklaşık yüzde yetmişini, belediyeler ise %15'ini finanse etmektedir. Kredi ve Yurtlar Kurumu, Çalışma ve Sosyal Güvenlik Bakanlığı, Türkiye Kömür İşletmeleri, Millî Eğitim Bakanlığı ve Vakıflar Genel Müdürlüğü ise sosyal yardım türleri ile ilişkili olarak sosyal yardımları finanse eden diğer kurumlar olarak görev almaktadır (SYGM, 2024).

[7] *Türkiye'de sosyal yardım türleri ile ilgili ayrıntılı bilgi Aile ve Sosyal Hizmetler Bakanlığı websitesinde yıllık olarak güncellenmektedir.*

3. Türk Devletleri'nde Sosyal Yardımların Kapsamı, Yoksulluk ve Eşitsizlik Üzerine Etkisi

DB bünyesinde mevcut bulunan 86 veri setinden biri olan ASPIRE veri portalı, dünya üzerindeki ülkelerin mevcut sosyal güvenlik programlarının yoksulluk ve gelir dağılımı üzerindeki etkisini araştırmak ve analiz etmek için sisteme dâhil olan ülkelerin resmi istatistik ajansları tarafından elde edilen hane halkı anketlerinin bir derlemesidir. (WB Aspire, 2018: 8).

Sosyal güvenlik ve istihdam politikalarını iyileştirmek adına veri kalitesini ve veri setinin kullanılabilirliğini artırmak için sürekli geliştirilmeye devam edilen ASPIRE projesi günümüzde 129 ülkeyi kapsama almıştır. Bu ülkelere ait hane halkı anketlerinden elde edilen veriler bir araya getirilerek sosyal koruma programlarının kapsamı, hedeflerindeki başarısı ve amaçlara ulaşmadaki yeterliliği ile yoksulluğun azaltılmasına yönelik etkileri ölçülebilmektedir (Brollo et al., 8). ASPIRE sayesinde sosyal yardım türlerine ilişkin ayrı bir analiz yapma imkânı vardır. Nakit transferlerin yanı sıra ayni yardımlar, sübvansiyonlar ve diğer sosyal yardım türleri de veritabanında yer almaktadır. ASPIRE ile farklı ülkelerin sosyal yardım sistemlerinin standart göstergeler çerçevesinde karşılaştırılması politika analizini kolaylaştırmaktadır (WB Aspire, 2018: 9-10).

Yemtsov vd. (2019) ASPIRE veri setini kullanarak yaptığı analizinde, Rusya'da sosyal yardımların yoksul hanehalkları içinde yalnızca %10'luk bir kesime ulaştığının altını çizmiştir. Bu nedenle 2024 yılına kadar yoksulluk oranının yarıya indirilmesine ilişkin hedefe ulaşmada zorluk yaşanacağını ileri sürmektedir (Yemtsov et al., 2019: 7-8). Litvinova vd. (2017)'de Yemtsov vd.'ye benzer şekilde, Rusya'da bölgesel düzeyde sosyal yardımların yoksul halka ulaşması açısından büyük farklılıkların olduğu; bazı bölgelerde yardımların ulaşma yüzdesinin %47'lere kadar çıktığı, ancak bazı bölgelerde ise uluslararası standartların çok altında kaldığı ortaya konmuştur (Litvinova et al., 2017: 38). Bu açıdan sosyal yardımların yetersizliği ve eşitsiz dağılım sorunu üzerinde yoğunlaşılmıştır.

ASPIRE veritabanı, aynı anket metodolojisiyle kapsama dahil tüm ülkeler için analiz yapabilme imkânı sunmaktadır; ancak her ülke için veri aralığı aynı yılları kapsamamaktadır. Bu nedenle, mevcut beş ülke için en son verilerin sistemde kayıtlı olduğu yıllar esas alınarak karşılaştırma yapılmıştır.

Sosyal yardımların yoksulluk ve eşitsizlik üzerindeki etkilerine ilişkin analiz öncesinde, sosyal korumanın iki temel bileşeni olan sosyal yardım ve sigortanın kapsama oranlarının %20'lik dilimlere göre analizi Tablo 1'de gösterilmektedir. Analize konu olan beş Türk Devleti'nde sosyal yardımların kapsamının en yoksul %20'den en zengine doğru gidildiğinde azalma eğiliminde olması, sosyal yardım programlarının tasarımının ve uygulamasının etkin ve etkili olduğunu gösterebilmektedir. Ancak bu eğilim ve kapsam oranları ülke özelinde farklılaşmaktadır. Türkiye en yoksul %20'lik dilimde en yüksek kapsama oranına sahipken (%39,6), Türkiye'yi sırasıyla Kazakistan, Azerbaycan, Kırgızistan ve Özbekistan takip etmektedir. Buna karşın en yoksul %20'lik kesim ile en

zengin kesimin kapsam oranları arasındaki farkta Türkiye ilk sırada (%37,1) iken, Türkiye'yi sırasıyla Kazakistan, Kırgızistan, Azerbaycan ve Özbekistan takip etmektedir. Bu durum sosyal yardım programlarının yoksul yanlısı kapsamının önemini gösterir niteliktedir. Özbekistan, 2017 yılı sonrasında reform politikalarına yönelmesi nedeniyle sosyal yardım politikalarında en düşük kapsama sahip ülke olarak değerlendirilebilir.

Sosyal yardım politikalarından farklı olarak, sosyal sigorta kapsama oranının en yoksul %20'lik nüfustan en zengine değişimi, analize dahil ülkeler açısından önemli farklılıklar göstermektedir. Türkiye, Özbekistan ve Kazakistan'da sosyal sigortanın kapsamı gelir arttıkça artarken, Azerbaycan'da azalmakta; Kırgızistan'da ise genel olarak toplumun yaklaşık yarısı her gelir grubunda kapsam içindedir. Yoksul kesimdeki düşük sosyal sigorta kapsamı, uluslararası literatür (Zarazua, 2019: 3) ve analize dahil ülkelerin tecrübeleriyle uyumlu olarak kayıt dışı istihdamı gösterebilir niteliktedir.

Tablo: 1
Nüfusun %20'lik Dilimleri İtibariyle Sosyal Yardım ve Sosyal Sigorta Kapsama Oranı

Kapsama Oranı (%)	Sosyal Yardım					Sosyal Sigorta				
	İlk %20 (en yoksul)	İkinci %20	Üçüncü %20	Dördüncü %20	Beşinci %20 (en zengin)	İlk %20 (en yoksul)	İkinci %20	Üçüncü %20	Dördüncü %20	Beşinci %20 (en zengin)
Azerbaycan (2015)	33,37	25,12	26,72	24,91	24,47	56,98	53,57	49,58	46,84	46,09
Kazakistan (2017)	36,18	28,17	23,47	20,21	15,56	29,62	29,46	29,58	31,77	37,14
Kırgızistan (2020)	15,30	13,59	10,37	6,43	3,71	49,92	48,81	50,47	49,37	48,28
Özbekistan (2018)	10,34	8,01	8,12	3,35	3,62	18,27	19,05	19,71	20,68	22,87
Türkiye (2019)	39,6	16,9	8,8	4,9	2,1	26,4	32,4	41,7	44,5	41,5

Kaynak: ASPIRE World Bank Database (2024)'ten yararlanılarak hazırlanmıştır.

Tablo: 2
Nüfusun En Yoksul ve En Zengin %20'lik Dilimlerine Göre Sosyal Yardım Programlarının Kapsama Oranı

Kapsama Oranı (%)	Nakit Transfer		Ayni Transfer		Yaşlı Aylığı		Diğer Sosyal Yardımlar	
	En Yoksul % 20	En Zengin %20	En Yoksul % 20	En Zengin %20	En Yoksul % 20	En Zengin %20	En Yoksul % 20	En Zengin %20
Azerbaycan (2015)	18,91	7,72	4,42	6,11	8,70	5,87	9,20	10,09
Kazakistan (2017)	14,35	2,77	15,67*	8,82*	22,39	9,45	4,37	4,25
Kırgızistan (2020)	13,35	1,81	0,94	0,51	-	-	0,21	0,33
Özbekistan (2018)	9,15	2,46	-	-	-	-	-	-
Türkiye (2019)	18,8	0,5	2,6	0,6	7,4	0,5	1,3	0,5

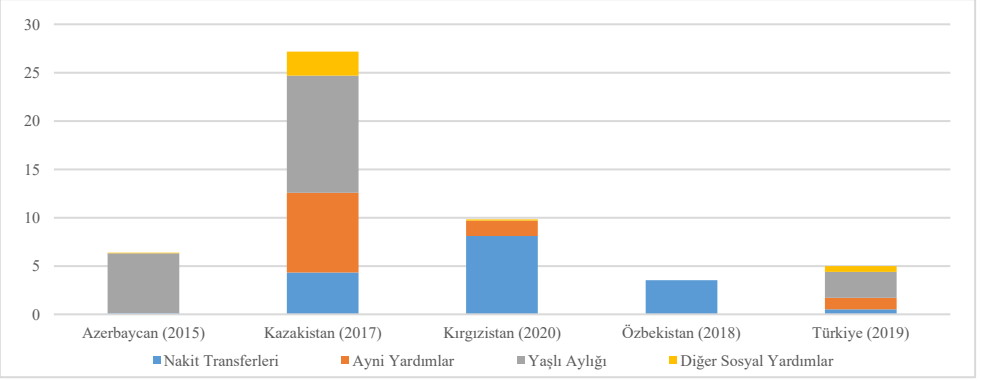
** 2014 yılı verilerine göre.*
Kaynak: ASPIRE World Bank Database (2024)'ten yararlanılarak hazırlanmıştır.

Tablo 2, beş ülke için en zengin ve en yoksul %20'lik kesimlerin, ulaşılabilen veriler ışığında, nakit transferler, ayni transferler, yaşlı aylığı ve diğer sosyal yardımlar olarak sınıflandırılan farklı sosyal yardım türlerinin kapsama oranlarını göstermektedir. Nakit transferler, Kazakistan hariç yoksul kesimlerde en yüksek kapsama oranına sahip sosyal yardım türüdür ve 2000'li yıllar ile birlikte sosyal yardımların yapısındaki küresel değişime uygun (Zarazua, 2019: 3) bir görünüm analize dahil beş ülkede de gözlenmektedir. Kazakistan'da ise en yoksul kesimlerdeki kapsama oranı sırasıyla yaşlı aylığı, ayni transferler, nakit transferler ve diğer sosyal yardımlardır. Nakit transferlerde yoksul kesimdeki en yüksek kapsama oranına sahip ülkeler Azerbaycan ve Türkiye'dir. Bu ülkeleri

sırasıyla Kazakistan, Kırgızistan ve Özbekistan izlemektedir. Benzer bir yaklaşımla, aynî transferlerde en yüksek yoksul yanlısı kapsama oranı Kazakistan'dadır ve Kazakistan'ı sırasıyla Azerbaycan, Türkiye ve Kırgızistan takip etmektedir. Diğer sosyal yardımlardaki kapsama oranı, özellikle Azerbaycan ve Özbekistan'da en zengin %20'lik kesimde daha yüksektir; Kırgızistan'da ise yoksul ve zengin kesimlerde birbirine yakındır; Türkiye'de ise yoksul yanlısı bir orana sahiptir.

Sosyal yardım türlerinin yoksulluğu azaltmadaki başarısı,[8] incelemeye konu olan Türk devletleri için Grafik 1'de gösterilmektedir. Kazakistan, %27'lik oranla 2017 yılında sosyal transfer harcamalarıyla yoksulluk oranını en fazla düşüren ülkedir. Kazakistan'ı %9 ile 2020 yılında Kırgızistan, %7 ile 2015'te Azerbaycan, %5 ile 2019'da Türkiye ve %3 ile 2018'de Özbekistan takip etmektedir.

Grafik: 1
Sosyal Yardım Programlarının Yoksulluk Üzerine Etkisi (%)



Kaynak: ASPIRE World Bank Database (2024)'ten yararlanılarak hazırlanmıştır.

Sosyal yardım türlerinin yoksulluğu azaltmadaki başarısı incelemeye konu ülkelerde farklılaşmaktadır. Yaşlı aylığı sırasıyla Kazakistan, Azerbaycan ve Türkiye'de yoksulluk oranını düşürmede en yüksek etkiye sahip sosyal yardım türüdür. Kazakistan'da 2017 yılında yaşlı aylığı %12, ayni yardımlar %8, nakit transferler %4 ve diğer sosyal yardımlar %2,5 oranında yoksulluğu azaltmıştır. Kırgızistan'da 2020 yılında nakdi transferler ile ayni transferler yoksulluğu sırasıyla %8 ve %1,5 oranında düşürmüştür. Azerbaycan'da 2015 yılında yaşlı aylığı yoksulluğu azaltmada en önemli sosyal yardım türü iken, diğer yardımların etkisi oldukça sınırlıdır. Benzer bir durum 2018 yılında Özbekistan'da nakdi transferler açısından (%3) göze çarpmaktadır. Türkiye'de 2019 yılında yaşlı aylığında %2,7, ayni transferlerde %1,2, diğer sosyal yardımlarda %0,6 ve nakit transferlerde %0,3 oranında

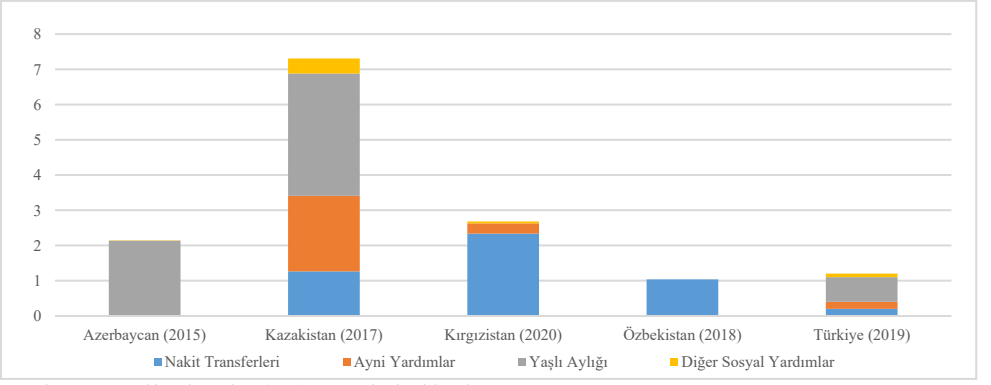
[8] *Günlük 2,15$'lık yoksulluk eşiği dikkate alınmıştır.*

yoksulluğu azaltabilmiştir; bu durum, farklı sosyal yardım türlerinin uygulanması açısından Kazakistan'a benzerlik göstermektedir.

Sosyal yardımların gelir eşitsizliğini düzeltici etkileri, incelemeye konu beş ülkede, Gini katsayısındaki değişimler dikkate alınarak Grafik 2'de gösterilmektedir.

Azerbaycan'da mevcut veri ışığında, Gini katsayısında %2,1'lik bir iyileşme yaşlı aylığı yardımları ile sağlanmaktadır. Kazakistan'da ise nakit transferlerin %1,2, ayni transferlerin %2, yaşlı aylığının %3,5 ve diğer sosyal yardımların ise %3,5 düzeyinde gelir eşitsizliğini azalttığı görülmektedir. Kırgızistan'da nakit transferler Gini katsayısında %2,3'lük bir iyileştirme sağlarken, ayni yardımların etkisi ‰5 düzeyindedir. Özbekistan'da nakit transferlerin gelir dağılımı üzerindeki iyileştirici etkisi %1'dir. Türkiye'de ise nakit transfer ile aynî yardımlar %0,2, yaşlı aylıkları %0,7, diğer sosyal yardımlar ise %0,1'lik iyileştirici bir etki sağlamıştır.

Grafik: 2
Sosyal Yardım Programlarının Gini Katsayısı Üzerine Etkisi (%)



Kaynak: ASPIRE World Bank Database (2024)'ten yararlanılarak hazırlanmıştır.

4. Sonuç

Türk Devletleri'ndeki sosyal yardımların genel yapısı, Türk Devletleri'nin sosyal, kültürel ve ailevi yapısının bir iz düşümüdür. Sosyal yardımlar, aileyi, yaşlıyı, çocuğu, engelliyi, belirli bir gelirin altında yaşayan hanehalklarını ve gelir getiren hanehalkı reisinin vefatını önceliklendirmektedir. Ayrıca bu yardımlara ek olarak eğitim, sağlık ve barınma gibi temel kamu hizmetleri ile elektrik, su, ulaşım ve ısınma gibi temel kamu kolaylıkları sosyal yardımların önemli bileşenleridir. Sosyal yardımların yerelde kırılgan kesimlerce erişiminde "Mahalla" ve "Sosyal Yardımlaşma Vakıfları" gibi yerel örgütlenmeler önemli bir diğer yapılanma olarak ve dünya genelinde iyi uygulamaya örnek teşkil edecek şekilde karşımıza çıkmaktadır. Kırgızistan, Kazakistan ve Azerbaycan'da kurumsal ve hukuki yapı 1990'ların ikinci yarısında, Türkiye'de ise 1980'li yılların ikinci yarısında önemli değişiklikleri beraberinde getirse de, köklü değişim 2000'li yıllarla birlikte göze

çarpmaktadır. Özbekistan'da ise bu değişim 2017'den sonra yaşanmıştır. Analize dahil tüm Türk devletlerinde sosyal yardımlar bütçeden finanse edilirken, sorumlu kurumlar Türkiye hariç genellikle sosyal güvenlikten sorumlu bakanlıklar altında örgütlenmektedir. Türkiye'de ise 1980'lerde başlayan idari ve kurumsal değişim, 2010'lu yıllardan günümüze aileyi, sosyal yardım ve hizmetleri bir arada dikkate alan bir bakanlık yapılanmasıyla yürütülmektedir.

Sosyal yardımların uygulamadaki başarısını görmek adına ilk adımda kapsama oranına ilişkin sonuçlara bakıldığında, Türkiye, Kazakistan ve Azerbaycan'ın nüfusun en yoksul %20'lik kesim üzerinde en yüksek kapsama oranına sahip olduğu görülmektedir. Bu kapsama oranı, nüfusun gelir düzeyi arttıkça kademeli olarak azalmaktadır. Fakat Azerbaycan ve Kazakistan'da en zengin %20'lik nüfus diliminde kapsam oranı, %24 ve %15'lik oranlarla diğer Türk devletlerine göre daha yüksek seyretmektedir. Sosyal yardımların türleri itibarıyla analizine ilişkin sonuca bakıldığında da benzer bir tablo ortaya çıkmaktadır. Nakit ve aynî transferler ile yaşlı aylığı ve diğer sosyal yardımların en zengin %20'lik nüfusu kapsama oranı en yüksek iki Türk devleti Azerbaycan ve Kazakistan'dır. Bu yüksek kapsama oranı, sosyal yardımların etkililiği üzerinde düşünülmesi gereken bir sorunu teşkil etmektedir.

Sosyal yardım programlarının hem en yoksul hanehalkını ekstrem yoksulluk eşiğinin üzerine çıkarmadaki başarısını hem de gelir eşitsizliğini ölçen önemli bir gösterge olan Gini katsayısı üzerinden değerlendirdiğimizde, Kazakistan en başarılı model olarak karşımıza çıkmaktadır. Kazakistan, en yoksul %20'lik nüfusun yoksulluk düzeyindeki iyileşmesini %27 ile sağlarken, aynı zamanda farklı sosyal yardım türlerinde hedeflemeyi bir arada kullanmaktadır. En yoksul kesimin durumunu iyileştirmede ve genel gelir eşitsizliğinin giderilmesinde Gini üzerinde olumlu etki yaratmada en az etkili iki ülkenin ise Azerbaycan ve Özbekistan olduğu görülmektedir. Türkiye bu noktada, Kazakistan'a benzer şekilde, farklı sosyal yardım türlerini bir arada uygulayarak sosyal yardımların etkililiğini artırmaya çalışmakta; ancak gerek en yoksul kesimin durumunu gerekse Gini katsayısını iyileştirmede orta sıralarda yer almaktadır. Analizde dikkate alınan yoksulluk eşiği sonucunda ortaya çıkan yoksulluk profillerine göre, farklı sosyal yardım türlerini bir arada uygulama başarısını gösteren Kazakistan ve Türkiye'nin diğer Türk Devletleri için model teşkil etmesi mümkündür.

Bu sonuçlar nezdinde tüm ülkeler için birinci öncelikli konunun sosyal yardımların hedeflenmiş şekilde uygulanması ve bu sayede etkinliğin ve etkililiğin artırılarak gerçek ihtiyaç sahiplerine yardımların ulaştırılmasını sağlamak olduğu görülmektedir. Fakat bu durum, mevcut sistemlerin bazı yardım türleri ve kapsama oranları dikkate alındığında, hedefe ulaşmada yetersiz kaldığını ve bu nedenle finans kaynaklarının israf edilme riskini ortaya koyduğunu göstermektedir. Sosyal yardım programları, bu hedef ve sorunlar dikkate alınarak, sık sık etki analizleri çerçevesinde gözden geçirilmeye tâbi tutulabilir.

Politikaların uygulanması esnasında hedeflemenin iyileştirilmesi için daha kapsamlı ve güncel bir veritabanının oluşturulması, yalnızca ASPIRE veritabanı gibi uluslararası

platformlar için değil, Türk Dünyası'nın kendi aralarında da gerçek ihtiyaç sahiplerini tespit etmesi adına önemli bir adım olacaktır. Buna destek olmak adına gelir testi uygulamalarının standart hale getirilmesi ve oluşturulacak yeni dijital platformların entegrasyonu da fayda sağlayacaktır.

Türk Devletleri'nin idari ve coğrafi yapısı dikkate alındığında, sosyal yardımların her haneye ulaşabilmesi önünde fiziksel zorlukların bulunduğu bir gerçektir. Bu açıdan, sosyal yardımların Özbekistan örneğindeki "mahalla" teşkilatlarına benzer hâlihazırda mevcut vakıflar ve yerel teşkilatlar aracılığıyla ulaştırılması için çalışmalar yürütülmelidir. Bu kapsamda, mobil sosyal yardım sağlayıcı birimlerin tüm Türk Devletleri'ni kapsayacak şekilde oluşturulması düşünülebilir.

Türk Dünyası ülkeleri için ortak bir sosyal yardım modelinin geliştirilmesi, "Türk Devletleri Teşkilâtı"nın faaliyetleri içinde yer alan "Aile ve Sosyal Konularda İşbirliği"ni hızlandırabilecek niteliktedir. Bu sayede Türk Dünyası'ndaki dayanışmayı artırıp yoksulluk ve gelir eşitsizliği ile mücadeleyi başarılı kılmak ve Türk Devletleri Teşkilâtı içerisinde hiç kimsenin sosyal yardımlardan mahrum kalmamasını sağlamak ancak böyle bir işbirliği sayesinde mümkün olabilecektir. Oluşturulacak ortak "Sosyal Güvenlik ve Yardım Teşkilatı" Türk Devletleri'nin ekonomik kalkınmasına da katkı sağlayacaktır.

Kaynaklar

ADB Asian Development Bank (2024), *Basic Statistics: Statistics and Data Innovation Unit*, Economic Research and Development Impact Department.

Agrawal, P. (2008), "Economic Growth and Poverty Reduction: Evidence from Kazakhstan", *Asian Development Review*, 24(2), 90-115.

Az Sosial (2024), <https://sosial.gov.az/fealiyyet/destek-istiqametleri/sosial-muavinet-teqaudler/sosial-muavinetler>, 23.10.2024.

AzSTAT (2024), <https://www.stat.gov.az/source/healthcare/>, 17.07.2024,

Barro, A. & E.C. Svante (2022), "Social Reforms in Kazakhstan", *Silk Road Paper*, Central Asia-Caucasus Institute & Silk Road Studies Program.

Brollo, F. et al. (2024), "Challenges Facing SSNs in Emerging and Developing Economies: An Illustration Using the World Bank's ASPIRE Database", IMF *Working Paper* No. 24/96.

Coudouel, A. & M. Sheila (2000), "Social Assistance in Uzbekistan", in: S. Hutton & G. Redmond (eds.), *Poverty in Transition Economies* (51-58), Routledge Studies of Societies in Transition.

Dobronogov, A. (2003), "Social Protection in Low-Income CIS Countries", *Lucerne Conference of the CIS-7 Initiative*.

DWCP (2016), *Decent Work Country Programme of the Republic of Azerbaijan for 2016-2020*, Republic of Azerbaijan, International Labour Organization.

Edes, B. (2011) *ADB and Social Protection Challenges and Opportunities*, Asian Development Bank.

Falkingham, J. (2004), "Inequality and Poverty in the CIS-7 Countries, 1989-2002", in: C.R. Shiells & S. Sattar (eds.), *The Low-Income Countries of the Commonwealth of Independent States: Progress and Challenges in Transition* (141-169), IMF, The World Bank.

Gassmann, F. (2018), "Social Assistance", in: S.W. Handayani (ed.), *Asia's Fiscal Challenge: Financing the Social Protection Agenda of the Sustainable Development Goals* (132-167), Asian Development Bank.

Grosh, M. et al. (2022), "Overview", in: M. Grosh et al. (eds.), *Revisiting Targeting in Social Assistance: A New Look at Old Dilemmas* (1-35), Washington, DC: World Bank.

Habibov, N.N. & F. Lida (2006), "Social Assistance and the Challenges of Poverty and Inequality in Azerbaijan, a low-income country in transition", *The Journal of Sociology & Social Welfare*, 33(1), 203-226.

ILO International Labour Organization (2003), "Decent Work: Integrated Approach to Social Sphere in Kazakhstan", The Republic of Kazakhstan: *Inception Report* on Targeted Social Assistance Scheme, ILO, UNDP Country Office in The Republic of Kazakhstan.

ILO Krg. (2023), *Kyrgyz Republic: Social Protection Profile*, International Labour Office, ILO.

Ismailakhunova, S. (2024), *Poverty & Equity Brief Kyrgyzstan*, World Bank Group, <https://databankfiles.worldbank.org/public/ddpext_download/poverty/987B9C90-CB9F-4D93-AE8C-750588BF00QA/current/Global_POVEQ_KGZ.pdf>, 15.09.2024.

ISSA Az. (2024), *ISSA Country Profiles: Azerbaijan*, International Social Security Association, <https://www.issa.int/node/195543?country=798>, 10.10.2024.

ISSA Krg. (2024), *ISSA Country Profiles: Kyrgyzstan*, International Social Security Association, <https://www.issa.int/node/195543?country=896>, 19.11.2024.

ISSA Kz. (2024), *ISSA Country Profiles: Kazakhstan*, International Social Security Association, <https://www.issa.int/node/195543?country=889>, 10.10.2024.

ISSA Uzb. (2024), *ISSA Country Profiles: Uzbekistan*, International Social Security Association, <https://www.issa.int/node/195543?country=1005>, 11.12.2024.

İpek, M. (2015), "Yeni Yoksulluk ve Türkiye'de Sosyal Yardım Paradoksu", *Karatahta İş Yazıları Dergisi*, 1, 77-104.

Kamp, M. (2004), "Between Women and the State: Mahalla Committees and Social Welfare in Uzbekistan", in: P. Jones Luong (ed.), *The Transformation of Central Asia: States and Societies from Soviet Rule to Independence* (29-58), Cornell University Press.

Kanbur, R. & N. Lustig (2001), "Poverty Attacking", *World Development Report 2000/2001*, World Bank Group.

Litvinova, V.V. et al. (2017), "Атлас индикаторов социальной защиты: возможности для межрегиональных сравнений (Atlas of Social Protection Indicators: Opportunities for Interregional Comparisons), *Financial Journal*, 33-45.

Maltseva, E. (2012), "Welfare Reforms in Post-Soviet States: A Comparison of Social Benefits Reform in Russia and Kazakhstan", *Dissertation*, University of Toronto.

Matthews, M. (1986), *Poverty in the Soviet Union The life-styles of the underprivileged in recent years*, Cambridge University Press.

Micklewright, J. & M. Sheila (2005), "Targeting social assistance in a transition economy: The Mahallas in Uzbekistan", *Social Policy & Administration*, 39(4), 431-447.

Nebiler, M. (2024), *Poverty & Equity Brief Kazakhstan*, World Bank Group, <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099062824104098455/p1746031177dea03f1a50a15909c3219622>, 12.09.2024.

OECD (2018), "Social protection coverage in Kyrgyzstan", in: *Social Protection System Review of Kyrgyzstan* (67-97), OECD Development Pathways, OECD Publishing, Paris.

Ortiz, I. et al. (2016), "Social Protection Floors, Volume 2: Innovations to Extend Coverage", International Labour Organization.

Pamuk, Ş. (2005), *Osmanlı-Türkiye İktisadi Tarihi 1500-1914*, İletişim Yayınları.

Papa, J. et al. (2020), "An assessment of the social protection system in Uzbekistan, based on the Core Diagnostic Instrument (CODI)", A *Joint Report* by ILO, UNICEF, and The World Bank, International Labour Organization.

Perova, E. (2024), *Poverty & Equity Brief Turkey*, World Bank Group, <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099850001032526747/idu14ac067bc1e7b4144b519a5e1b72a3c0adeaf>, 15.12.2024.

Qaz Stat. (2023), *Living Standards in Kazakhstan 2018-2022*, Agency for Strategic Planning and Reforms of The Republic of Kazakhstan Bureau of National Statistics Press, Astana.

Rahmanov, R. (2014), "Social Spending and Household Welfare: Evidence from Azerbaijan", Graduate Institute of International and Development Studies *Working Paper* No: 02/2014, The Graduate Institute, Geneva.

Rakymzhanova, S. et al. (2018), "Development of The Social Protection Funding Mechanisms in The Republic of Kazakhstan", *Revista Espacios*, 39(27), 31-39.

Rashidovna, G.K. (2023), "Developing a Comprehensive Social Security System in Uzbekistan: Challenges and Opportunities", *European Journal of Economics, Finance and Business Development*, 1(3), 42-47.

Shagazatova, M. (2012), "Republic of Uzbekistan: Updating and Improving the Social Protection Index", ADB Technical Assistance *Consultant's Report*, Asian Development Bank.

Solovyeva, A. (2023), "Social Safety Nets and Poverty in the Kyrgyz Republic", in: *Kyrgyz Republic: Selected Issues* (31-40), International Monetary Fund, Middle East and Central Asia Dept.

T.C. Aile ve Sosyal Hizmetler Bakanlığı (2024), <https://www.aile.tr/sygm/programlarimiz/sosyal-yardim-programlarimiz/>, Sosyal Yardımlar Genel Müdürlüğü Sosyal Yardım Programları, 12.11.2024.

Uochi, I. (2024), *Poverty & Equity Brief Uzbekistan*, World Bank Group, <https://documents.worldbank.org/pt/publication/documents-reports/documentdetail/099062824104017042/p1746031dfc05b0d31b699103096082711c>, 20.12.2024.

USATA (2019), *Uzbekistan Social Assistance Targeting Assessment*, Social Protection & Jobs Global Practice Europe and Central Asia Region.

World Bank (2024), *The World Bank Poverty and Inequality Platform*, <https://pip.worldbank.org/country-profiles/AZE>, 09.06.2024.

World Bank ASPIRE (2018), *The State of Social Safety Nets*, World Bank.

World Bank ASPIRE (2024), *World Bank Database*, <https://databank.worldbank.org/reports.aspx?source=1229>, 10.10.2024.

Yemtsov, R.G. et al. (2018), *Measuring the Effectiveness of Social Protection: Concepts and Applications*, Streamlined Analysis with ADePT Software series, Washington, DC: World Bank.

Yemtsov, R.G. et al. (2019), *Towards more effective social assistance in Russia: An update of the system performance considering new national target of halving poverty by 2024*, World Bank.

Zarazua, M.N. (2019), "Welfare and redistributive effects of social assistance in the Global South", WIDER *Working Paper* 2019/82, United Nations University Press.

Sosyoekonomi

2026, Vol. 34(70), 441-472

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.19
Date Submitted: 16.08.2025
Date Revised: 06.11.2025
Date Accepted: 09.09.2026

Orta Çağ Yahudilerinin Ekonomik Dönüşümü

Seda ÖZMEN *(https://orcid.org/0000-0002-9235-4476), Zonguldak Bülent Ecevit University, Türkiye; ozmenseda@beun.edu.tr*

The Economic Transformation of Medieval Jews

Abstract

In historical memory, medieval Jews have often been associated primarily with moneylending, and people have viewed their economic activities within this narrow framework. Yet Jewish communities were active in diverse fields, including agriculture, craftsmanship, and local and international trade. This study examines the shift from a production-based economy in the early Middle Ages to a credit-centred one in the later period, highlighting the role of growing Church pressure, the fiscal needs of secular authorities, expulsions, and property losses. While focusing on Western European Jewry, it also offers comparative insights into Jewish communities in the Islamic world and Byzantium, drawing on Geniza documents, responsa literature, and legal records.

Keywords : Middle Ages, Jewish, Usury, Interest, Economy.

JEL Classification Codes : B11, N13, N33, N43.

Öz

Orta Çağ Yahudileri, tarihsel hafızada çoğunlukla tefecilikle özdeşleştirilmiş; ekonomik faaliyetleri de bu dar çerçevede değerlendirilmiştir. Oysa Yahudi toplulukları tarımsal üretim, zanaatkârlık, yerel ve uluslararası ticaret gibi çok çeşitli alanlarda etkin olmuştur. Bu çalışma, erken Orta Çağ'daki üretime dayalı yapıdan geç Orta Çağ'da faiz merkezli ekonomiye yönelişi ele almakta; Kilise'nin artan baskıları, seküler otoritelerin mali ihtiyaçları, sürgünler ve mülkiyet kayıplarının bu dönüşümdeki rolünü incelemektedir. Batı Avrupa Yahudileri odakta olmakla birlikte, İslam dünyası ve Bizans'taki cemaatlere de karşılaştırmalı olarak değinilmekte, Geniza belgeleri, responsa literatürü ve hukukî kayıtlar kullanılmaktadır.

Anahtar Sözcükler : Orta Çağ, Yahudi, Tefecilik, Faiz, Ekonomi.

1. Giriş

Orta Çağ, Yahudi topluluklarının hem coğrafî hem de ekonomik açıdan büyük dönüşümler yaşadığı bir dönem olmuştur. Roma dünyasının çöküşüyle şekillenen yeni siyasal ve dinî düzen, Yahudilerin toplumsal konumlarını yeniden belirlemiş; Batı Avrupa'da artan Hristiyanlaştırma, Bizans'ta teolojik tartışmalar ve İslam dünyasında "zimmî" statüsü Yahudilerin ekonomik faaliyetlerini doğrudan etkilemiştir. Bu bağlamda Yahudiler, erken Orta Çağ boyunca tarım, zanaatkârlık ve yerel ticaret gibi faaliyetlerde bulunmuşlar; geç Orta Çağ'a gelindiğinde ise özellikle Batı Avrupa'da tefecilikle özdeşleşen bir ekonomik role evrilmişlerdir.

Yahudilerin Orta Çağ'daki ekonomik faaliyetleri, yaygın kanının aksine yalnızca tefecilikten ibaret olmayıp, tarım, zanaat, yerel ve uluslararası ticaret ile faizle borç verme gibi geniş bir yelpazeyi kapsamaktadır (Bkz. Tablo 1). Bu makale, söz konusu dönüşümün yalnızca dışsal baskılarla değil, aynı zamanda Yahudi hukuku ve rabbinik düşüncenin sağladığı içsel meşruiyetle de şekillendiğini ileri sürmektedir.

Tablo: 1
Orta Çağ Yahudi Ekonomisinin Kronolojik Gelişimi (7.-14. Yüzyıllar)

Dönem	Ekonomik Ağırlık Merkezi	Temel Faaliyet Alanları	Ticaret Ağı / Mal Akışı	Göç ve Yerleşim Dinamikleri
7.-9. yüzyıllar	Doğu Akdeniz - İslam Dünyası	Tarımsal üretim (zeytin, üzüm, keten), zanaat, yerel ticaret	Filistin, Mısır, Irak hattında iç pazar ağı	İslam fetihleriyle Yahudilerin Mısır, Kuzey Afrika ve Mezopotamya'ya yayılması
9.-11. yüzyıllar	Akdeniz ve Kızıldeniz rotaları	Uluslararası ticaret; değerli taş, kürk, baharat, köle, gümüş	Radhanî ağları: Fransa-Mısır-Basra-Orta Asya bağlantısı	Batı ve İslam dünyası arasında aracı tüccar sınıfının oluşumu
11.-12. yüzyıllar	İberya ve Güney Avrupa	Zanaatkârlık (dokuma, cam, boya, deri), panayır ticareti	Barselona, Toledo, Marsilya ve Napoli üzerinden Akdeniz ticareti	Kentleşmeyle birlikte liman ve pazar şehirlerine yoğun yerleşim
12.-13. yüzyıllar	Ren Havzası ve Orta Avrupa	Küçük ölçekli ticaret, kredi ve ipotekli borç işlemleri	Mainz, Regensburg, Speyer üzerinden kuzey iç ticareti	Feodal dışlanma sonucu kırsaldan şehirlere göç ve *kahal* örgütlenmesi
13.-14. yüzyıllar	Batı'dan Orta Doğu Avrupa'ya kayış	Tefecilik, rehincilik, para ticareti	İngiltere, Fransa, Almanya'dan Polonya ve Bohemya'ya sermaye transferi	Sürgünler (1290 İngiltere, 1306 Fransa) sonrası Doğu Avrupa'ya yerleşim

Yahudilerin ekonomik dönüşümü dinî, siyasî, toplumsal ve kültürel etkenlerin karşılıklı etkileşimiyle şekillenmiş çok boyutlu bir süreçtir. Bu dönüşüm, kimi zaman ekonomik ve siyasi baskılarla, kimi zaman dinî yorum farklılıklarıyla belirlenmiş; Yahudi topluluklarının hayatta kalma stratejileriyle birleşerek, Orta Çağ Avrupa'sında onlara özgü bir ekonomik profil yaratmıştır. Bu ekonomik dönüşümün Avrupa bağlamında daha iyi anlaşılabilmesi için, İslam dünyası ve Bizans'taki Yahudi cemaatlerine dair bazı karşılaştırmalı örnekler de sunulmuştur.

Bu çalışma dört ana başlık altında ele alınmıştır. İlk bölümde Yahudilerin erken Orta Çağ'daki tarımsal üretim faaliyetleri, toprak sahipliği ve kırsal yaşam içindeki rolleri ele alınmıştır. İkinci bölümde kentleşme ile birlikte gelişen zanaatkârlık ve yerel ticaret faaliyetleri hem İslam dünyasındaki hem de Avrupa'daki örneklerle sunulmuştur. Üçüncü bölüm, Yahudilerin uluslararası ticaretteki aracı rollerini ve Radhanîler gibi örnekleri tartışarak, Yahudilerin erken Orta Çağ'da küresel bağlamda nasıl etkin olduklarını ortaya koymuştur. Son bölümde ise Yahudilerin tefecilik faaliyetleri hem Kilise'nin baskıları hem

de rabbinik otoritenin içtihatları çerçevesinde ele alınmış; bu faaliyetin toplumsal sonuçları, siyasi otorite ile ilişkisi ve ekonomi içindeki işlevi incelenmiştir. Çalışma, birincil ve ikincil kaynaklara dayanarak Orta Çağ Yahudi toplumlarının ekonomik kimliğini tarihsel süreklilik ve dönüşüm ilkeleri çerçevesinde yeniden düşünmeyi amaçlamaktadır.

2. Yahudiler ve Tarımsal Faaliyetler

Yahudilikte tarım yalnızca ekonomik bir uğraş olarak değil, Tanrı ile yapılan ahdî ilişkinin temel bir göstergesi olarak da değerlendirilebilir. Tevrat'a göre Tanrı, İsrailoğullarına toprağı kalıcı mülk olarak değil, emanet olarak vermiştir; bu anlayış çerçevesinde toprağı işlemek, her yedinci yılda ona dinlenme hakkı tanımak, zekât ve bağış kurallarına uymak gibi uygulamalar Tanrı'nın koyduğu dini yükümlülükler arasında sayılır. Levililer 25:23'te geçen "Toprak benimdir; sizler yalnızca benim yanımda yabancılar ve konuklarsınız" ifadesi, mülkiyetin ilahi kökenine işaret eder. Aynı bağlamda, her yedinci yılın ürün toplama yasağıyla birlikte *şemita* (nadas) yılı olarak belirlenmesi[1] ve ürünlerin yoksullara bırakılmasının emredilmesi[2], tarımı yalnızca bir geçim aracı olmaktan çıkarıp ahlaki ve toplumsal bir sorumluluk alanı hâline getirir (Wilson, 1997: 29).

Talmud ve diğer klasik Yahudi kaynakları, Yahudi toplumunun geçimini büyük ölçüde tarıma dayandırdığı dönemleri yansıtan çok sayıda düzenleme içermektedir. Talmud dönemi bilginleri tarıma olumlu bakmakla birlikte, tarımla uğraşmanın Tora çalışmaya engel olabileceği korkusuyla 'tarımdan daha aşağı bir meslek yoktur' ya da 'toprak yalnızca güçlü pazulu adamlara verilmiştir' gibi veciz ifadeler ortaya koymuşlardır (Baron, 1971: 151). Buna rağmen Talmud, insanların toprak sahibi olmasını ve bu yolla kazanç elde etmesini doğrudan olumsuzlamamakta, hatta bazı ifadelerle bu faaliyeti desteklemektedir. Bu çelişkili durum, dönemin sosyal gerçekliğiyle dini idealler arasında var olan gerilimi yansıtmakla birlikte, farklı bağlamlarda dile getirilmiş ahlaki uyarılar olarak da okunabilir. Talmud, maddi zenginliğin bireyin Tanrı'ya karşı manevi sorumluluğunu gölgeleme ve dünyevileşmeye yol açma tehlikesi taşıdığına dikkat çeker. Bu riski dengelemek amacıyla tarımsal üretim ve toprak mülkiyetiyle ilgili çeşitli dinî düzenlemeler önerilir. Öte yandan, yoksulluk ve başkalarına muhtaç yaşamak da ideal bir durum olarak sunulmaz (Pesachim, 113a). Bu iki uç arasında adil ve sorumlu bir yaşam tarzının geliştirilmesi gerektiği vurgulanır. Bu çerçevede bazı din adamları çiftçiliği Tanrı'ya hizmetle eşdeğer bir faaliyet olarak görür. Özellikle *Erets Yisrael*'de (İsrail topraklarında) tarımla uğraşmak bir *mitsva* (ilahi emir) olarak değerlendirilir. "Tora yalnızca tarımın mümkün olduğu bir toplumda

---

[1] *"Altı yıl tarlanı ekeceksin, bağını budayacaksın, ürününü toplayacaksın. Ama yedinci yıl toprak dinlenecek. O yıl Şabat yılı olacak; Rab'be adanacak. Tarlanı ekmemeli, bağını budamamalısın." Levililer, 25:3-4.*

[2] *"Ülkenizdeki ekinleri biçerken tarlanızı sınırlarına kadar biçmeyeceksiniz. Artakalan başakları toplamayacaksınız. Bağbozumunda bağınızı tamamen devşirmeyeceksiniz, yere düşen üzümleri toplamayacaksınız. Onları yoksullara ve yabancılara bırakacaksınız." Levililer, 19: 9-10. "Üçüncü yıl, ondalığı verme yılı; bütün ürününüzün ondalığını bir yana ayırın. Ayırma işini bitirdiğinizde, ondalığı Levililere, yabancılara, öksüzlere ve dul kadınlara vereceksiniz. Öyle ki, onlar da kentlerinizde yiyip doysunlar." Yasanın Tekrarı, 26:12.*

yaşatılabilir" (Berakhot, 35b:10) anlayışı, tarımı yalnızca ekonomik bir etkinlik olmaktan çıkarır; onu aynı zamanda dini sürekliliğin ve toplumsal istikrarın temel koşulu haline getirir.

İsrail Krallığı'nın yıkılmasıyla birlikte Kudüs merkezli Yahudi yaşamı sona ermiş ve Yahudiler diasporaya dağılmıştır. Bu yeni tarihsel bağlamda, özellikle 7. ila 11. yüzyıllar boyunca etkin olan Geonim, Talmud merkezli dini otoriteleriyle başta İslam dünyası olmak üzere çeşitli Yahudi cemaatlerine rehberlik etmiştir. Bu dönemde şekillenen responsa literatürü[3], farklı coğrafyalarda yaşayan Yahudilerin karşılaştığı yeni sosyoekonomik sorunlara yanıt sunmayı amaçlamıştır. Diğer ekonomik faaliyetler gibi tarımsal faaliyetler de bu yanıtların bir parçası hâline gelmiştir. Geonim dönemine ait kaynaklar, Yahudi cemaatlerinin İslam topraklarında ve kısmen Bizans'ta, daha sınırlı ölçüde ise Hristiyan Avrupa'da tarımla meşgul olmaya devam ettiğini göstermektedir (Gamoran, 2008: 39-40).

7. yüzyılda İslam'ın yayılmasıyla Yahudiler geniş bir coğrafyada "zimmî" statüsü altında yaşamlarını sürdürmüşlerdir. Bu statü, onlara ibadet özgürlüğü tanırken, cizye (baş vergisi) ve haraç (toprak vergisi) karşılığında sınırlı bir özerklik de sağlamıştır. Bu çerçevede Yahudiler Mısır, Filistin ve Mezopotamya gibi bölgelerde zeytin yetiştiriciliği, bağcılık, tahıl üretimi ve arıcılık gibi tarımsal faaliyetlerini sürdürmüşlerdir. Geniza belgeleri çoğunlukla Akdeniz ticaretine odaklansa da, Yahudi toplumunun tarımsal üretime katkılarını da açıkça yansıtmaktadır. Bu belgelerin ışığında, Yahudilerin tarıma yalnızca geçimlik değil, aynı zamanda bir yatırım alanı olarak yaklaştıkları görülmektedir. Filistin, Mısır ve Suriye'de tarlalar, bağlar, bostanlar ve meyve bahçeleri üzerinde mülkiyet hakkı bulunan Yahudiler, bu arazileri sıklıkla Müslüman ortaklar ya da kiracılar aracılığıyla işletmişlerdir. Tarım, yalnızca küçük üreticilerin değil, zengin Yahudilerin de ilgi alanına girmiş; tarım arazileri, vasiyetlerde miras konusu olmuş ve değerli taş ticareti gibi diğer alanlarla birlikte ortaklık şeklinde değerlendirilmiştir (Goitein, 1999: 116-127).

Tahıl üretimi, özellikle buğday ve arpa, temel gıda maddesi olmanın yanı sıra vergi, maaş ve borç ödemelerinde de kullanılmıştır. Susam ve keten gibi yağlı tohumlar hem iç tüketimde hem de dış ticarette önem taşımıştır. Bal ve balmumu üretimi ise arıcılıkla birlikte gıda ve aydınlatma ihtiyaçlarını karşılayan başlıca kalemler arasında yer almıştır. Zeytin yetiştiriciliği Mısır'da sınırlı olsa da Suriye ve Filistin'den ithal edilen zeytinyağı hem beslenmede hem de aydınlatmada kullanılmış; zeytinyağı üreticiliği Yahudiler arasında yaygınlaşmıştır. Meyvecilik faaliyetleri kapsamında hurma, incir, nar, keçiboynuzu, muz, karpuz ve çeşitli kuruyemiş türleri öne çıkmıştır. Yahudiler bu alanlarda hem üretici hem de tüccar olarak etkin olmuş; bazı meyve bahçeleri vakıf statüsünde cemaat yararına tahsis edilmiştir. Bağcılık ise şarap üretimiyle doğrudan bağlantılıdır (Goitein, 1999: 116-127).

---

[3] *Responsa literatürü, Geonim (yani Geonlar) döneminde özellikle Babil dışındaki Yahudi topluluklarının teolojik ve pratik sorunlarını çözmek amacıyla Babil'deki akademilere yönelttikleri sorulara verilen yazılı yanıtlardan oluşur. Bu külliyat, sözlü geleneğin yazıya geçirilmesinde ve Babil Talmudu'nun tüm Yahudi dünyasında otorite haline gelmesinde belirleyici bir rol oynamıştır. Cevaplar genellikle akademi bünyesindeki âlimlerin ortak değerlendirmesiyle oluşturulmuş; içerik bakımından kısa yanıtlar kadar kapsamlı açıklamalara da yer verilmiştir. Günümüze özellikle Kahire Genizası aracılığıyla ulaşan bu metinler, Geonlar'ın kurumsal görüşünü yansıtan erken dönem yazılı kaynaklar arasında yer alır (Ta-Shma, 2007: 228-231).*

Dini kurallar gereği, şarap yalnızca Yahudiler tarafından üretilebildiğinden, üzüm sıkan Yahudi işçiler belgelerde sıkça anılmaktadır[4]. Bağlar, İslam hukukuna göre çoğunlukla devlet mülkiyetindeyken, Endülüs gibi bazı bölgelerde özel mülkiyete konu olmuş ve ayrıntılı hukuki belgelerle işlem görmüştür. Tavuk yetiştiriciliği gibi hayvancılık da Yahudi ekonomik faaliyetlerinin önemli bir parçasını oluşturmakla birlikte, Şabat kısıtlamaları hayvancılık faaliyetlerinin çoğu zaman Müslüman ortaklarla yürütülmesine neden olmuştur[5].

Erken Orta Çağ'daki responsa literatürü ve bazı Avrupa kentlerine ait kayıtlar, Yahudilerin sahip oldukları taşınmazlar, bunlardan elde ettikleri gelirler, karşılığında ödedikleri vergiler ve miras işlemleri gibi hususlara ilişkin bilgi vermektedir. Bu, İslam dünyasındaki kadar yoğun olmasa da Avrupa'da özellikle İspanya, İtalya, Güney ve Orta Fransa ile Almanya'da Yahudi tarımsal faaliyetlerin yadsınamayacak derecede varlık gösterdiğini düşündürmektedir. Orta Çağ'ın ilk yüzyıllarından itibaren bu faaliyetlerin en yoğun şekilde belgelenebildiği bölge Almanya'dır. Narbonne'da Yahudilere ait toprak mülkiyetinden söz edilen[6] İmparator Şarlman (hs. 768-814) döneminden itibaren, 10. yüzyılda hâlâ köylerde yaşayan ve toprak vergisi ödeyen Fransız Yahudileri ile birlikte, Yahudilerin Doğu Frank Krallığı'na doğru genişleyen bir kırsal varlık gösterdiği görülmektedir (Aronius, 1902: 24-25). 945 yılında Metz yakınlarında bir Yahudi bağ sahibinden[7], 981 yılında ise Schierstadt'ta bir Yahudi mülk sahibinden söz edilmiştir[8]. Me'or Hagolah (sürgünün ışığı) unvanıyla bilinen Gershom ben Judah (ö.1028-1040?), Rashi

---

[4] *Libasyon şarabından herhangi bir fayda sağlamak yasaktır; zira bu tür şarap "putperest bir sunu" olarak kabul edilir. Bu nedenle bir Yahudi bu şarabı düşük bir bedelle bile olsa satamaz; zira karşılığında bir değer elde etmiş olur ve ondan faydalanmış olur. Bir Yahudi bu şarabı bir putpereste (Yahudi olmayan birine) hediye dahi edemez; çünkü alıcının minnettarlığı dolayısıyla dolaylı bir fayda doğar. Dolayısıyla, bu tür bir şarap için önerilen tek çözüm, onu "Ölü Deniz'e atmak", yani imha etmektir (Soloveitchik, 2024: 18). Ancak 14. yüzyıla gelindiğinde bu katı yasağın uygulanabilirliği fiilen ortadan kalkmıştır. Yahudi bilgin Alexander Suslin (ö.1349) dönemin Yahudi olmayanlarının putperestlikten bihaber olduğunu belirterek, onların dokunduğu şarabın yasak kapsamında değerlendirilmemesi gerektiğini ifade eder. Bu yaklaşım, söz konusu yasağın tarihsel koşullar doğrultusunda gevşetildiğini ve halakhik normların toplumsal ve ekonomik pratiklerle uyumlu hâle getirilmeye çalışıldığını göstermektedir (Hoffmann, 1910: 235).*

[5] *Benzer şekilde, Şabat günü tarlanın bakımı için Yahudi olmayanlarla yapılan ortaklıklarla ilgili responsalarda pek çok soru ve tartışmaya rastlanmaktadır (Gil, 2003: 280-281).*

[6] *Bu konuda bilinen en erken ve aynı zamanda en kapsamlı kayıt, Papa III. Stephanus'un Narbonne Başpiskoposu'na ve Septimanya ile Hispania'daki tüm yöneticilere gönderdiği bir mektuptur. Bu mektup, Şarlman'ın hükümdarlığının ilk yıllarına, 768-772 tarihleri arasına tarihlenmektedir ve şu ifadeleri içermektedir: "Bu nedenle, Frank krallarının bazı fermanları (praecepta) nedeniyle Yahudi halkının (plebs Judaica), Hristiyan sakinler gibi, köylerde ve şehir dışı mülklerde kalıtsal topraklara (allodia) sahip olduğunu; Hristiyan erkeklerin onların bağlarını ve tarlalarını işlediğini; şehir içinde ve dışında onlarla birlikte yaşayan Hristiyan erkek ve kadınların gece gündüz küfür sözleriyle kirletildiklerini ve zavallı erkek ve kadınların adı geçen köpeklere kesintisiz biçimde akla gelebilecek her türlü hizmeti sunduklarını bize bildirdiğinizde, üzüldük ve büyük bir sıkıntı duyduk" (Toch, 2013: 79-80).*

[7] *"Metz'deki bir manastıra ait mülkler arasında, daha önce Yahudi olan David'in sahip olduğu bir bağ bulunmaktadır. Bu bağdan 30 fıçı (oxhoft) şarap elde edilmektedir (Aronius, 1902: 55).*

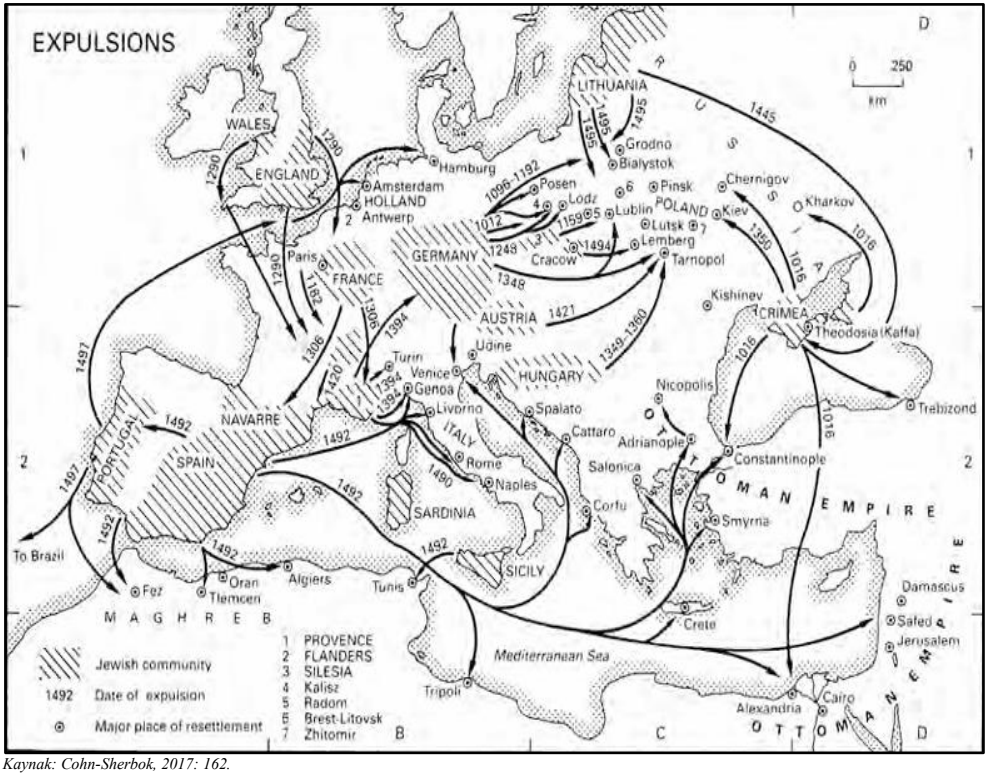
[8] *"İmparator II. Otto, Regensburg'un banliyösü olan Nordgau'daki Heinrich'in kontluğu içinde yer alan Schierstadt mülkünü, tüm müştemilatıyla birlikte, daha önce aynı mülkü imparatorun izniyle Yahudi Samuel'den satın almış olan St. Emmeram Manastırı'na devretmektedir" (Aronius, 1902: 57).*

olarak bilinen Salomo ben Isaak (ö.1105) ve Meshullam ben Jacob (ö. 11/12.yüzyıl) gibi önemli Talmudistlerin responsalarında bağ ve tarla sahibi Yahudiler anılırken, kadınların da ev ve arsa getirdiği veya bağımsız mülk sahibi oldukları dikkat çekmektedir (Hoffmann, 1910: 142-150). İmparator IV. Heinrich'in (hs. 1084-1105) Speyerli üç Yahudi'nin mülkleri üzerindeki haklarını tanıyan emri, bu hukuki durumun resmî düzeyde de kabul edildiğini göstermektedir (Aronius, 1902: 71-77).

11. Yüzyıl sonlarına ait örnekler arasında, bir Yahudi'nin tarlasını gayrimüslim bir şahsa rehin verdiğini gösteren bir belge de yer almaktadır. Aşkenaz Yahudilerinin rehberi niteliğindeki *Sefer Hasidim* (Dindarların Kitabı) gibi kaynaklarda, tarlaların getirisinden geçinmek mümkünse faizle iş yapılmasının yasak olduğu belirtilmiştir; bu da o dönemde Yahudilerin tarımsal faaliyetlerini sürdürdüğüne işaret etmektedir. Mainz'lı bir hahamın verdiği fetva da Yahudilerin toprak sahibi olduğunu doğrulamaktadır. 12. Yüzyılda Silezya'daki geniş Yahudi toprak mülkiyeti vakaları da bu tabloyu desteklemektedir (Hoffmann, 1910: 3-5).

Orta Çağ boyunca Yahudiler, sıklıkla para işlemleri sayesinde köyler ve derebeylikleri dahil birçok taşınmazı ipotekli olarak ellerinde tutmuş, bu geçici mülkiyet çoğu kez kalıcı hale gelmiştir. Ancak bu mülklerden çoğu zaman yalnızca gelir elde etmişler ve bizzat üretim sürecine katılmamışlardır. Zamanla ipotekli taşınmazların doğurduğu sorunlar nedeniyle bu tür varlıkları elden çıkarmaya yönelmişlerdir. Hukuki statülerinin kırılganlığı, mülklere el koyma, sürgün ve şiddet gibi tehditler karşısında mülklerini taşınabilir hale getirme ihtiyacı doğmuştur (Bkz. Harita: 1). Kilise ise özellikle ondalık vergisinin ödenmemesi endişesiyle Yahudi toprak mülkiyetine karşı çıkmış; çeşitli konsil kararlarında Yahudi toprak sahiplerinin de bu vergilere tabi olması gerektiği vurgulanmıştır. IV. Lateran Konsili'nin (1215) 67. Kanonu bu vergiyi kalıcı ve evrensel bir temele oturtmaya çalışmıştır (Tanner, 1990: 265-266). Kırsal mülkiyete erişim sınırlı kalsa da, Yahudiler şehirlerde daha yoğun şekilde mülk edinmiş, getto uygulamasının yaygınlaşmadığı bu erken dönemde oturdukları evlerin mülkiyetine genellikle sahip olmuşlardır. Ancak 14. yüzyılın başlarından itibaren, Yahudilerin şehir toprağına sahip olmalarını sınırlayan düzenlemeler artmaya başlamıştır.

Harita: 1
Yahudi Sürgünleri



Kaynak: Cohn-Sherbok, 2017: 162.

Yahudilerin toprak mülkiyetinden uzaklaşma süreci, sosyoekonomik ve siyasal birçok etkenin kesiştiği karmaşık bir dönüşüm yapısını yansıtmaktadır. Feodal olmayan toprak mülkiyeti rejimlerinin çözülmesiyle birlikte Yahudiler kırsaldan kente itilmiş; mülklerinden mahrum bırakılarak mali faaliyetleriyle öne çıkan bir kimliğe bürünmüşlerdir. Yahudilerin sunduğu hizmetler başlangıçta takdir toplamış, ancak yerel halk bu teknikleri benimsedikten sonra Yahudiler hızla göz ardı edilmiştir. Yahudiler, faaliyetlerinin feodal düzenle bağdaşmaması nedeniyle dışlanmaya mahkûm olmuştur. Zira o dönemde toprak yalnızca bir üretim kaynağı değil, aynı zamanda siyasal iktidarın da temelini oluşturmaktaydı. Toprağa sahip olmak, belirli sayıda serfi denetim altında tutmayı ve hatta asil vassalların sadakatini kazanmayı beraberinde getiriyordu. Bu tür bir toplumsal yapıya Yahudilerin dâhil edilmesi mümkün değildi. Karolenj döneminden itibaren standartlaşan ve açıkça Hristiyan inancına dair unsurlar barındıran sadakat yeminlerini Yahudilerin etmesi kabul edilebilir bir durum değildi. Ayrıca Yahudilerin Hristiyan köylüler veya onlara bağlı soylular üzerinde otorite kurmaları da toplumsal düzen açısından istenmeyen bir durumdu (Baron, 1971: 163). Fransız ilahiyatçı Peter Abelard'ın (ö.1142) (1979: 33) kaleme aldığı

bir diyalogda Yahudi karakterin sözleri Yahudilerin mülk edinme hakkının pratikte nasıl geçersiz hâle geldiğini açıkça ortaya koymaktadır:

> *Ne tarlalara ne bağlara ne de herhangi bir taşınmaz mülke sahip olmamıza izin verilmektedir; zira bunları açık ya da gizli saldırılardan koruyacak kimse yoktur. Bu nedenle elimizde kalan yegâne kazanç kapısı, yabancılara faizle borç vererek bu sefil hayatımızı burada sürdürmeye çalışmaktır; ancak bu da bizi baskı altında kaldıklarını düşünenler nezdinde en nefret edilen kimseler hâline getirmektedir.*

Sonuç olarak, İtalya, Fransa ve Almanya'da daha erken, İspanya'da ise daha geç olmak üzere Yahudiler toprak mülkiyetinden kademeli biçimde çekilmişlerdir. Ancak bu durum, ilerleyen yüzyıllarda tarımsal faaliyetlerden bütünüyle vazgeçtikleri anlamına gelmemektedir. Toprağa bağlı bir üretim biçiminden ziyade, dönemin siyasi ve ekonomik konjonktürüne göre şekillenen bir girişimcilik ruhu, Yahudilerin tarımla bağlarını tamamen koparmadıklarını; yalnızca faaliyet biçimlerinin dönüşüm geçirdiğini göstermektedir. Bu sürecin sonucunda Yahudiler kırsal üretimden kent merkezli iktisadi faaliyetlere yönelmişlerdir.

3. Yahudiler ve Kentsel Meslekler

İslam dünyasında Yahudiler sanayi üretiminin ve kentsel zanaat yaşamının birçok alanında hem işçi hem de girişimci olarak yer almışlardır. Müslüman şehirlerde tarımsal üretime bağlı olarak gelişen sanayilerde, örneğin un değirmenleri, şarap presleri, iplik eğirme ve dokuma atölyeleri gibi, Yahudiler aktif bir biçimde çalışmaktaydılar; kimi zaman kendi lonca benzeri birlikleri içinde organize olurlardı. Örneğin, İslam coğrafyacısı Mukaddesî (ö.300/1000) (2015: 196) Suriye'deki boyacıların, sarrafların ve tabakçıların büyük çoğunluğunu Yahudilerin oluşturduğunu aktarmaktadır.

Şarap tüketiminin İslam hukuku gereği yasak olması, Yahudilerin bağcılık ve buna bağlı üretim süreçlerinde daha belirgin bir rol üstlenmelerine neden olmuştur. Bununla birlikte cam üretimi, deri tabaklama, boyacılık, ciltçilik ve kasaplık gibi zanaat alanlarında da Yahudi emeğinin yoğun olduğu görülmektedir. Bu mesleklerdeki varlıkları, hem dini ritüellere (örneğin kaşer[9] kurallarına uygun cam kap kullanımı) hem de zamanla oluşan teknik uzmanlığa dayanmaktaydı. Geniza belgeleri Yahudilerin aynı zamanda temel gıda üretimi alanlarında, özellikle fırıncılık ve kasaplıkta, çalıştıklarını da belgelemektedir. Artan lüks tüketim ihtiyacına bağlı olarak dokuma ürünlerine olan talep Yahudilerin bu alanda da faaliyet göstermesini sağlamıştır. Halı, keten ve ipek dokumaları ile altın tel nakışı gibi yüksek vasıf gerektiren işlerde Yahudi zanaatkârlar öne çıkmıştır. İslam coğrafyacılarından İbni Havkal (4/10. yüzyıl) (2017: 76) Kayravan cihetinde çok sayıda Yahudi yaşadığını, ipek imal edildiğini ve palamutla deri tabaklandığını aktarmaktadır. Yahudiler kuyumculuk ve

[9] *Aşkenaz (Doğu Avrupalı) Yahudileri tarafından kullanılan Koşer, Sefarad (İspanyol/Akdeniz kökenli) Yahudileri tarafından Kaşer şeklinde telaffuz edilmektedir.*

süs eşyası yapımında da faaldi. Altın ve gümüş işçiliği sadece bir zanaat değil, aynı zamanda servetin korunması aracı olarak da işlev görüyordu (Arkin, 2002: 52).

Yahudilerin tamamen dışlandığı bir zanaat kolu bulmak oldukça zordur. Çin'den Semerkant'a ithal edildikten sonra Müslüman ve Hristiyan ülkeler boyunca yayılmaya başlayan kâğıt üretimi gibi yeni sanayi dallarında bile Yahudilerin belirli bir rol oynadığı görülmektedir. Doğu Akdeniz'de kâğıt üretiminin bir dönem için başlıca merkezi olan Taberiye şehrinin burada tesadüfen yer almadığı açıktır. Kutsal Kitap öğreniminin eski merkezlerinden biri olan bu şehir, büyük olasılıkla Filistin ve Suriye'de giderek daha nadir ve pahalı hâle gelen Mısır papirüsü ya da benzer derecede maliyetli parşömen yerine bu daha ucuz yazı materyalini kullanmanın avantajlarını ilk fark eden yer olmuştur. Bu sanayi alanındaki ilerlemenin Araplar, Yahudiler ve hem Doğulu hem de Batılı Hristiyanlar nezdinde edebî üretimi ne kadar etkilediğini tahmin etmek güç değildir. 10. ila 12. yüzyıllar arasında yaşanan bu yeni sanayi üretimiyle edebî devrim arasında yalnızca kronolojik bir çakışmadan fazlası söz konusudur (Baron, 1971: 169).

Geniza kayıtları bir iş kolundan diğerine geçişin, hatta toplumsal hareketliliğin oldukça yaygın olduğunu göstermektedir. Balıkçının oğlu doktor olabiliyor; çömlekçi baharat tüccarına dönüşebiliyordu. Bu yönüyle Orta Çağ İslam toplumları Yahudi bireyler için doğuştan gelen statüye bağlı kalmaksızın ekonomik ilerleme ve mesleki yükselme imkânları sunan bir zemin oluşturmuştur (Arkin, 2002: 55).

Bizans İmparatorluğu, Yahudilerin zanaat ve sanayi üretiminde etkin olduğu bir diğer bölgeydi. Yahudi nüfusunun Makedonya, Teselya ve Trakya bölgeleri başta olmak üzere, başkent Konstantinopolis ve Thebai kentlerinde yoğunlaştığı düşünülmektedir. 6. Yüzyıl gibi erken bir dönemde Yahudilerin başkentte Halkoprateia (balık pazarı) olarak anılacak derecede kentin içinde yer aldığı görülürken 12. Yüzyılda şehri ziyaret eden Tudelalı Benjamin'in de (2001: 43) gözlemlediği gibi, Yahudiler şehirden uzak bir yere yerleştirilmiştir. Yine de şehrin bakır ve pirinç endüstrisinde önemli roller oynamaya devam etmişlerdir (Arkin, 2002: 38).

Dini açıdan kaşer kuralları yalnızca tüketim pratiklerini değil, aynı zamanda Yahudilerin üretim ve işleme süreçlerini de şekillendirmiştir. Bu durum, onları hem Yahudi cemaatine özgü kapalı bir ekonomik ağa yöneltmiş hem de zanaatkârlık alanlarında uzmanlaşmalarına yol açmıştır. Örneğin, Canea ve Rethymno gibi Girit şehirlerinde kaşer şarap ve peynirin hem özel tüketim hem de perakende satış amacıyla işlendiği belgelenmiştir. Ayrıca, üretim kapasiteleri Yahudi tüketimini aşan girişimci bireylerin kaşer şarap ve peyniri dış pazarlara -özellikle Konstantinopolis, İskenderiye, Rodos ve Kıbrıs gibi limanlara- ihraç ettikleri anlaşılmaktadır (Jacoby, 2008: 26-32).

Bizans başkenti Konstantinopolis'in Vlanga semtinde, özellikle 13. ve 14. yüzyıllarda Yahudi tabakçılar hem imparatorluk hem de Venedik ile entegre şekilde faaliyet göstermekteydi. Kontoskalion Limanı'na yakınlık, tabaklama işleminin coğrafi olarak uygun bir ortamda gerçekleştirilmesini sağlıyordu. Girit'teki Candia ve Modon gibi Venedik

idaresindeki liman şehirlerinde de Yahudi tabakçılar vardı. Ritüel kesimden elde edilen deriler hem Yahudi kasaplar aracılığıyla temin edilmekte hem de Hristiyanlardan satın alınmaktaydı. Bu deri ürünleri, ayakkabıcılık gibi zanaat dallarında Yahudi zanaatkârlar tarafından işleniyordu. Yahudilerin tabakçılıkla meşgul olduğunu göstermesi bakımından Başpiskopos Chonaili Niketas'ın "Yahudiler ikamet ettikleri yerlerden kovulmuşlar ve aç, deri kemiren köpekler gibi şehirlerde dolanarak eski elbiseleri boyayan ve tabaklayan kişiler olmuşlardır" sözü örnek verilebilir (Baron, 1971: 166). 14. Yüzyılda Candia ve Canea'da çok sayıda Yahudi ayakkabıcının faaliyet gösterdiği, duvarcılık gibi inşaat işlerinde Hristiyan ortaklarla iş birliği yaptığı kaydedilmiştir.

Şehirlerde ipek endüstrisi, devlete bağlı loncalar tarafından sıkı biçimde denetleniyordu. İpek üretimi, Thebai, Negroponte ve Andros gibi bölgelerde Yahudi bireylerin katıldığı bir zanaat dalıydı. Tudelalı Benjamin (2001: 39) Thebai'deki Yahudilerin ipek sektörüne ister dokumacı ister terzi olarak katılımından özellikle etkilenmiştir: "Korint'ten iki günlük bir yolculukla Tebes'e (Tep/Tebes) ulaşırsınız. Tebes'te 200 kadar Yahudi yaşamaktadır. Bütün Rum ülkesinde ipek ve erguvani giysi imalatının en mahir sanatkârları bu Yahudilerdir." İstanbul'da Latin işgali sonrası ipek üretimi zayıflasa da bazı Yahudilerin bilgi ve becerilerini Ege adalarına taşıdıkları gözlemlenmektedir. Candia'da ev içi ipek işçiliği yapan kadınlar küçük parçalar üretirken, daha büyük ölçekli dokuma işleri de belgelenmiştir. Sakız Adası'nda ipek ticareti ve boyama atölyeleri gibi faaliyetler 14. ve 15. yüzyıllarda kayıt altına alınmıştır (Jacoby, 2008: 36). Yine Sakız Adası'nda hançer ve gemi yapımı gibi alanlara da katıldıkları belgelenmiştir. Bu üretim alanları, Yahudi cemaatlerinin yalnızca kendi iç ihtiyaçlarına değil, aynı zamanda yerel pazarın genel taleplerine de cevap verdiğini göstermektedir.

Yahudiler lonca sistemlerinin dışlayıcı uygulamalarıyla henüz karşı karşıya kalmamışlardı. Batı Avrupa'da ilerleyen yüzyıllarda Yahudileri açıkça dışlayan lonca örgütlenmeleri henüz gelişiminin ilk aşamalarındaydı ve Yahudi zanaatkârlığı üzerinde ciddi kısıtlamalar yaratmamıştı. Buna karşın ne İslam dünyasında ne de Bizans İmparatorluğu'nda loncaların Yahudilere karşı Batı'daki gibi sistematik ayrımcı uygulamalara başvurduğu görülmemektedir (Arkin, 2002: 56).

Avrupa'da Yahudi zanaatkârların faaliyetleri bölgesel ve kronolojik olarak büyük farklılıklar göstermektedir. Hristiyan ve Yahudi toplumlara ait çeşitli türdeki kayıtlar daha çok mülkiyet ve ticari işlemlerle ilgili olduğundan, küçük ölçekli zanaat faaliyetlerinin izini sürmek oldukça güçtür. Var olan kayıtların Yahudilerin daha aktif olduğu, Bizans ve İslam dünyasının ilişkide olduğu, İspanya ve Güney İtalya gibi sanayinin ticarete eşlik ettiği bölgelerden gelmesi şaşırtıcı değildir. Buradaki ticaretin bir sonucu olarak, Yahudilerin tekstil, boyacılık, camcılık, metalürji ve buna bağlı birçok iş dalında yer aldığı görülmektedir (Abulafia: 2008: 49-51). Örneğin 1129 yılında Gaeta'da bir Yahudi boyahane tesisi kaydedilmiş ve yaklaşık aynı zamanda Brindisi'yi ziyaret eden Tudelalı Benjamin, burada yaşayan on Yahudi'nin de kumaş boyacılığı yaptığını yazmıştır (Tudelalı Benjamin & Ratisbonlu Petachia, 2001: 29).

Bazı idareciler bu doğal sürece müdahalede bulunarak zanaatkâr Yahudilerin işlerinin Avrupa'da daha görünür hale gelmesini sağlamıştır. Bu bağlamda II. Friedrich'in Sicilya ve Napoli'de boyacılık ve ipek üretimi alanlarında resmî devlet tekelini kurmak üzere Yahudi ustalarla anlaşma yapmış olması şaşırtıcı değildir. Friedrich'in bu girişimleri 13. yüzyıla aittir, ancak bu yöndeki ilk adımlar 1147 gibi erken bir tarihte atılmıştı; zira o yıl II. Roger, Balkanlar'daki ipek sanayisinin merkezi olan Bizans'ın Thebai (Thebes) kentine saldırmış ve Yahudilerle birlikte birçok Hristiyanı da Güney İtalya'ya zorla götürmüştü (Baron, 1971: 168).

Aşkenaz bölgelerinde Yahudi zanaatkârlığı çok daha geç ve daha seyrek görünmeye başlar. 11. Yüzyılda iç ihtiyaçlar için çalışan zanaatkârlardan söz edilirken, 12. ve 13. yüzyıllarda Yahudi ve Yahudi olmayan müşterilere hizmet eden daha belirgin örnekler ortaya çıkmıştır. Ancak bilgi eksikliği, bu döneme dair net bir tablo oluşturmayı zorlaştırmaktadır. Buna karşın, Fransa'daki Yahudilerin 'Yahudi camı' olarak bilinen bir çeşit cam üretiminde bulunduklarına ve un değirmenlerini ve büyük ölçekli tuz ocaklarını işletmekte olduklarına dair bilgiler mevcuttur. Benzer şekilde Almanya'da da Yahudilerin işlettiği bir tuz madeninden bahsedilmektedir. Müslüman ülkelerde değerli veya diğer madenlerin çok daha büyük ölçekte işletilmesinde rol alan Yahudilerin burada da aynı şeyi yapması şaşırtıcı değildir. Yahudilerin kuyumculukta yaygın biçimde kullanılan değerli taşların çıkarıldığı çok sayıdaki taş ocağında ya yönetici ya da işçi olarak yer almamış olmaları düşünülemez. Ne var ki, Yahudi kuyumcu yahut altın ve gümüş ustaları hakkında çok az bilgi vardır. İngiltere Kralı John'un 1199'da 'kuyumcumuz' dediği Yahudi Leo'ya özel bir koruma ve vergi muafiyeti sağlamasından, İngiltere'deki Yahudilerin de aynı işi yaptıklarını düşündürmektedir. Marangozlar, duvar ustaları ve inşaat ile mobilya sektörlerinde çalışan diğer Yahudi işçiler hakkında da yeterli bilgi bulunmamakla birlikte İberya'daki Yahudilerin Hristiyan hükümdarlar adına inşaat müteahhitliği yaptıkları, halk hamamları, değirmenleri ve zeytinyağı preslerini işlettikleri bilinmektedir (Baron, 1971: 168-170; Toch, 2013: 232).

Hekimlik, İslam dünyasından Avrupa'ya Yahudiler arasında yaygın olarak görülen prestijli bir meslek olmuştur. Erken dönemden itibaren Yahudi doktorlar hem piskoposlar hem de krallar tarafından tercih edilmiştir. Karolenj döneminden itibaren Latince kaynaklarda Yahudi hekimler sıklıkla görünmeye başlamış, hatta edebî anlatılarda yahut polemik metinlerinde "katil doktor" imgesine bile dönüşmüştür. Musa bin Meymun (ö.1204) ve Hasday ibn Şaprut (ö.965) gibi isimler, Yahudi hekimliğinin hem yönetici sınıfla kurduğu yakın ilişkiyi hem de toplum içindeki etkisini gözler önüne sermektedir. Ancak Kuzey Avrupa'da Yahudi doktorlar, Hristiyan muadilleriyle aynı itibara sahip olmamış; metinlerde doktorlara dair göndermeler, daha çok muskacılık ve küçük tedavi uygulamalarıyla sınırlı kalmıştır. Geç Orta Çağ'da ise şifacılar, cerrahlar, diş ve göz hastalıklarında uzmanlar, eczacılar ve ebelik yapan kadınlar dahil olmak üzere çok daha çeşitli bir sağlık uygulayıcıları grubu Yahudi toplumu içinde görünür hâle gelmiştir (Toch, 2013: 233-234).

4. Yahudiler ve Ticaret

Orta Çağ Avrupa'sındaki Yahudi ticareti, yalnızca Batı'daki yerel gelişmelerle açıklanamaz; bu ticari varlık, Bizans ve İslam dünyasında şekillenen daha erken Akdeniz deneyimlerine dayanmakta ve bu bölgelerdeki Yahudi ticaret ağları Avrupa'daki faaliyetlerin temelini oluşturmaktadır. Michael Toch'un (2021: 323-332) belirttiği üzere, Avrupa Yahudileri, özellikle Akdeniz çevresindeki Yahudi merkezlerinden -İtalya, Bizans ve İberya'dan- 9. yüzyıldan itibaren kuzeye doğru yönelmişlerdir. Bu süreç, yalnızca bir demografik göç değil, aynı zamanda bir ekonomik yer değiştirme hareketiydi. Geç Antik Çağ'daki nüfus daralması ve şehir hayatının gerilemesinden sonra, dokuzuncu yüzyılda Avrupa genelinde gözlemlenen ekonomik toparlanma ve yeniden kentleşme süreci Yahudiler için de ticari fırsatlar yaratmıştı. Bu bağlamda Akdeniz'e kıyısı olan kentler Yahudi ticaretinin Avrupa'daki ilk uğrak noktaları olmuştur. Marsilya, Amalfi, Venedik ve Narbonne gibi liman şehirleri, Bizans ve Müslüman doğudan gelen malların Batı'ya aktarımında önemli roller üstlenen Yahudi tüccarların yerleşim merkezleriydi. Bu şehirler, yalnızca ticaretin değil, aynı zamanda Yahudi nüfusunun da kuzeye doğru hareketinin başlangıç noktalarıydı. Bu süreçte güneyden kuzeye doğru çift yönlü bir Yahudi hareketi yaşanmış; güneydeki yerleşimlerin canlanmasına paralel olarak, kuzeyde tamamen yeni Aşkenaz yerleşimleri ortaya çıkmıştır. Toch'un (2021: 323-332) ifadesiyle: "On birinci yüzyılda hem kuzey hem de güney Yahudiliği olgunlaşmıştı. Avrupa manzarasının bir parçası hâline gelmişlerdi. Orta Doğu'daki dinî otorite merkezlerinden entelektüel bağımsızlık talep edecek kadar güçlüydüler ve antik dönemdekilerden oldukça farklı olan çeşitli ekonomik faaliyetlerde yol alabilecek hazır hukukî prosedürlerle donatılmışlardı. Bu ve daha birçok bakımdan, Avrupa'nın Orta Çağ Yahudi toplulukları, geç Antik Çağ'ın Yunanca konuşan Akdeniz diasporasından oldukça farklı, yeni bir olguyu, bir kopuşu temsil etmektedir".

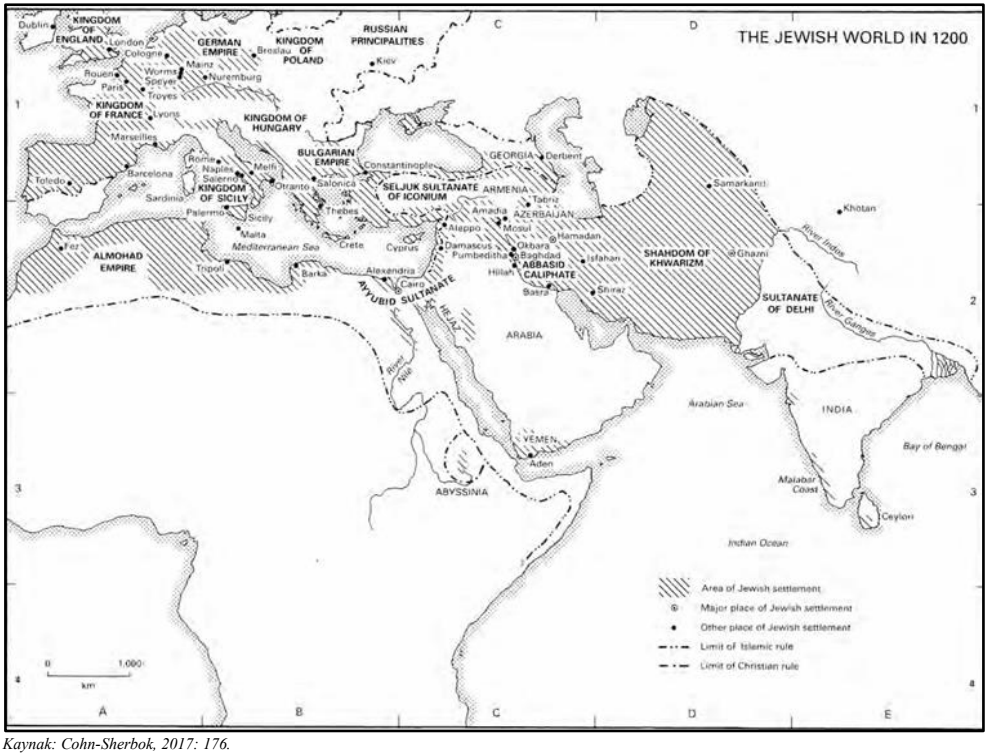
Bununla birlikte, Yahudi tüccarların ticari etkinliği yalnızca Akdeniz havzası ya da Avrupa içi bölgesel hatlarla sınırlı kalmamış; Hristiyan ve İslam dünyası arasında doğrudan ticari ilişkilerin zorlaştığı bir dönemde, kıtalararası bağlantılar kurarak uluslararası ticaretin taşıyıcısı hâline gelmişlerdir. Bu rol, yalnızca ekonomik fırsatlarla değil, aynı zamanda Yahudi cemaat yapısının sunduğu bağlantı ağı, çok dillilik gibi kültürel avantajlar ve dini hukukun ticareti teşvik eden yapısıyla da desteklenmiştir. Yahudi tüccarların bu çok katmanlı ticaret ağı, hem kent pazarlarında ve panayırlarda yürüttükleri yerel faaliyetlerle hem de Akdeniz'i ve ötesini aşan rotalarla şekillenmiştir.

4.1. Yerel Ticaret: Avrupa Kentlerinde Yahudi Ticareti ve Panayır Ekonomisi

Avrupa'da Yahudi ticaretinin gelişimi, kentleşme süreciyle doğrudan bağlantılı tarihsel bir zeminde şekillenmiştir. Özellikle 9. ve 10. yüzyıllarda Avrupa'nın çeşitli bölgelerinde kentlerin yeniden canlanması, ticaret yollarının açılması ve bölgesel pazarların oluşması, Yahudilere hem yerleşim hem de ekonomik faaliyet açısından yeni imkânlar sunmuştur (Bkz. Harita: 2). Bu dönemde kentler, Yahudiler için yalnızca yaşanılan yerler

değil, aynı zamanda sosyal örgütlenmenin, hukuki özerkliğin ve ekonomik failliğin merkezleri hâline gelmiştir.

Harita: 2
13.yy. da Yahudi Yerleşimleri



Kaynak: Cohn-Sherbok, 2017: 176.

Yahudi tüccarlar, ilk etapta Akdeniz çevresinde, daha sonra Ren Nehri havzasında, Frank toprakları ve güney Almanya şehirlerinde görülmeye başlamışlar; şehir otoriteleri, bu grupların ticari yetkinliklerinden yararlanmak amacıyla onları doğrudan davet etmişlerdir. Bu durumun bilinen en iyi örneklerinden biri Speyer Piskoposu Rudiger Huozmann'ın 1084 yılında Yahudileri kendi şehrine davet etmesidir. Rudiger, o dönem kilisenin Yahudilere getirdiği pek çok sınırlamayı dikkate almaksızın, şehrine davet ettiği Yahudilere sosyoekonomik açıdan pek çok imtiyaz tanımıştır. Bunun gerekçesini fermanının ilk cümlesinde şöyle ifade etmiştir: "Speyer köyünü bir şehre dönüştürmek istediğimden Yahudileri getirmemin yerimizin itibarını bin kat artıracağını düşündüm" (Marcus & Saperstein, 2015: 63-65).

Bu bağlamda şehir yönetimleri Yahudi topluluklarına çoğu zaman yazılı fermanlarla tanımış oldukları geniş ayrıcalıklar sağlamıştır. Bu ayrıcalıklar arasında belirli malları alım-

satım hakkı, pazarlarda yer tahsisi, seyahat güvenliği, taşınır ve taşınmaz mal edinme yetkisi, ticari anlaşmazlıklarda kendi hukuk sistemlerine başvurma hakkı gibi düzenlemeler yer almaktaydı. Örneğin, Şarlman ve oğlu Dindar Ludwig'in (hs.814-840) Yahudilere tanıdığı ayrıcalıklar arasında köle sahibi olma, bu köleleri satma ve kendi dinlerine döndürme hakları da yer almıştır. Ayrıca Yahudilerin mülklerinde Hristiyan işçi çalıştırmalarına da izin verilmiş; bu da Yahudilere hem tarımsal hem de kentsel üretim faaliyetlerinde avantaj sağlamıştır (Bachrach, 1977: 86).

Yahudi ticaretinin en yoğunlaştığı alanlar panayırlar ve bölgesel pazarlardı. Mainz, Köln, Frankfurt, Regensburg, Saint-Denis ve Troyes gibi şehirlerde yılın belirli dönemlerinde kurulan büyük panayırlarda Yahudiler aktif olarak yer alıyorlardı; çoğu zaman şehir dışından gelen diğer tüccarlar ile ticaret yapıyorlardı. Bu fuarlarda şarap, kürk, ipek, at, deri, metal eşya ve lüks tüketim mallarının yanı sıra günlük tüketim ürünleri de el değiştiriyordu. Lyon Başpiskoposu Agobard'ın (ö.840) aktardığına göre, imparatorluk habercileri Lyon'a vardıklarında, yerel panayırlar cumartesi gününden Yahudilerin tercih edebileceği herhangi bir güne, hatta pazar gününe bile erteleniyordu. Bu durum, Yahudilerin bu haftalık pazarlarda bulunmasının ne kadar önemli görüldüğünü açıkça ortaya koymaktadır (Baron, 1971: 175; Toch, 2013: 203).

Bu ticaret yalnızca bireysel değil, kurumsal bir yapıya da sahipti. *Kompagniegeschäft* adı verilen ticaret ortaklıkları yaygın olarak kullanılıyordu. Büyük sermaye sahipleri, taşra veya başka şehirlerdeki Yahudilere belirli mallar emanet ederek onları fuar alanlarına gönderiyorlardı; kâr ve zararı önceden belirlenmiş oranlarda bölüşüyorlardı. Bu ortaklıkla riski ve emeği paylaşmış oluyorlardı. Yahudi tüccarlar özellikle Prag, Merseburg, Magdeburg, Regensburg ve Worms gibi şehirlerde yoğunluk gösteriyorlardı; savaşan taraflar için finansman sağlama işini üstleniyorlardı. Galip olanların ganimetlerini hızla paraya çevirebilmeleri sağlanıyordu. Bu tür yüksek kazançlı işler, kırsal halkın nefretini ve kıskançlığını uyandırıyordu (Hoffmann, 1910: 10-11).

Ticaretin hukuki ve ahlaki sınırları ise cemaat içinde bizzat hahamlar tarafından çizilmiştir. Panayır alanında ortaya çıkan anlaşmazlıklar çoğu zaman seyyar haham mahkemelerinde çözüme kavuşturuluyordu. Haham Elieser ben Nathan'ın Köln panayırlarında verdiği kararlar, bu tür bir hukukî müdahalenin örneklerini sunar. Elieser, şahit beyanları, yazılı senetler ve taraf ifadelerine dayanarak borç anlaşmazlıklarını çözüme kavuşturmuş, ticari işlemlerin ahlaki geçerliliğini denetlemiştir. Ayrıca haham otoriteleri Yahudilerin dini açıdan sakıncalı ticari faaliyetlere girmesini engellemek amacıyla çok sayıda düzenleme yapmışlardır. Özellikle Hristiyan ikonografisi içeren nesneler, kilise ayininde kullanılan araçlar veya dini günlerde alışveriş gibi konular ticari sınırlamalara tabi tutulmuştur (Hoffmann, 1910: 12-13).

Panayırlar sadece ticari değil, aynı zamanda sosyal temasın, bilgi dolaşımının ve cemaat içi etkileşimin de alanlarıydı. Farklı şehirlerden gelen Yahudiler burada haberleşirdi, mektuplar alıp verirdi, evlilik görüşmeleri yapardı ve dini meseleleri müzakere ederdi. Hatta

bazı hahamlar, panayır dönemlerinde şehirlerinden ayrılıp bu alanlarda geçici mahkemeler kurarak halkın sorularını yanıtlamış ve hukuki danışmanlık hizmeti sunmuşlardır.

Tüm bu yapı, Yahudilerin yerel ticaretteki varlığını sistemli ve örgütlü bir çerçevede sürdürdüğünü göstermektedir. Ancak bu ekonomik düzenin sürekliliği her zaman garanti altında olmamıştır. 14. Yüzyıl itibarıyla artan toplumsal gerilimler, antisemitik şiddet dalgaları, ekonomik krizler ve yerli Hristiyan esnafın baskıları Yahudilerin panayır ekonomisinden dışlanmasına yol açmıştır. Yine de 11-13. yüzyıllar boyunca Yahudiler, şehir ekonomilerinin vazgeçilmez unsurları olarak Avrupa yerel ticaret sisteminde belirleyici bir rol oynamışlardır.

4.2. Uluslararası Ticaret: Radhanîler

7. Yüzyıldan itibaren İslam'ın Doğu Akdeniz, Kuzey Afrika ve Mezopotamya'da hızla yayılmasıyla birlikte, Hristiyan Bizans ile Müslüman Doğu arasında yeni bir siyasi sınır hattı oluşmuştu. İslam fetihleriyle birlikte Doğu Akdeniz'in pek çok önemli limanı Müslüman kontrolüne geçerken, Bizans İmparatorluğu'nun etkisi batıya ve kuzeye kaymıştı. Bu siyasi bölünme, yalnızca askerî ve kültürel bir ayrışma değil, aynı zamanda ticari ilişkilerde de ciddi bir kopuşa da neden oldu. Doğu ile Batı arasındaki ticaret yolları kesintiye uğramış, taraflar arasındaki doğrudan ticari temas hem siyasal güvensizlik hem de dinî yasaklamalar nedeniyle oldukça sınırlı kalmıştı.

Bu ortamda Yahudiler her iki dünyanın ticaretine aracılık edebilecek istisnai bir aktör olarak öne çıkmışlardı. Zira Yahudi cemaatleri hem Hristiyan Avrupa'da hem de İslam coğrafyasında dağınık ama birbirine bağlı şekilde varlık göstermekteydi. Bu diasporik yapı, Yahudi tüccarların farklı siyasi rejimler altında yaşayan aynı dine mensup güvenilir ortaklarla çalışmasını mümkün kılıyordu. Dahası, Yahudilerin çok dilli oluşu (İbranice, Arapça, Yunanca, Latince, Farsça ve bazen Slav dilleri gibi) ve her iki kültürel dünyaya da aşinalıkları, onları yalnızca fiziksel değil, kültürel anlamda da "geçiş unsuru" hâline getiriyordu (Arkin, 2002: 45).

Bu kültürel ve coğrafi avantajlara ek olarak, Yahudi tüccarların uluslararası ticarette öne çıkmalarını sağlayan bir diğer belirleyici unsur, ortak bir hukuki dil ve kurumsallaşmış bir ticaret etiğine sahip olmalarıydı. Farklı coğrafyalara dağılmış Yahudi cemaatleri, ticari işlemlerini Talmudik esaslara dayalı ortak bir hukuk anlayışı çerçevesinde yürütüyorlardı. Bu hukuki yapı, yalnızca teorik bir çerçeve olarak değil, somut uygulamalarla şekillenen canlı bir mekanizma olarak da işliyordu. Özellikle Orta Çağ boyunca Yahudi dünyasında gelişen responsa geleneği, ticaretin ahlaki ve hukuki temellerini sürekli olarak güncelleyen bir sistem işlevi gördü. Uzak mesafeli ortaklıklarda vekilin sorumluluğu, kâr-zarar paylaşımı gibi karmaşık meselelerde, önde gelen rabbinik otoriteler sık sık sorulara yanıt veriyorlardı ve cemaatler arası ticari ilişkileri teşvik edici hükümler oluşturuyorlardı (Gamoran, 2008: 39-49; Gil, 2003: 273-319).

Yahudi tüccarların uluslararası ticaretteki aracı rolünün en belirgin ve belgelenmiş örneği 9. ve 10. yüzyıl Arap coğrafyacıları tarafından zikredilen Radhanî tüccarları örneğinde görülür. Radhanîler, Batı Avrupa'dan Çin'e kadar uzanan geniş bir coğrafyada ticaret yapan, çok dilli ve sürekli hareket halinde olan Yahudi tüccarları ifade eden bir terim olarak literatüre geçmiştir (Gottesman, 2015: 763-764).

Radhanîlerin kim olduğu, isimlerinin kökeni ve faaliyet alanları hakkındaki temel bilgiler, başta İbn Hurdâzbih (ö.300/912-13) ve İbnü'l Fakîh (ö. 3-4/9-10. yüzyıl) olmak üzere, erken dönem Müslüman coğrafyacıların eserlerinden alınmıştır. İbn Hurdazbih *Kitab'ül Mesalik ve'l Memalik* isimli eserinde Radhaniler olarak isimlendirdiği Yahudi tüccarlar hakkında şöyle demektedir:

> *Bu tacirler Arapça, Farsça, Rumca, Efrencçe, Endülüs dili ve Slav dili konuşabilmektedir. Bu tacirler, doğudan batıya ve batıdan da doğuya karada ve denizde yolculuk etmektedir. Batıdan köle, esir, ipek kumaş, işlenmiş deri, yaban eşeği, kürk ve kılıç getirmektedirler. Fehna'dan denize açılmakta ve Ferama'da tekrar karaya çıkmaktadırlar. Ticaret eşyalarını sırtlarında Kulzum'dan Car ve Cüdde'ye taşımaktadırlar. Buradan Sind, Hind ve Çin bölgesine geçerler. Çin bölgesinden de misk, avd, kafur ve Çinevi gibi şeyleri getirirler. Aynı yol üzere Kulzum'a geri dönüp yanlarındaki şeyleri Ferma'ya getirirler. Buradan gemilere binerek Batı Denizi'ne açılırlar. Kimi zaman yolları Konstantiniyye'ye düşmekte ve Rumlardan alışveriş yapmaktadırlar. Bazen Efrenc Melikinin ülkesine yolları düşmekte ve burada alışveriş yapmaktadırlar. Eğer isterlerse, Efrenc ülkesinden ticaret malları almakta ve bunları Batı Denizi'nden Antakya'ya götürmekte, burada karaya çıkmaktadırlar. Yolun üçte birini yürüyerek Fırat kıyılarına varmaktadırlar ve Fırat'tan gemilere binerek Bağdat'a varmaktadırlar. Daha sonra Dicle'den gemilere binerler ve Übülle'ye varırlar. Übülle'den Amman, Sind, Hind ve Çin'e varmaktadırlar. Bu yolların bazısı diğerlerine bağlıdır (İbn Hurdazbih, 2008: 130).*

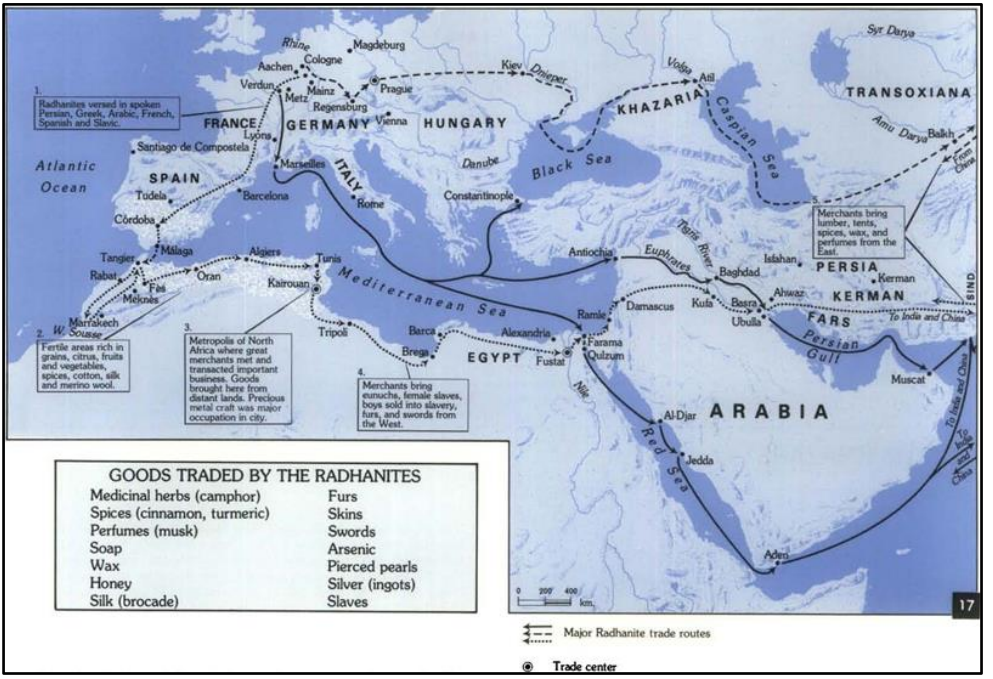
Uluslararası Yahudi ticaretine referans olarak kullanılan diğer önemli kaynak, İbnü'l Fakîh'in *Mukhtasar Kitāb al-Buldān* adlı eseridir. Eserde, Batı'dan Doğu'ya Frank topraklarından Çin'e kadar uzanan; Batı'dan brokar ve benzeri kumaşları Doğu'ya, Doğu'dan da tarçın ve benzeri ürünleri Batı'ya taşıyan Yahudi tüccarlarından bahsedilmektedir. İbn Hurdazbih'in verdiği bilgiler kadar detay içermeyen bu anlatıdaki en büyük farklılık Yahudi tüccarların radhaniler yerine rahdaniler şeklinde isimlendirilmiş olmasıdır[10].

[10] *Gil (1974: 307) bu iki temel referans kaynağını karşılaştırmış ve birtakım farklılıklar tespit etmiştir. Buna göre İbnü'l Fakîh'e atfedilen eserde tüccarların başlangıç noktası Frank ülkesi iken, İbn Hurdazbih'in (2008: 130) çizdiği rotayla karşılaştırıldığında Tanca, Remle, Şam, Kufe, Basra, Ahvaz, Kirman gibi pek çok şehir eksiktir. Aynı zamanda tüccarların konuştuğu diller arasında Endülüslülerin ve Slavların dilleri sayılmazken, ticaret malları arasında da köleler gibi bazı mallardan bahsedilmemektedir.*

Radhani/Rahdani kavramının anlamı dolayısıyla araştırmacılar Yahudi tüccarların menşei konusunda farklı görüşler ileri sürmüşler; kavramı bir konum ya da bir grup ile ilişkilendirmeye ve anlamlandırmaya çalışmışlardır. Radhan kavramının bir coğrafyadan ziyade tüccarların mesleki niteliğini yansıttığını savunanlar arasında yer alan M.J. de Goeje (1879) bu terimi "kumaş tüccarları"nı işaret eden bir Farsça kelime olarak tanımlamış; J.T. Reinaud (1848) ise *connaisseurs de chemin* (yol bilgeleri) olarak yorumlamıştır. Kısa bir süre sonra R. Dozy (1927) de *Supplement* isimli çalışmasında bu kavramın rah (yol) +dan (bilen) köklerinden türetildiğini belirterek Reinaud'a katılmıştır. Fr. Kmietowicz (1970) ise terimin Latin *veredarii*'den (kuryeler) türediğini, bu tüccarların bazen diplomatik elçilik veya tercümanlık da yaptığını öne sürerken, J. Jacobi (1971) onları Abbâsî istihbarat servisine bağlı casuslar olarak tanımlamıştır. Buna karşılık, kavramı coğrafi bir kökene bağlayanlardan biri olan D. Simonsen (1907) bu kavramı Rhône Nehri kıyısındaki *nautae Rhodanici* denizcilerine dayandırarak Yahudi tüccarların hareket noktasının batı olduğunu iddia etmiştir. W. Heyd (1879), Cl. Cahen (1964), C. Roth (1966) ve M. Lombard (1971) gibi araştırmacılar da Simonsen'in batı tezine destek vermişlerdir. Buna karşın J. Jacobs (1919) ve S. Katz (1937) Radhan'ı Rey'le ilişkilendirirken, Gil (1974: 299-328) doğu tezine destek olmakla birlikte bu konumun Rey'le ilişkili olamayacağını belirtmiştir. Bununla birlikte, günümüzde çoğu kaynak, Radhan'ı Güney Irak'taki Sevâd bölgesine ait bağımsız bir idarî birim olarak kabul eder; bu topraklar Nasturi yazmalarda Cuhâ (Jukha) adıyla da anılır ve Pumbedita Geonluğu'na kadar uzanan köklü bir Yahudi yerleşimini barındırmıştır (Bareket, 2003: 558-561).

Genel olarak İspanya veya Fransa'dan yola çıkan Yahudi tüccarlar, Akdeniz'i geçerek Mısır'a ulaşıyor, mallarını deve sırtında Süveyş kıstağından Kızıldeniz'e aktarıyor, oradan da gemiyle Hindistan ve Çin'e kadar gidiyorlardı (Bkz. Harita: 3). Aynı güzergâhtan geri dönerek misk, öd ağacı, kafur, tarçın ve Doğu ülkelerine ait diğer ürünleri de beraberlerinde getiriyorlardı. Batıdan ise hadımlar, cariyeler ve köle erkek çocuklar, sırma işlemeli kumaşlar, kunduz ve sansar kürkleri ile kılıçlar getiriyorlardı. Bazıları mallarını satmak üzere Konstantinopolis'e deniz yoluyla gidiyordu. Diğerleri ise aynı amaçla Frank kralının sarayını ziyaret ediyordu. Bazen Doğu'ya ulaşmak için Kızıldeniz rotasını kullanmak yerine Antakya'da karaya çıkarlardı, Suriye'yi geçerek Fırat Nehri'ne ulaşır, oradan da Bağdat'a geçerlerdi. Ardından Dicle Nehri boyunca Basra Körfezi'ne iner, oradan da Hindistan ve Çin'e ulaşırlardı. Bu yolculuklar karayoluyla da yapılabiliyordu. Böylece Yahudi tüccarlar, Tanca, Kayrevan ve diğer Kuzey Afrika şehirleri üzerinden doğuya ilerleyerek Kahire, Şam, Kufe, Basra, Ahvaz, İran ve Hindistan'a ulaşır, nihayetinde yine Çin'e varırlardı (Dunlop, 2007: 52).

Harita: 3
Radhanîlerin Ticaret Rotaları



Kaynak: Beinart, 1992: 26.

Radhanîlerin uluslararası ticaretteki aracılık rolü, sadece teorik bir iddia değil, geniş coğrafyalara yayılmış yerleşim ağları, seyahat rotaları ve kişisel hikâyeler üzerinden somut biçimde izlenebilir. Orta Çağ belgelerinin tükenmez hazinesi olan Kahire Genizası, Yahudilerin Avrupa'dan Müslüman ülkelere sürekli ve olağan biçimde gerçekleştirdikleri geçişlere dair pek çok örnek sunmaktadır. Bu örneklerden biri 11. yüzyılın ilk yarısına tarihlenen bir belgeye konu olan Musa b. Yakup'un hikâyesidir. Bu kişi, Kayrevan'daki *Bet Din* (Yahudi Dini mahkemesi) huzurunda verdiği ifadesinde: babasının Sicilya'da, amcasının İskenderiye'de öldüğünü, annesinin Marsilyalı olduğunu, kardeşinin ise bir dönem Trablus'ta yaşamış olduğunu, davanın görüldüğü sırada ise Mısır'da olduğunu, kendisinin de bir süre Sicilya'da ikamet ettiğini anlatmıştır. Bu kişisel hikâye, Yahudi tüccarların Batı Avrupa'dan Kuzey Afrika'ya, Akdeniz'den Mezopotamya'ya uzanan ticari ve sosyal hareketliliğini gözler önüne serer. Aile bağlarının ve ikametlerin bu derece geniş bir coğrafyaya yayılmış olması, Radhanî sisteminin ne kadar geniş bir ağa sahip olduğunu ortaya koyar (Rabinowitz, 1945: 269).

8. Yüzyıl başlarına tarihlenen ve Batı Çin'deki Hotan harabelerinde bulunan Farsça yazılmış bir mektup Yahudi tüccarların yalnızca ekonomik aktörler olmadıklarını, aynı

zamanda Abbâsiler ile Çin gibi uzak güçler arasında haberleşme ve mal akışı bağlamında aracılık yapabilecek aktörler olarak da görüldüklerini düşündürmektedir. Nitekim Halife Me'mun'un (hs. 813-833) Bizans'a göndereceği hediyeler hakkında bilgi almak istemesi üzerine misk ve samur gibi Çin menşeli lüks malların tercih edilmesi, Abbâsî sarayının doğu ile kurduğu ilişkilerde Yahudi tüccarların sunduğu ağlardan faydalanmış olabileceğine işaret etmektedir. Benzer biçimde Şarlman'ın Halife Harun Reşid'e gönderdiği heyette Isaac isimli bir Yahudi'nin yer alması ve diğer iki Hristiyan elçinin bu yolculuktan sağ olarak dönememesine rağmen Isaac'ın meşhur fil ve çeşitli hediyelerle sağ salim dönmesi, Yahudilerin diplomatik ve ticari ilişkilerde oynadığı ayrıcalıklı rolün göstergesi sayılabilir (Adler, 1987: 1). Dolayısıyla bu tüccarlar, sadece malların değil, aynı zamanda bilgilerin, fikirlerin ve diplomatik mesajların da taşıyıcısıydı (Gil, 1974: 313).

Orta Çağ'da Radhanîlerin Batı'dan Doğu'ya taşıdığı ticaret malları arasında köle önemli bir yer tutar. Yahudilerin kendi emirleri altında çalıştırmak yahut ticaretini yapmak üzere Hristiyanları kullanmaları yasak olduğundan, ticareti yapılan kölelerin genellikle pagan ve Yukarı Saale ile Volga arasındaki bölgeden temin edilen Slav halklardan olduğu görülmektedir (Abrahams, 1993: 97-98). Kölelerin Konstantinopolis ve Mısır'a taşınma güzergâhı İngiltere'den Fransa'ya, oradan İspanya'ya dek uzanmakla birlikte, Yahudilerin sahip oldukları sermaye ve uluslararası bağlantılar, bu alanda İtalyan tüccarlarla birlikte anılmalarını sağlıyordu. Bu etkinliğin varlığı, 825'te Zaragozalı Abraham'a verilen imparatorluk fermanıyla belgelenmiştir. Yabancı köleleri satın alma ve imparatorluk sınırları içinde satma izni, Yahudilerin bu ticarete resmî olarak katıldıklarını gösterir (Hoffmann,1910: 17)[11]. Kilise makamları ise Lyon Başpiskoposu Agobard'ın (ö.840) ve halefi Amulo'nun (ö.852) Hristiyan kölelerin İspanya'ya satılması ve çocuk kaçırma iddialarıyla Yahudileri en sert biçimde eleştiren sözlerini kayda geçirmiştir[12]. Kilisenin engellemesine rağmen, bu ticarete pagan kölelerin dışında Hristiyan kölelerin de dahil edildiğine dair kayıtlar vardır. Prag Piskoposu Aziz Adelbert (ö.997) ve Polonya Dükü Wladislaw'ın (hs. 1079-1102) eşi Judith (ö.1105) Yahudilere fidye ödeyerek bazı Hristiyan köleleri özgürlüğüne kavuşturmuşlardır. Bu duruma dair şikâyetlerin artması kilisenin Yahudilerin Hristiyan işçi çalıştırmasını ve köle sahibi olmasını tekrar tekrar yasaklamasını gerekli kılmıştır (Hoffmann, 1910: 18). 949'da Verdun merkezli hadım erkek ihracatından Yahudilerin sorumlu tutulması, 965 yılında Prag'ı ziyaret eden İspanyol Yahudi İbrahim bin Yakub'un köle pazarındaki Yahudi tüccarlara dair tanıklığı, İslam coğrafyacılarından İbni Havkal (2017: 115) ve Mukaddesi'nin (2015: 256) İspanya'dan gelen hadım Slav kölelerin

---

[11] *Ancak Toch (2013: 186) İmparator Dindar Ludwig'in verdiği bu iznin uluslararası köle ticaretiyle ilgili olmadığını, yalnızca Yahudilerin pagan köle çalıştırma ve iç piyasada satışını yapmaya izin verdiğini savunmaktadır.*

[12] *"Bu krallığın tüccarları ister Hristiyan ister Yahudi olsun, pek çok halk ve sadık şehrinden geçerek pagan köleleri bizim inançsız ve en azılı düşmanlarımızın ellerine teslim ediyorlar (ve böylece, eğer Hristiyanlar tarafından satın alınmış olsalardı kurtarılabilecek olan o talihsiz köleler acı içinde yok olmakta, krallığımızın düşmanlarının sayısı da büyük ölçüde artmaktadır). Bu tüccarların dindar prenslerimiz tarafından durdurulmaları ve kölelerini Hristiyan sınırları içerisinde satmaya zorlanmaları gerekmektedir" (Toch, 2013: 187).*

Yahudi tüccarlar tarafından temin edildiğine dair ifadeleri, Yahudilerin bu ticaret dalına katılımlarını somut olarak ortaya koyar (Rabinowitz, 1945: 260; Hoffmann, 1910: 18)[13].

10. Yüzyılın sonlarında, Hristiyan Batı ile Müslüman Doğu arasındaki düşmanlık, Yahudi aracılar için muazzam bir ticaret sahası sunmuştu. Ne var ki, İslam dünyasının zayıflamasıyla Akdeniz'in kuzey kıyılarındaki İslam hâkimiyetinin gerilemesi, Hristiyan tüccarların Tunus, Mısır ve Levant ile doğrudan ticari ilişki kurmasına olanak sağlarken, İskenderiye ve Halep'in tüccarları da yağma ve korsanlıktan ziyade meşru ticareti benimsemiştir. 9. Yüzyılda deniz ticaretinde etkin olan Yahudi tüccar sınıfı, 11. yüzyıla gelindiğinde Venedik, Amalfi ve Ceneviz gibi şehirlerin deniz ticaretinde gittikçe artan rekabetiyle karşılaşmak zorunda kalmış; Haçlı seferleriyle birlikte İtalyanlar, Akdeniz ticaretinde Yahudileri etkisiz hale getirmiştir (Arkin, 2002: 45-49).

Uluslararası ticarette payı gittikçe azalan Yahudi tüccarlar, faaliyetlerini doğuya uzanan nehir yolları ve iç ticaret merkezlerine Mainz, Regensburg, Prag gibi şehirlere kaydırmak zorunda kalırken, ayrımcı yasaların sıkılaşması neticesinde giderek küçük ölçekli perakende, seyyar satıcılık ve tefecilikle yetinecek hale gelmişlerdir. Nürnberg'de kabul edilen düzenleme, Yahudilerin ancak et ve at alıp satmalarına izin verildiğini hükme bağlamış; 14. yüzyılda Glogau ve Wiener Neustadt gibi şehirlerde kumaş ticareti yasaklanırken, Trier'de genel bir ticaret yasağı getirilmişti. Bu tür tedbirler, Hristiyan ticaretini teşvik etmeye yönelikti ve Hristiyan loncalarına Yahudilerin kabul edilmeyişi onların durumunu tehlikeli hale getiriyordu. Örneğin Venedik'te, radhaniler ne yerli ne de yabancı tüccar statüsünde sayılmamış; dolayısıyla devlet destekli loncalara kabul edilmemişlerdir. Ceneviz'de ise dinsel hoşgörüsüzlüğün gölgesinde "her an evlerinden kovulabilecekleri" bir belirsizlik hâkimken, Floransa'da ise lonca sistemine dâhil edilmeyen Yahudiler, yüksek faiz sınırlamaları, ikamet kısıtlamaları ve silah taşıma yasağıyla ekonomik yaşamın dışında tutulmuşlardır (Hoffmann, 1910: 15; Arkin, 2002: 45-49). Bu durum, Yahudi cemaatlerini kendi içlerinde lonca benzeri bir örgütlenmeye yöneltmiştir. *Kahal* meclisleri ve bu meclislerin seçilmiş yöneticileri (*parnasim*) cemaatin ekonomik yaşamını düzenleyen başlıca kurumsal merkezler hâline gelmiştir. Bu yöneticiler *takkanot* adı verilen düzenlemelerle vergi adaletini sağlamaya, ticari dürüstlüğü korumaya ve üyeler arasında sermaye akışını denetlemeye çalışmışlardır. Böylece Yahudiler dışlayıcı lonca sisteminin yerine kendi iç dayanışma ağlarını kurarak üretim, kredi ve ticaret ilişkilerini cemaat bünyesinde sürdürmüşlerdir (Rosensweig, 1975: 39-52). Israel Abrahams'ın belirttiği gibi, özellikle Fransa, Almanya ve İtalya'daki Yahudi cemaatleri, Hristiyan meslek birliklerinden dışlanmalarına rağmen, cemaat fonları ve yardımlaşma kasaları aracılığıyla kendi ekonomik döngülerini sürdürebilmişlerdir. Bu iç yapılanma, sadece gelir dağılımında dengeyi sağlamakla kalmamış, antisemitik baskılara karşı topluluğun mali bağımsızlığını

[13] *Bu verilere rağmen Toch (2013: 178-190), kaynakların hem sayıca yetersiz hem de bağlamdan koparılmış olduğunu; dolayısıyla Orta Çağ'daki Avrupa Yahudilerinin binlerce Slav köleyi taşıyacak demografik büyüklüğe sahip olmadığını savunmaktadır. Sınırlı ölçekte ev içi köle alım-satımı söz konusu olsa da, Yahudilerin dönemin genel köle ticaretinin ana aktörleri arasında yer almadığını iddia etmektedir.*

sağlamak suretiyle bireysel zenginleşmeden çok, cemaatin kurumsal sürekliliğini hedefleyen bir örgütlenme biçimini yaratmıştır (Abrahams, 35-61).

Ancak bu iç örgütlenme ve cemaat dayanışması, Yahudileri ticaretin daralan sınırlarından kurtaramamış, zamanla sermaye birikimini sürdürebilmek için faizli kredi ve tefecilik alanına yönelmelerini de engelleyememiştir.

5. Yahudiler ve Tefecilik

11. ve 13. Yüzyıllar arası nüfus artışına ve kentleşmeye eşlik eden ticaret devriminin yaşandığı bir dönem olmuştur. Avrupa'da kara ve nehir yolları üzerinde gelişen ticaret, bölgesel üretimle birleşmiş; özellikle tekstil gibi sektörlerde sanayi merkezlerinin ortaya çıkmasıyla ekonomik yapı büyük yatırımlar ve sürekli kredi akışı gerektirir hâle gelmiştir. Ancak bu büyümenin getirdiği parasal ihtiyaçlara rağmen, Avrupa'nın kırsal nüfusu hâlâ yılda bir ya da iki kez ödeme alabilecek yavaş bir tarımsal ekonomi içinde kalmış; kamu harcamaları, savaşlar ve anıtsal inşa faaliyetleri gibi nedenlerle merkezi ve yerel otoritelerin para talebi sürekli artmıştır. Tüm bu gelişmeler, krediye olan ihtiyacın belirgin şekilde arttığı bir bağlam yaratmış ve Yahudiler için ticaretin dışında yeni meslek alanları arayışını hızlandırmıştır. Gerçekten de artan kentleşme, uzun mesafe ticaretinin tehlikeleri, Yahudi nüfusun fiziksel olarak hareket etmesini zorlaştıran düşmanlık ortamı ve büyük ölçekli ekonomik sistemlerin talepleri Yahudileri yerleşik ve düşük riskli alanlara yönlendirmiştir. Bu çerçevede, özellikle para yönetimi ve ödünç verme gibi faaliyetler Yahudiler için cazip bir meslek alanı hâline gelmiştir (Toch, 2008: 187-188).

İslam dünyasında Müslümanlara yönelik faiz yasağı, her ne kadar zamanla bu yasağı aşmanın çeşitli yolları bulunmuş olsa da, özellikle Yahudiler açısından önemli bir ekonomik fırsat alanı yaratmıştır. Bu durum, Yahudilerin kredi ve ödünç verme gibi faaliyetlerde öne çıkmasına zemin hazırlarken, Müslüman toplumlarda Yahudilere yönelik Batı Hristiyan dünyasında gözlemlenen ayrımcılığa rastlanmamıştır (Wilson, 1997: 35). İslam dünyasında Yahudiler, zimmî statüsü altında görece geniş bir hareket alanına sahip olmuşlar; ticaret, zanaat ve deniz taşımacılığı gibi alanlarda faaliyet gösterebilmişlerdir. Geniza belgeleri, Akdeniz'de Yahudi tüccarların Müslümanlarla yoğun biçimde iş birliği yaptığını, ancak bu ilişkilerin daha çok ortaklık ve mal dolaşımı esasına dayandığını göstermektedir (Gotein, 1999: 71-74).

Hristiyanlığın aksine İslam'ın ticarete olumlu yaklaşımı ve Müslüman tüccarların Yahudileri rakip görmemesi, her ikisinin de bir diğerinin kârını yok edeceği korkusuna kapılmadan ticaret gelirini paylaşmalarını sağlamıştır. Aynı zamanda İslam dünyasındaki Yahudiler, faizli kredi yerine kâr-zarar ortaklığına dayanan *commenda/mudarabe* sistemiyle ticaret yapmışlardır. Bu modelde bir taraf sermayeyi sağlıyor, diğeri ticareti yürütüyor; kâr paylaşılırken, zarar yalnızca sermaye sahibine ait oluyordu. Böylece hem faiz yasağı aşılmış hem de uzun mesafeli ticaretin finansmanı sağlanmıştır. Ayrıca Yahudilerin ekonominin belirli bir alanına sıkışıp kalması ve bu alanda Müslüman meslektaşlarından daha fazla efor sarf etmesinin de önüne geçilmiştir (Cohen, 2013: 148-160).

Buna karşın Batı'daki Yahudi ekonomik faaliyeti, geniş serbestlikten değil, sınırlılıklar içinde geliştirilen bir uzmanlaşmadan doğmuştur denilebilir. Baskı altındaki bir topluluğun hem kendini hem de bağlı bulunduğu kraliyet ekonomisini sürdürebilmek için geliştirdiği bir rasyonelleşme biçimi olarak tanımlanabilir. Batı Avrupa Yahudilerinin İslam dünyasındaki dindaşlarına göre daha ileri düzeyde ekonomik etkinlik göstermelerinin temelinde, geniş bir serbestlik değil, kurumsal baskı altında oluşan bir ekonomik adaptasyondan bahsedilebilir. Batı'daki koşullar, Yahudileri tarım ve ticaretten uzaklaştırıp finansal aracılığa yöneltmiş; Hristiyan toplumlarının kredi ihtiyacı ile Yahudi topluluklarının hayatta kalma stratejilerinin birleşmesi, tefeciliğe geçiş sürecini hazırlamıştır.

5.1. Kilise Yasakları

Kilise tefecilik, yani faizle borç verme uygulamasına karşı son derece katı bir tutum sergilemiştir. Ticari faaliyetleri dahi belirli ölçülerde tehlikeli gören Kilise'nin faizli işlemleri onaylaması zaten beklenemezdi. Hristiyan kutsal metinlerinde ticari faaliyetlere dair açık bir hüküm bulunmadığından, Kilise bu faaliyetleri denetleyerek bazılarını meşru, bazılarını ise gayrimeşru ticaret olarak değerlendirebilmekteydi. Ancak faizle yapılan işlemler konusunda hüküm son derece açıktı. Luka İncili'nde "Borç verdiğinizde karşılığında fazladan hiçbir şey beklememelisiniz" (*date mutuum nihil inde sperantes*) denilmekteydi. Bu doğrultuda Kilise, borç verilen anaparaya eklenen her türlü fazlalığı tefecilik (*usura est, quicquid sorti accedit*) olarak değerlendirerek kesin bir yasak getirmiştir (Hoffmann, 1910, 22-23; Tosechini, 2008: 2).

Tefeciliğe karşı kilise konsil mevzuatı toplanan yerel ve genel konsiller doğrultusunda netlik kazanmıştır. Kilise tefecilikle mücadelesine hüküm ve cezalarının bağlayıcı olmadığı Yahudilerden değil, Hristiyanlardan başlamıştır. 1139 yılında toplanan II. Lateran Konsili'nin 13. Kanonu, faizle borç para verenlerin doymaz açgözlülüğünü kınamış ve itibarsız ilan ettiği tefecilerin tövbe etmedikleri sürece kilise tarafından cenaze törenlerinin düzenlenmeyeceğini bildirmiştir (Tanner, 1990: 200). 40 yıl kadar sonra toplanan III. Lateran Konsili'nin 25. Kanonu bu cezayı daha net şekilde tekrar etmekle birlikte, yasağı dinlemeyen din adamlarını da uyarmıştır:

> *Bu nedenle, kötü şöhretli tefecilerin bu günah içinde ölürlerse sunak ayinine veya Hristiyan cenaze törenine katılmalarına izin verilmemesi gerektiğini beyan ederiz. Tefecileri kabul eden veya Hristiyan cenaze töreni düzenleyen kişi, aldığını geri vermeye zorlanmalı ve kendi piskoposunun kararına göre kefaret ödeyene kadar görevini yerine getirmekten men edilmelidir (Tanner, 1990: 223).*

Tefeciliğe karşı uygulanan cezaların kapsamı zamanla seküler ve dinî otoriteleri de içine alacak şekilde genişletilmiş; faizli işlemlere katılanlar aforoz tehdidiyle karşı karşıya bırakılmıştır. Ancak bu sert tutuma rağmen Hristiyanlar arasında tefeciliğin oldukça yaygınlaştığı anlaşılmaktadır. Nitekim Clairvauxlu Bernard (ö.1153) 1146 yılında II. Haçlı

Seferi sırasında Yahudilere karşı şiddet çağrılarına karşı çıkarken, faizle iş yapan Hristiyanların daha kötü olduğunu açıkça dile getirmiştir. Bu durumu en net biçimde 15. yüzyılda Eisenach'ın belediye kâtibi J. Purgoldt'un sözleri yansıtır: "Yahudilerin toprakları yoktur; zanaat ya da ticaret yapmalarına izin verilmemektedir. Bu yüzden tefecilik onların geçim kaynağıdır; ama Hristiyan tefecilerin gerekçesi yalnızca açgözlülük ve kötülüktür" (Hoffmann, 1910: 27).

Tefecilik işlemleri, anapara, faiz oranı, gecikme bedeli ve teminat gibi unsurlarla kayıt altına alındığı için Hristiyan tefecilere dair çok sayıda örnek belgelenebilmiştir. Bu belgeler yalnızca sıradan bireyleri değil, din adamlarını ve ruhban kurumlarını da kapsamaktadır. İtalya'dan Almanya'ya kadar birçok kilise ve manastır, az ya da çok bu kârlı işe dâhil olmuş; özellikle manastırlar, halkın altın ve gümüş gibi değerli mallarını emanet ettiği güvenli mekânlar olarak, bu tür işlemler için gerekli sermayeye sahip olmuşlardır. Öyle ki, bir şövalyenin tüm mülkünü manastıra satarken bedelin yalnızca yarısını alması ve kalanını geri dönme şartına bağlaması gibi uygulamalar, manastırların bu tür kârlı satış işlemleri sayesinde zenginleştiğini göstermektedir (Hoffmann, 1910: 39-41).

1215 yılında toplanan IV. Lateran Konsili'nin faiz konusunda aldığı kararlar radikal bir mevzuat ortaya çıkarmıştır. Kilisenin yargı yetkisi Hristiyanlarla sınırlı olmasına rağmen, bu konsilde tefecilik yapan Yahudilerin dolaylı da olsa cezalandırılması karara bağlanmıştır:

> *Gelecekte herhangi bir bahaneyle bir Yahudi bir Hristiyan'dan ağır ve ölçüsüz faiz talep ederse, bu kişiye Hristiyanlarla her türlü ilişki kurma hakkı, aşırı taleplerine yeterli bir telafi yapana kadar yasaklansın. Gerekirse, Hristiyanlar da bu tür ticaretten kaçınmaları için herhangi bir itiraza açık olmaksızın kilise cezasıyla zorlanacaktır. Ayrıca prenslere de şu yükümlülüğü getiriyoruz: Bu konuda Hristiyanlara karşı öfkeye kapılmasınlar; bilakis Yahudileri bu uygulamadan uzak tutmaya çalışsınlar. Aynı ceza yöntemiyle Yahudiler, kiliselerin onlara ait olan ve önceden Hristiyanlara ait evlerden ve mülklerden kiliselerin almaya alışkın olduğu ondalık ve sunuları telafi etmeye zorlanacaktır. Böylece, bu mülkler Kilise'ye hiçbir kayıp olmaksızın korunmuş olacaktır (Tanner, 1990: 265).*

Kilise Hristiyanlar arasında faize karşı alınan önlemlerin etkili olduğunu ima ederken, Yahudilerin faize yönelmesini bir tür boşluğu doldurma veya fırsatçılık olarak sunmakta ve böylece Yahudi tefeciliğini artan bir tehdit olarak çerçevelemektedir. Her ne kadar Hristiyanlar arasında faizle borç verme uygulamasının tamamen ortadan kalktığı söylenemese de, bu faaliyetlerin genellikle gizli biçimde yürütüldüğü ve çoğu zaman Yahudilerin aracı kılındığı görülmektedir. Bu durumda kazanç Hristiyanlara, kötü şöhret ise Yahudilere kalmakta; bu da tefeciliğin görünürde Yahudilerle özdeşleşen bir meslek hâline gelmesine yol açmaktadır. Kilise söyleminde belirginleşen Yahudi tefeci stereotipi, arka planda Yahuda'nın ihanetini ve açgözlülüğünü çağrıştırmakta; buradan hareketle, inançsız ve sapkın olarak tanımlanan Yahudilerin ekonomik anlamda Hristiyanlar üzerinde güç

sahibi olmasının engellenmesi gerektiği vurgulanmaktadır (Todeschini, 2008: 10; Grayzel, 1933: 44-45).

Bu çerçevede, Kilise'nin Yahudiler üzerindeki yargı ve ceza mekanizmalarını kullanması dikkat çekicidir. İtalyan kanon hukukçusu Pisalı Huguccio (ö.1210) Yahudiler üzerinde Kilise yargı yetkisini açıkça savunan ilk isim olmuştur. Ona göre, "Yahudiler günah işlediklerinde ya da suç işlediklerinde, bir piskopos ya da onun mahkemesi onlara para cezası verebilir, onları sakatlayabilir veya idam edebilirdi." Papa III. Celestinus (ö.1198) ile onun halefi ve yeğeni olan Papa III. Innocentius (ö.1216) tefeci Yahudilerin dolaylı aforozla, yani onlarla her türlü ticari ilişkinin kesilmesi suretiyle cezalandırılmasını savunmuştur. 1229 yılında ise Kilise vergi ödememek, tefecilik yapmak ve din adamlarına saldırıda bulunmak gibi gerekçelerle Yahudilerin Kilise mahkemelerinde yargılanabileceğine hükmetmiştir (Mell, 2018: 23).

Kendi gücünün sınırlarının farkında olan Kilise, tefecilikle mücadele konusunda seküler otoriteleri harekete geçmeye çağırmıştır. 1146 yılında Cluny Başrahibi Peter the Venerable (ö.1156) Fransa Kralı VII. Louis'ye (hs.1137-1180) yazdığı bir mektupta, Fransa'daki Yahudilerin servetlerine el konulmasını ve bu kaynakların bir haçlı seferinin finansmanında kullanılmasını talep etmiştir. Bu mektup, Hristiyan dünyasında ortaya çıkmakta olan belirli bir zihniyetin erken bir tezahürünü yansıtır: Yahudiler inançsız olduklarından ve bu nedenle toprak sahiplerinin ve Kilise'nin serfleri sayıldıklarından, meşru bir servet edinemezler. Bu akıl yürütmeye göre, Yahudilerin zenginliği kaçınılmaz biçimde yasa dışıdır ve hırsızlık ya da ticari sahtekârlık yoluyla elde edilmiştir. Peter, Fransa'daki Yahudilerin genellikle *simony* (kutsal şeylerin parayla alınıp satılması) suçunu işleyenlerle, yani Hristiyan değerlerini yağmalayan hırsızlarla ortak hareket ettiklerini ileri sürmüştür (Todeschini, 2008: 13).

Peter'in çağrısı karşılık bulmuş; Kral VII. Louis, "Kudüs'e gitmeyi gönüllü olarak kabul eden herkes, Yahudilere olan borçlarından muaf tutulacaktır" şeklindeki bir kraliyet fermanıyla, Fransa'daki Yahudilerin büyük ölçüde alacaklarını tahsil etmelerini engellemiştir. İngiltere Kralı II. Henry (hs.1154-1189), Fransa Kralı Philip Augustus (hs.1180-1223) ve özellikle IX. Louis (hs.1226-1270), Kilise'nin çağrılarına kulak vererek Yahudi tefecilerin faaliyetlerini en azından denetim altına almaya çalışmışlardır. Dindarlığıyla tanınan IX. Louis, Yahudilerin tefeciliği bırakmalarını ve bedensel emekle geçinmelerini emreden tek hükümdar olmuştur. Ne var ki, bu talimat pratikte karşılığı olmayan sembolik bir jestten öteye geçememiştir; zira hiçbir toplumsal yapı ekonomik temellerini bir gecede bu denli radikal biçimde dönüştüremezdi. Avrupa'daki diğer prensler ise bu tür köklü müdahalelere girişmemiş; zira tefeciliğin yasaklanmasının sonucunda kayıp yaşayanların sadece Yahudiler olmayacağının farkında olmuşlardır. Bu durum, Yahudilerin yürüttüğü tefecilik faaliyetlerinin hükümetin ve yerel yöneticilerin idari ve hukuki desteğine bağımlı olmasıyla yakından ilişkilidir. Alacakların tahsili ve rehin edilen malların satışı gibi işlemler ancak otoritenin müdahalesiyle mümkün olabilir. Böylece Yahudiler giderek gelişen bürokratik şehir ve prenslik idarelerinin kontrolü altında tutulmuş, faaliyetleri özel defterlere kaydedilmiştir. Kilise'nin tefeciliğe yönelik sert eleştirilerine rağmen, yöneticiler

kamu düzeni, ekonomik istikrar ve vergi gelirleri nedeniyle Yahudi tefecilerle iş birliğini sürdürmüşlerdir (Toch, 2008: 195-196; Grayzel, 1933: 45-48; Mell, 2018: 52-54).

5.2. Rabbinik Yorumlar

Yahudi dini literatüründe yer alan bazı ifadeler Yahudilerin Orta Çağ'dan itibaren Avrupa'da tefecilik ve bankacılıkla uğraşmalarını haklı göstermek için kullanılmıştır. Bunlardan en çok referans gösterilenlerden biri Levililer (25:35-38)'de yer alan: "Yurttaşlarınızdan biri yoksullaşır ve aranızda geçimini sağlayamazsa, ona yardım edin... Ondan hiçbir şekilde faiz almayın... Ona faizle borç vermeyin veya ona kârla yiyecek satmayın" ifadeleri ile Tesniye (23:19-20)'de yer alan: "Kardeşinizden, para, yiyecek veya faiz getirebilecek herhangi bir şey için faiz almayacaksınız. Yabancıdan faiz alabilirsiniz, fakat İsrailli kardeşinizden alamazsınız" ifadeleri olmuştur. Burada dikkat çeken en önemli husus, faiz yasağının yalnızca Yahudileri kapsıyor olmakla birlikte[14], Yahudi olmayanları dışarıda bırakmasıdır. İkinci husus, Yahudi olmayanlardan faiz alınması hükmündeki İbranice *tashikh* kelimesinin bir emre mi yoksa bir izne mi işaret ettiği konusundaki görüş farklılıklarıdır. Yahudi alimler bu konuda farklı yorumlarda bulunmuşlardır. Talmud literatürüne bakıldığında, bu ifadenin mümkünse kaçınılması gereken izin verilmiş bir eylem olarak yorumlandığı anlaşılmaktadır. Yahudi olmayanlardan alınan faizin borç veren kişiye mutsuzluk getireceğinden, faizle iş yapmanın zenginlik amacıyla değil, geçim sebebiyle başvurulması gereken bir durum olduğundan bahsedilmiştir. Ancak Yahudilerin neredeyse tek geçim kaynağının faizle iş yapmaktan ibaret olduğu Geç Orta Çağ'a gelindiğinde, bu ayetin yorumunda da bazı değişikliklere gidilmiştir. 12. Yüzyılda da Fransa'da yaşamış olan Rabbeinu Tam (ö.1171), Yahudilerin artık Yahudi olmayan çoğunluğun arasında bir azınlık olarak yaşadığının, kral ve feodal beylere vergi ödediğinin ve ticaretin her alanında Yahudi olmayanlarla iş yaptığının altını çizerek, bu eylemin her Yahudiye caiz olması gerektiğinde ısrar etmiştir. Bu konuda çok daha keskin bir yorum ise Musa bin Meymun'dan gelmiştir. İbn Meymun, Emirler Kitabı'nda (Sefer ha-Mitzvot), Tesniye (23:21)'de yer alan sözlerin zorunlu nitelikte olduğunu şu şekilde ifade etmiştir: "Yahudi olmayana faizle borç vermek zorundayız; ki ona yararlı olmayalım, ona iyi davranmayalım; aksine ona faiz yoluyla zarar verelim, bu zararı ona sözleşmeyle yükleyelim." Levi ben Gershom (ö.1344) Yahudi olmayana zarar vermek maksadıyla faizle borç verilmesini bir zorunluluk olarak görmesi bakımından İbn Meymun'a destek verirken, Abraham ben David (1198), Musa İbn Nahman (ö.1270) ve öğrencisi Shlomo İbn Aderet (ö.1310) bu ifadenin bir izin olarak anlaşılması gerektiğini belirtmişlerdir (Mutius, 2008: 17-23).

Tashikh kelimesine getirilen yorumlar aynı zamanda *ah* (kardeş) ile "*nokhri*" (yabancı) ayrımının nasıl anlaşılması gerektiğiyle ilgili yorumlarla birlikte okunmalıdır.

---

[14] *11. Yüzyılda Alman ve Fransız rabbiler Talmud bilginlerinin hayal edemeyeceği sosyoekonomik durumlar karşısında faiz yasağını daha fazla koruyamamışlar ve gentile karşısında dezavantajlı durumdaki Yahudiler için bu yasağı etkisiz hale getirmek adına birtakım yöntemlere başvurmuşlardır. "Rehinli rehin", "Yahudi olmayan birinin vekilliği" gibi Yahudiler arası faizli işlemleri meşrulaştıran bu uygulamalar için bakınız (Schiffman, 2024: 545-567).*

Yabancıya faizle borç vermeye izin veren buyruk, dini gelenekte genellikle Yahudi cemaatinin dışında kalan, Yahudi hukukuna bağlı olmayan kimselerle sınırlı tutulmuştur. Musa İbn Nahman, bu ayrımın oldukça yüksek düzeyde bir *hesed* (iyilikseverlik) beklentisine dayandığını, ancak bu seviyedeki iyilikseverliğin tüm insanlıktan beklenemeyeceğini belirtmiştir. Yahudiler arasındaki ekonomik ilişkilerde faizsiz borcun bir ahlaki zorunluluk, dış topluluklarla ilişkilerde ise bağlayıcı olmayan bir tercih olduğu belirtilmiştir. Benzer biçimde, David Kimhi (ö.1235) *nokhri*ye faizle borç vermeyi ahlaken meşru gören açıklamalar yapmıştır. Kimhi'ye göre, Yahudi ile yabancı arasındaki ilişkide böyle bir *hesed* yükümlülüğü bulunmamaktadır. Dahası, Kimhi yabancıların genellikle Yahudilerden nefret ettiklerini belirtmiş ve bu nedenle onlara karşı faizsiz borç verme gibi bir yükümlülüğün ahlaki olarak gerekmediğini ileri sürmüştür. Bununla birlikte, eğer yabancı Yahudi'ye karşı *hesed* gösterirse, ona da aynı şekilde karşılık verilmesi gerektiğini kabul etmiştir. Bu düşünceler, Yahudi kaynaklarının faiz yasağını iç topluluk için ahlaki bir ideal, dışa dönük ilişkilerde ise toplumsal ve ekonomik koşullara bağlı bir izin olarak değerlendirdiğini göstermektedir (Kirschenbaum, 1985: 289).

Katolik evrenselcilik doktrini çerçevesinde Hristiyan teoloji geleneği, Tesniye'deki "kardeş" ve "yabancı" ayrımını ya alegorik biçimde tevil etmiş ya da tarihsel bağlamla sınırlandırarak evrensel doğal adalet ilkesine dayalı kapsamlı bir faiz yasağı tesis etmeye yönelmiş; buna karşın Yahudi hukuk geleneği, söz konusu yasağı cemaat içi ilişkilerde *hesed* ilkesine dayanan ahlaki bir yükümlülük olarak yorumlamış, cemaat dışına yönelik uygulamalarda ise metnin lafzını muhafaza ederek tarihsel ve toplumsal zorunluluklara bağlı bir esneklik geliştirmiştir (Kirschenbaum; 1985: 289).

Bu esnekliğin ve rabbinik desteğin pratikte ne denli güçlü bir kurumsallaşmaya yol açtığını gösteren çarpıcı örneklerden biri, 13. yüzyıl Aragon Krallığı'na bağlı Perpignan şehrindeki Yahudi cemaatidir. Yaklaşık yüz aileden oluşan bu cemaat, şehir nüfusunun yaklaşık %5'ine ulaşmış ve ekonomik faaliyetlerini neredeyse bütünüyle tefeciliğe dayandırmıştır. 1261-1287 yıllarına ait noter kayıtlarında, yetişkin Yahudi erkeklerin yaklaşık %80'inin Hristiyanlara kredi verdiği belgelenmiştir. Üstelik, tefecilik alanında en aktif olan Yahudiler, cemaatin en saygın üyeleri gibi görünmektedir; seçkin bir Talmudist ve âlim olan Menachem HaMeiri (ö.1315) belgelerde tam otuz bir işlemde tefeci olarak yer alırken, Yahudi şairlerden Phinehas Ha-Levi (ö.13. yüzyıl) ve Abram Bedersi'nin (ö.1340) adları da aynı şekilde geçmektedir. Krediler yalnızca şehir halkına değil, soylulara, din adamlarına ve manastırlara kadar uzanmaktaydı; sermaye, vasiler ve çeyizler aracılığıyla kuşaktan kuşağa aktarılmaktaydı. Kayıtlar, Yahudilerin taşınmaz yatırımlarından kaçındığını, tefecilik faaliyetlerini bireysel olarak yürüttüğünü ve piyasadaki para arzına göre esnek faiz oranları uyguladığını göstermektedir. Kilise yasağına rağmen yerel otoritelerin desteğiyle sürdürülen bu sistem, Yahudi cemaatinin mali temelini oluşturmuş; ancak 1285 Fransız-Aragon Savaşı, faiz oranlarındaki düşüş ve Hristiyan rakiplerin yükselişiyle zayıflamış, cemaat yavaş yavaş fakirleşmiş ve 1493'teki sürgünle sona ermiştir (Arkin, 2002: 58-63).

Orta Çağ boyunca faiz oranlarına ilişkin elimizdeki veriler, coğrafyaya göre dikkat çekici farklılıklar göstermektedir. Örneğin İspanya'da 11. ve 12. yüzyıllara ait bazı belgeler Yahudi tefecilerin kısa vadeli tarımsal kredilerine dair bazı faiz oranlarını kaydetmiştir. Barselona ve Tudela belgeleri, bir yıla kadar vadeli borçlarda faiz oranının çoğunlukla %20-25 civarında olduğunu; bazı taşınabilir rehinlere dayalı borçlarda ise %100'e kadar çıktığını göstermektedir. Bu yüksek oranlar, ciddi teminat riski ve hukuki güvencelerin zayıflığıyla açıklanabilir (Toch, 2013: 142-144).

Bizans İmparatorluğu'nda Yahudi tefeciler, devletin faiz düzenlemeleri nedeniyle kredi piyasasında etkili olamamışlardır. Faiz oranları, borç verenin toplumsal konuma göre %4 ile %8 arasında değişirken, tüccarlar ve Yahudiler için %6, deniz ticareti gibi yüksek riskli işlemler için ise %12 olarak belirlenmiştir. Bu sınırlamalar, yüksek faizli kredi vermeyi neredeyse imkânsız hâle getirmiştir. 9. yüzyılda İmparator I. Nikeforos'un (802-811) özel kişilerin borç vermesini yasaklayarak faizi %16,66 oranında devlet tekeline almasıyla birlikte, Yahudiler kredi faaliyetlerinden tamamen dışlanmışlardır. Dolayısıyla Bizans'ta Yahudi tefeciler muhtemelen daha çok ticaret ve zanaat alanlarında faaliyet göstermişlerdir (Baron, 1971: 198). İslam dünyasında ise durum farklı olmuş; Yahudi tefeciler, faiz yasağına rağmen ticaretin sunduğu esnekliği kullanmışlardır. Krediler çoğunlukla "kâr payı" ya da "fiyat farkı" adı altında verilmiş, böylece faiz dolaylı biçimde uygulanabilmiştir. Ticari merkezlerde oranlar genellikle %30-40 düzeyinde seyretmiştir (Baron, 1971: 214).

Avrupa genelinde, özellikle İngiltere ve Fransa'da 12. ve 13. yüzyıllar boyunca Yahudi tefecilerle ilişkili faiz oranları %33 ila %60 aralığında seyretmiş; bazı belgelerde %100 ve üzeri oranlar meşru sayılmıştır. Kralların tefecilik faaliyetlerinden vergi ve müsadere yoluyla doğrudan gelir elde etmesi, bu yüksek oranların yalnızca ekonomik değil, politik bir işlev taşıdığını da gösterir (Baron, 1971: 203-204).

Böylece, Bizans'ta devlet denetimi, İslam dünyasında dini kısıtlama, Batı Avrupa'da ise kraliyet müdahalesi faiz oranlarını belirleyen üç temel unsur hâline gelmiştir. Yahudi tefeciler, bu üç farklı yapının kesiştiği her bölgede, kredi sisteminin hem risk taşıyıcısı hem de sermaye sağlayıcısı olarak hareket etmiş; oranlar da bu yapısal konumun doğal bir sonucu olarak %20 ile %100 arasında değişmiştir.

6. Orta Çağ Yahudi Ekonomisinin Modern Ekonomiye Etkisi

İktisat tarihi açısından bakıldığında, Orta Çağ Yahudi ekonomik faaliyetleri yalnızca dönemin toplumsal koşullarının bir sonucu olarak değil, aynı zamanda modern kapitalizmin doğuşundaki ahlaki ve entelektüel zemine yaptığı katkı bakımından da ele alınabilir. Bu bakımdan Yahudilerin kendine has yeteneklerini ekonomik hayata aktarabilmesi sayesinde ileride şekillenecek kapitalist sistemde belirleyici bir rol oynamış oldukları söylenebilir.

Yahudi topluluklarının geniş bir coğrafyaya dağılmış olmaları, Hristiyan ticaret odalarının ancak büyük çabalarla ve sınırlı ölçüde kurabildikleri uluslararası kredi ve ticaret ağlarını doğal biçimde oluşturmalarını sağlamıştır. Sürekli yer değiştiren, "yabancı" olarak

yaşadıkları toplumlara hızla uyum sağlayan Yahudiler, farklı hukuk sistemleri ve topluluklarla kurdukları esnek ilişkiler sayesinde, yeni keşiflerin ve sömürgeleştirme süreçlerinin öncesinde bile Avrupalı tüccarlardan daha deneyimli hale gelmişlerdir. Yarı yurttaş statüsünde yaşamaları, ekonomik etkinliklerini sınırlandırmamıştır; aksine bu durum, politik tarafsızlıkları ve yasal haklarının değişkenliğiyle birlikte, riskleri ve fırsatları bir arada barındıran dinamik bir sermaye yapısının doğmasına yol açmıştır. Kapitalist girişimlerin ilk biçimlerinin kurulabilmesi için gerekli olan birikimi, bankacılık, senet düzenleme, hisse brokerliği ve depoculuk gibi yeni kurumlarla birleştirmeleri, onları kapitalist örgütlenme içinde ayrıcalıklı bir konuma taşımıştır (Sombart, 2019: 163-179).

Yahudilikte ekonomik faaliyet, yalnızca kazanç arayışı değil, Tanrı'nın dünyayı düzenleme buyruğuna (*tikkun olam)* uygun bir davranıştır. Bu kavram, iktisadî faaliyeti etik bir görev olarak tanımlar: para, dünyayı düzene koymanın ve adaleti gerçekleştirmenin aracıdır. Attali'nin belirttiği üzere Talmud'un ekonomik öğretisi, parayı şiddetin yerine koyan ve insan ilişkilerini sözleşme ile barış temelinde kuran bir araç olarak konumlandırır (Attali, 2009: 100-114).

Bu anlayış, Weber'in Protestanlık için dile getirdiği "dünyevi asketizm" kavramına paraleldir. Weber'e göre Protestanlar için çalışma ve kazanç tanrısal bir görevdir (Weber, 1999: 147). Yahudilikte bu bilinç çok daha erken bir biçimde yerleşmiş; dünyevi etkinlik doğrudan kutsal bir düzenin bir parçası haline gelmiştir.

Merkantilist sistemde zenginlik, devletin biriktirdiği altın ve gümüşle ölçülürken, Smith gerçek zenginliği üretken emeğin dolaşımında görür (Smith, 2020: 345). Yahudilikte ise para, Sombart'ın tanımladığı gibi, "durağan bir hazine değil, sürekli devridaim eden bir varlık"tır. Sermaye kullanılmadığında ölüdür; dolaşımda olduğunda Tanrı'nın düzenine hizmet eder (Sombart, 2019: 199-200). Bu düşünce, Smith'in "paranın kendisi zenginlik değil, zenginliği sağlayan araçtır" yargısıyla neredeyse aynıdır (Smith, 2020: 337). Weber'in Protestanlık'ta gözlemlediği "dünyevi görev bilinci" ise bu dini-ahlaki düşüncelerin rasyonel bir dünyevi başarı anlayışına dönüşmesidir (Weber, 1999). Böylece merkantilizmin devlet merkezli birikim modeliyle Protestanlığın birey merkezli çalışma etiğiyle, Yahudiliğin topluluk merkezli etik kapitalizmi arasında tarihsel bir süreklilik ortaya çıkar.

Fizyokratlar toprağı zenginliğin tek kaynağı olarak görürken, Yahudi ekonomik zihniyeti toprağa bağlı olmayan bir üretkenlik modelini çok daha önce geliştirmiştir. Mülkiyet yasağı ve sürgün deneyimi Yahudileri taşınabilir servet biçimlerine, para, bilgi, kredi ve ticari ağlara yöneltmiştir. Bu yönelim, klasik iktisadın temellerini oluşturan "doğal düzen" ve "doğal fiyat" anlayışlarıyla derin bir düşünsel paralellik taşımaktadır. Fizyokratların doğada var olduğuna inandıkları ekonomik denge fikri ile Adam Smith'in serbest rekabet koşullarında emeğin, sermayenin ve toprağın paylarının kendiliğinden dengeye ulaşacağı yönündeki "doğal fiyat" öğretisi, Yahudi hukukunda ve ticari pratiğinde yüzyıllar öncesinden fiilen uygulanmış bir zihniyetin teorik ifadesi niteliğindedir. Yahudi hukuk sistemi, Hıristiyan skolastisizminin "adil fiyat" kavramının aksine, fiyatın tarafların özgür pazarlığıyla belirlendiği bir piyasa düzenini benimsemiş; bu anlayış, müdahaleden

arınmış bir ekonomik alan yaratarak hem fizyokratların "laissez-faire" ilkesine hem de Smith'in "görünmez el" öğretisine tarihsel bir öncül oluşturmuştur. Böylece Yahudi ekonomik düşüncesi, toprağa değil bilgiye ve değişime dayanan üretkenliğiyle, erken modern dönemde şekillenecek kapitalist zihniyetin temellerini hazırlamış; piyasanın kendi doğallığı içinde işleyebileceği fikrini çok daha erken bir dönemde pratiğe dönüştürmüştür (Sombart, 2019: 227-228).

7. Sonuç

Bu çalışma, Orta Çağ boyunca Yahudi ekonomik faaliyetlerinin geçirdiği dönüşümü tarihsel bağlamı içinde ele alarak, bu sürecin yalnızca mesleki tercihlerle değil, çok katmanlı siyasal, toplumsal, dinsel ve kurumsal etkenlerle şekillendiğini ortaya koymuştur. Erken Orta Çağ'da Yahudiler, hem şehirli hem de kırsal bağlamda tarım, zanaat ve yerel ticaret gibi alanlarda üretken ve yerleşik bir topluluk olarak varlık göstermiştir. Bu dönem, Avrupa'nın Yahudi tüccarlara ve üreticilere duyduğu ekonomik ihtiyacın yüksek olduğu bir dönemdi. Ancak Avrupa'daki yapısal dönüşümler, bu iş birliğinin zamanla yerini dışlayıcı ve denetleyici bir ilişkiye bırakmasına yol açmıştır.

Yüksek Orta Çağ'da Kilisenin güç kazanmasıyla birlikte Yahudilere karşı geliştirilen teolojik söylemler, ekonomik faaliyetin özellikle faizli işlemlerle özdeşleştirilmesi üzerinden somutlaşmış; Hristiyan toplumun gözünde Yahudilerin zenginleşmesi dini bir tehdit olarak algılanmaya başlanmıştır. Haçlı seferlerinin tetiklediği toplumsal gerilim ve şiddet, yalnızca fiziksel saldırılarla sınırlı kalmamış, Yahudilerin ekonomik faaliyetlerine yönelik sistematik müdahalelerin de zeminini hazırlamıştır. 12. Yüzyıldan itibaren, Hristiyan tüccarların ticarî becerilerinin gelişmesiyle Yahudilere olan ihtiyaç giderek azalmış; bu da Yahudilerin kentlerdeki ekonomik rollerinin daralmasına, toprak mülkiyetinden dışlanmalarına ve giderek faizli işlere yönelmelerine yol açmıştır. Bu yönelimin arkasında yalnızca dışsal baskılar değil, cemaat içi yapılar ve rabbinik otoritelerin dini yorumları da etkili olmuştur. Faiz yasağının çeşitli bağlamlarda esnetilmesi, Yahudi cemaatlerinin ekonomik varlıklarını sürdürmeleri için pragmatik bir iç meşruiyet zemini yaratmıştır. Böylece Yahudiler hem sistemik dışlanma hem de topluluk içindeki dayanışma mekanizmaları aracılığıyla tefecilik gibi sınırlı ama görünür bir mesleki alana yönlendirilmiştir.

Sonuç olarak, Yahudilerin Orta Çağ'daki ekonomik dönüşümü ne doğal bir eğilim ne de yalnızca dış baskıların kaçınılmaz bir sonucu olarak görülebilir. Aksine, bu dönüşüm, Avrupa toplumlarının değişen ekonomik ihtiyaçları, siyasal ve dinsel yapıların müdahaleleri ile Yahudi cemaatlerinin kendi içinde geliştirdiği stratejilerin kesişiminde şekillenmiştir. Bu bakımdan Yahudi ekonomik tarihi yalnızca tefeciliğe indirgenemez, aksine çok katmanlı bir toplumsal işleyişin ve dönüşüm sürecinin ürünüdür.

Bu tarihsel süreç, modern dünyanın ekonomik ve entelektüel yapılanmaları üzerinde de kalıcı izler bırakmıştır. Orta Çağ'da geliştirilen mali aracılık, sözleşme güvenliği ve risk paylaşımı pratikleri, erken kapitalist ekonomilerin ortaya çıkışına zemin hazırlamış; Yahudilerin rasyonel hesap ve bilgi temelli ticaret anlayışı, modern ekonomik düşüncenin şekillenmesinde belirleyici bir rol oynamıştır. Bu birikim, modern çağda Yahudi bireylerin

finans, bilim, teknoloji ve savunma sektörlerinde etkin konumlar edinmelerine imkân sağlamıştır. Bununla birlikte, ekonomik başarı ve entelektüel görünürlük antisemitizmin yeniden üretilmesinde tarihsel bir unsur olarak varlığını sürdürmüştür. Dolayısıyla Orta Çağ Yahudi ekonomik yapısının incelenmesi, yalnızca geçmişin anlaşılmasına değil, günümüz dünyasında ekonomik rekabet, toplumsal dışlanma ve bilgi üretimi arasındaki dinamiklerin tarihsel kökenlerini kavramaya da ışık tutmaktadır.

Kaynaklar

Abrahams, I. (1993), *Jewish Life in the Middle Ages*, Philadelphia and Jerusalem: The Jewish Publication Society.

Abulafia, D. (2008), "The Jews of Sicily and Southern Italy: Economic Activity", in: M. & E. Müller-Luckner (eds.), *Wirtschaftsgeschichte der Mittelalterlichen Juden* (49-62), R. Oldenbourg Verlag München.

Adler, E.N. (1987), *Jewish Travellers in the Middle Ages*, New York: Dover Publications.

Arkin, M. (2002), *Aspects of Jewish Economic History*, Illinois: Varda Books.

Aronius, J. (1902), *Regesten zur Geschichte der Juden im Fränkischen und Deutschen Reiche bis zum Jahre 1273*, Berlin: Verlag von Leonhard Simion.

Attali, J. (2009), *Yahudiler, Dünya ve Para*, (Çev. B. Günen), İstanbul: Kırmızı Kedi Yayınevi.

Bachrach, B.S. (1977), *Early Medieval Jewish Policy in Western Europe*, Minneapolis: University of Minnesota Press.

Bareket, E. (2003), "Radhanites", in: N. Roth (ed.), *Medieval Jewish Civilization* (558-561), New York: Routledge.

Baron, S.W. (1971), *A Social and Religious History of the Jews*, New York-London: Columbia University Press.

Beinart, H. (1992), *Atlas of Medieval Jewish History*, Jerusalem: Carta.

Cohen, M.R. (2013), *Haç ve Hilal Altında Ortaçağda Yahudiler*, (Çev. A. Fethi), İstanbul: Köprü Kitapları.

Cohn-Sherbok, D. (2017), *Judaism History, Belief and Practice*, New York: Routledge.

Dunlop, D.M. (2007), "Radaniya (Radhanites)", *Encyclopedia Judaica* (EJ), C. 17, 52.

Gamoran, H. (2008), *Jewish Law in Transition*, Cincinnati: Hebrew Union College Press.

Gil, M. (1974), "The Rādhānite Merchants and the Land of Rādhān", *Journal of the Economic and Social History of the Orient*, 17(3), 299-328.

Gil, M. (2003), "The Jewish Merchants in the Light of Eleventh-Century Geniza Documents", *Journal of the Economic and Social History of the Orient*, 46(3), 273-319.

Goitein, S.D. (1999), *A Mediterranean Society*, California: University of California Press.

Gottesman, B.M. (2015), "Radanites", *Encyclopedia of World Trade*, 3, 763-764.

Grayzel, S. (1933), *The Church and The Jews in the XIIIth Century*, Philadelphia: The Dropsie College for Hebrew and Cognate Learning.

Hoffmann, M. (1910), *Der Geldhandel der Deutschen Juden Während des Mittelalters*, Leipzig: Verlag von Duncker-Humblot.

İbn Havkal (2017), *10. Asırda İslam Coğrafyası*, (Çev. R. Şeşen), İstanbul: Yeditepe Yayınevi.

İbn Hurdazbih (2008), *Yollar ve Ülkeler Kitabı*, (Çev. M. Ağarı), İstanbul: Kitabevi.

Jacoby, D. (2008), "The Jews in Byzantium and the Eastern Mediterranean: Economic Activities from the Thirteenth to the Mid-Fifteenth Century", in: M. Toch & E. Müller-Luckner (eds.), *Wirtschaftsgeschichte der Mittelalterlichen Juden* (25-48), R. Oldenbourg Verlag München.

Kirschenbaum, A. (1985), "Jewish and Christian Theories of Usury in the Middle Ages", *The Jewish Quarterly Review*, 75(3), 270-289.

Marcus J.R. & M. Saperstein (2015), *The Jews in Christian Europe*, New York: Hebrew Union College Press.

Mell, J.L. (2018), *The Myth of the Medieval Jewish Moneylender*, Raleigh: North Carolina State University.

Mukaddesi (2015), *İslam Coğrafyası*, (Çev. D.A. Batur), İstanbul: Selenge Yayınları.

Mutius, H.V. (2008), "Taking Interest from Non-Jews - Main Problems in Traditional Jewish Law", in: M. Toch & E. Müller-Luckner (eds.), *Wirtschaftsgeschichte der Mittelalterlichen Juden* (17-23), R. Oldenbourg Verlag München.

P. Abelard (1979), *Dialogue of a Philosopher With a Jew and a Christian*, (Trns. P.J. Payer), Toronto: Pontifical Institute of Mediaeval Studies.

Rabinowitz, L. (1945), "The Routes of the Radanites", *The Jewish Quarterly Review*, 35(3), 251-280.

Rosensweig, B. (1975), *Ashkenazic Jewry in Transition*, Waterloo, Ontario, Canada: Wilfrid Laurier University Press.

Schiffman, D.A. (2024), "Usury in Medieval Jewish Thought", in: J.J. Tinguely (ed.), *The Palgrave Handbook of Philosophy and Money* (545-567), Switzerland AG.

Smith, A. (2020), *Milletlerin Zenginliği*, (Çev. M. Acar), İstanbul: Liberus Kitap.

Soloveitchik, H. (2024), *Jews and the Wine Trade in Medieval Europe*, Liverpool University Press.

Sombart, W. (2019), *Yahudiler ve Modern Kapitalizm*, (Çev. S. Gürses), İstanbul: Küre Yayınları.

Tanner, N. (1990), *Decrees of the Ecumenical Councils*, Washington: Georgetown University Press.

Ta-Shma, I.M. (2007), "Responsa", *Encyclopedia Judaica*, C.17, 228-231.

Toch, M. (2008), "Economic Activities of German Jews in the Middle Ages", in: M. Toch & E. Müller-Luckner (eds.), *Wirtschaftsgeschichte der Mittelalterlichen Juden* (181-210), R. Oldenbourg Verlag München.

Toch, M. (2013), *The Economic History of European Jews*, Leiden-Boston: Brill.

Toch, M. (2021), "Jewish Demographics and Economics at the onset of the European Middle Ages", in: G. McDowell et al. (eds.), *Diversity and Rabbinization* (323-335), Cambridge, UK: Open Book Publishers.

Todeschini, G. (2008), "Christian Perceptions of Jewish Economic Activity in the Middle Ages", in: M. Toch & E. Müller-Luckner (eds.), *Wirtschaftsgeschichte der Mittelalterlichen Juden* (1-16), R. Oldenbourg Verlag München.

Tudela'lı Benjamin & Ratisbon'lu Petachia (2001), *Ortaçağ'da (12.yy.) İki Yahudi Seyyahın Avrupa, Asya ve Afrika Gözlemleri*, (Çev. N. Arslantaş), İstanbul: Kaknüs Yayınları.

Weber, M. (1999), *Protestan Ahlakı ve Kapitalizmin Ruhu*, (Çev. Z. Gürata), Ankara: Ayraç Yayınevi.

Wilson, R. (1997), *Economics, Ethics and Religion*, London: Macmillan Press.

Sosyoekonomi

2026, Vol. 34(70), 473-502

RESEARCH ARTICLE

ISSN: 1305-5577 / e-ISSN: 3149-9775
DOI: 10.17233/sosyoekonomi.2026.04.20
Date Submitted: 27.08.2025
Date Revised: 25.08.2026
Date Accepted: 17.09.2026

OECD Ülkelerinde Toplumsal Cinsiyet Eşitsizliğinin Ekonomik Büyüme Üzerindeki Etkisi: Dinamik Panel Bulguları[1]

Damla GEBOLOĞLU *(https://orcid.org/0000-0001-5631-9713), Yanmar Turkey Makine A.Ş., Türkiye; damla_gebologlu@yanmar.com*

Berna TÜRKEKUL *(https://orcid.org/0000-0003-2445-3285), Ege University, Türkiye; berna.turkekul@ege.edu.tr*

The Effect of Gender Inequality on Economic Growth in OECD Countries: Evidence from Dynamic Panel Data[2]

Abstract

This study examines the impact of gender inequality on per capita income in OECD countries from 1990 to 2021. We apply Difference GMM and System GMM estimators to a balanced panel of 38 OECD countries. We examine gender inequality using the Gender Inequality Index alongside indicators of education, employment, and political representation. Investment and trade openness consistently raise per capita income. Women's parliamentary representation and secondary school enrollment have positive, significant effects, while female labour force participation remains largely insignificant. Female agricultural employment and primary school parity increase agricultural value added. The study disaggregates gender inequality across multiple dimensions and income groups, incorporates an agricultural growth model and a nonlinear relationship test, and evaluates Türkiye's position within the OECD to offer differentiated policy implications.

Keywords : Gender Inequality, Economic Growth, Dynamic Panel, GMM, OECD.

JEL Classification Codes : C33, J16, O40, O47, O57.

Öz

Bu çalışma, 1990-2021 döneminde OECD ülkelerinde toplumsal cinsiyet eşitsizliğinin kişi başına gelir üzerindeki etkisini incelemektedir. Analizde, 38 OECD ülkesini kapsayan dengeli panel veri seti kullanılmış ve Fark GMM ile Sistem GMM tahmincilerinden yararlanılmıştır. Toplumsal cinsiyet eşitsizliği, Cinsiyet Eşitsizliği Endeksi ile birlikte eğitim, istihdam ve siyasal temsil göstergeleri aracılığıyla ele alınmıştır. Yatırım ve dışa açıklık kişi başına geliri istikrarlı biçimde artırmaktadır. Parlamentoda kadın temsili ve ortaöğretim paritesi pozitif ve anlamlı etkiler üretirken, kadınların işgücüne katılım oranı büyük ölçüde anlamsız kalmaktadır. Tarımda kadın istihdamı ve

---

[1] *Bu çalışma, Ege Üniversitesi Bilimsel Araştırma Projeleri Koordinasyon Birimi tarafından BAP23706 numaralı proje kapsamında desteklenmiş olup, aynı zamanda Damla Geboloğlu tarafından Doç.Dr. Berna Türkekul danışmanlığında, Ege Üniversitesi Fen Bilimleri Enstitüsü Tarım Ekonomisi Anabilim Dalı'nda 2023 yılında tamamlanan "Cinsiyet Eşitsizliğinin Ekonomik Büyüme Üzerine Etkisi: OECD Örneği" başlıklı yüksek lisans tezinden esinlenerek hazırlanmıştır.*

[2] *This study was supported by the Ege University Scientific Research Projects Coordination Unit under project number BAP23706 and was prepared based on the master's thesis titled "The effect of gender inequality on economic growth: Case study of OECD countries", completed in 2023 by Damla Geboloğlu under the supervision of Assoc.Prof.Dr. Berna Türkekul at the Department of Agricultural Economics, Ege University Graduate School of Natural and Applied Sciences.*

ilköğretim paritesi tarımsal katma değeri artırmaktadır. Çalışma, cinsiyet eşitsizliğini farklı boyutlar ve gelir grupları temelinde ayrıştırmakta, tarımsal büyüme modelini ve U-şekilli ilişki sınamasını analize dahil etmekte; Türkiye'nin OECD içindeki konumunu değerlendirerek farklılaştırılmış politika çıkarımları sunmaktadır.

Anahtar Sözcükler : Toplumsal Cinsiyet Eşitsizliği, Ekonomik Büyüme, Dinamik Panel, GMM, OECD.

1. Giriş

Toplumsal cinsiyet ve biyolojik cinsiyet kavramları, literatürde farklı anlamlar taşımaktadır. Biyolojik cinsiyet, kadın ve erkek arasındaki anatomik, fizyolojik ve genetik farklılıkları ifade ederken, toplumsal cinsiyet, bu biyolojik farklılıklardan bağımsız olarak değil, aksine, bu biyolojik yapı üzerinden toplumsal ve kültürel süreçler (sosyalizasyon) içinde inşa edilen roller, davranışlar, sorumluluklar ve güç ilişkilerini tanımlamaktadır (Baer & Bositis, 1983: 125; Durutürk, 2020: 53-55). Bu nedenle toplumsal cinsiyet, doğuştan gelen sabit bir özellik değil; toplumsal normlar, kurumlar ve gündelik pratikler aracılığıyla üretilen ve yeniden üretilen dinamik bir yapıdır.

Toplumsal cinsiyet eşitsizliği ise kadınlar ve erkekler arasındaki toplumsal olarak kurulmuş farklılıkların haklara erişim, fırsatlar, kaynaklar ve karar alma süreçlerine katılım bakımından sistematik dezavantajlara dönüşmesi durumunu ifade etmektedir (Kabeer, 1999: 435-464). Toplumsal cinsiyet eşitsizliği, kadınlar ile erkekler arasındaki farklardan ibaret olmayıp, ekonomik, siyasal ve toplumsal kurumlara yerleşmiş güç asimetrileri üzerinden işleyen çok boyutlu bir yapıyı ifade etmektedir (Grown et al., 2000: 1146-1148).

Feminist iktisat perspektifi, toplumsal cinsiyet eşitsizliğini bireysel tercihlerle ya da yalnızca beşerî sermaye farklılıklarıyla açıklamamakta; bu eşitsizliğin toplumsal normlar, kurumsal yapılar, piyasa düzenlemeleri ve güç ilişkileri aracılığıyla yeniden üretildiğini vurgulamaktadır (Benería, 1999: 287-288, 306; Elson, 1999: 611-612; Kabeer, 2003: 44-45). Bu yaklaşım, neoklasik iktisadın rasyonel birey ve piyasa dengesi varsayımlarını sorgulayarak, toplumsal cinsiyet ilişkilerinin ekonomik yapıları nasıl şekillendirdiğini görünür kılmaktadır (Ferber & Nelson, 1993: 24-27, 37-38, 163-164). Böylece toplumsal cinsiyet eşitsizliği yalnızca sosyal adaletle ilgili bir mesele olarak değil, büyüme, verimlilik ve kalkınma performansını etkileyen yapısal bir ekonomik sorun olarak da ele alınmaktadır.

Kadınların ekonomik yaşama katılımını sınırlayan yapısal engeller, büyüme ve kalkınma üzerinde önemli verimlilik kayıplarına yol açmaktadır. Kadınların eğitim, istihdam, girişimcilik ve karar alma süreçlerine eşit biçimde katılamaması, hem kadınların ekonomik fırsatlarını ve refahını sınırlamakta hem de toplumun toplam insan sermayesi ve üretkenlik kapasitesini zayıflatmaktadır (Hallward-Driemeier, 2013: 1-3, 9-10; Klasen & Lamanna, 2009: 91-96). Özellikle eğitim düzeyinin yükselmesi ve emek piyasasına daha eşit koşullarda katılabilmesi, beşerî sermaye birikimini güçlendirmekte, kaynak tahsisinin etkinliğini artırmakta ve bu yolla ekonomik performansı desteklemektedir (Cuberes &

Teignier, 2016: 2-3, 5-7; Hill & King, 1995: 21-23, 26-29; Hsieh et al., 2019: 2-5; Knowles et al., 2002: 118-119). Bunun yanında feminist iktisat, kadınların ekonomik katkısının yalnızca görünür istihdamla sınırlı olmadığını, ev içi ücretsiz bakım emeğinin de ekonomik sistemin işleyişi açısından temel bir rol oynadığını vurgulamaktadır (Benería, 1999: 287-288, 295-296; Folbre, 2006: 183-184, 189-190). Ücretsiz bakım emeğinin görünmez kalması, toplumsal cinsiyet eşitsizliğinin yeniden üretilmesinde önemli bir rol oynamaktadır.

Bu çalışma, toplumsal cinsiyet eşitsizliğinin ekonomik büyüme üzerindeki etkilerini OECD ülkeleri bağlamında incelemektedir. OECD ülkeleri son yıllarda toplumsal cinsiyet eşitliğini kamu yönetişimi ve politika tasarımı süreçlerine daha güçlü biçimde entegre etmeye başlamış, bu doğrultuda toplumsal cinsiyete duyarlı kamu yönetişimi araçları geliştirmiştir. Bu araçlar yalnızca ölçme ve izleme mekanizmalarını güçlendirmemiş, aynı zamanda politika müdahalesi gerektiren alanların daha görünür hale gelmesini de sağlamıştır (OECD, 2018: 6, 24-25, 40-42, 2023: 3, 11, 52-53, 162). Bununla birlikte, üye ülkeler arasında toplumsal cinsiyet göstergeleri bakımından belirgin farklılıklar sürmektedir. Bu durum, OECD grubunu hem karşılaştırmalı analiz hem de politika öğrenmesi açısından uygun bir örneklem haline getirmektedir.

Bu heterojenlik Türkiye açısından daha da dikkat çekicidir. Türkiye, OECD ülkeleri arasında kadın işgücüne katılımının en düşük olduğu ülkelerden biri olmaya devam etmektedir. Eğitim alanında kaydedilen ilerlemelere rağmen bu iyileşmenin kadınların istihdamına aynı ölçüde yansımamış olması, toplumsal normların, bakım hizmetlerindeki yetersizliklerin ve işgücü piyasasındaki yapısal engellerin önemini göstermektedir. Dolayısıyla OECD ülkeleri içinde Türkiye'nin konumu, çalışmanın yalnızca karşılaştırmalı değil, aynı zamanda politika üretimine yönelik olarak da önem taşımasına yol açmaktadır.

Literatürde toplumsal cinsiyet eşitsizliği ile ekonomik büyüme arasındaki ilişki çeşitli iletim mekanizmaları üzerinden tartışılmaktadır. Bunlar başlıca beşerî sermaye, işgücü piyasası ve verimlilik, girişimcilik ve yenilikçilik, demografik yapı, hanehalkı kararları ve kurumsal kalite kanallarıdır. Eğitim ve sağlık alanındaki eşitsizlikler beşerî sermaye birikimini sınırlandırırken, işgücü piyasasındaki ayrımcılık ve mesleki ayrışma verimlilik kayıplarına yol açmaktadır. Benzer biçimde, kadınların girişimcilik ve mülkiyet haklarına sınırlı erişimi ekonomik dinamizmi zayıflatmakta; gelir ve karar alma gücünün hane içi dağılımı ise tüketim, tasarruf ve yatırım tercihlerini etkilemektedir. Siyasal temsil ve karar alma mekanizmalarındaki eşitsizlikler, kamu politikalarının niteliği ve kaynak tahsisi üzerinde de etkili olmaktadır. Mevcut çalışma bu mekanizmaları eğitim, istihdam ve siyasal temsil göstergeleri üzerinden ampirik olarak sınamaktadır.

Bu çerçevede literatürde üç ana yaklaşım öne çıkmaktadır. İlk yaklaşım, ekonomik büyümenin ve gelir artışının zaman içinde toplumsal cinsiyet eşitsizliklerini azaltabileceğini savunmaktadır (Cerra et al., 2021: 31; Kabeer, 2023: 40, 151, 201). İkinci yaklaşım, büyüme ile toplumsal cinsiyet eşitsizliği arasında çift yönlü bir ilişki bulunduğunu ileri sürmektedir. Buna göre büyüme eşitsizlikleri azaltabilir, eşitlikteki ilerleme de büyümeyi besleyebilir

(Galor & Weil, 1996: 374-376; Lagerlof, 2003: 403-404, 422-423). Bir diğer yaklaşım, toplumsal cinsiyet eşitsizliğinin ekonomik büyüme üzerindeki etkilerini doğrudan ampirik olarak inceleyen çalışmalara dayanmaktadır (Cavalcanti & Tavares, 2016: 109-111; Cuberes & Teignier, 2012: 8-13). Bu çalışmaların ortak sonucu, ilişkinin tek yönlü ve sabit olmadığını; kullanılan göstergeye, ülke grubuna ve kurumsal bağlama göre değişebildiğini göstermesidir. Türkiye örneğinde Çolak (2021: 1094) ekonomik büyümenin toplumsal cinsiyet eşitsizliğinin bazı boyutlarını, özellikle ücret farklarını, kadınlar lehine daraltabildiğini göstermektedir. Bu bulgu, büyüme ile toplumsal cinsiyet eşitsizliği arasındaki ilişkinin yalnızca eşitsizlikten büyümeye doğru değil, ters yönde de işleyebildiğini ortaya koymaktadır. Özellikle ekonomik kalkınma sürecinde doğrusal olmayan ve kadınların işgücüne katılımında gözlemlenen U-şekilli ilişki (Feminisation U) olasılığı, literatürde giderek daha fazla önem kazanmakta ve tartışılmaktadır (Galor & Weil, 1996: 384-385; Santos Silva & Klasen, 2021: 594; Uberti & Douarin, 2023: 5-6, 12).

Bu çalışmada, ana modellere ek olarak tarımsal büyümeye odaklanan ayrı bir model de tahmin edilmiştir. Bu tercihin üç temel gerekçesi vardır. Birincisi, OECD ülkeleri arasında önemli yapısal heterojenlikler bulunmaktadır. Türkiye, Meksika, Şili ve Kolombiya gibi ülkelerde tarım sektörü hâlâ önemli bir istihdam ve katma değer kaynağıdır. Örneğin Türkiye'de kırsal nüfus oranı %25'in üzerindedir ve tarımda çalışan kadınların büyük bölümü ücretsiz aile işçisi konumundadır. Bu nedenle, tarımsal büyümenin toplam büyüme üzerindeki etkisi bu ülkelerde göz ardı edilemez. İkincisi, toplumsal cinsiyet eşitsizliğinin sektörel boyutu, özellikle tarım alanında, giderek daha görünür hale gelmektedir. Kadınların tarımsal üretimdeki rolü çoğu zaman görünmez kalmakta; toprak mülkiyeti, krediye erişim ve tarımsal yayım hizmetlerinden yararlanma bakımından yapısal eşitsizliklerle karşılaşılmaktadır. Bu eşitsizlikler tarımsal verimliliği ve dolayısıyla kırsal büyümeyi doğrudan etkilemektedir. Üçüncüsü, kentleşme süreci devam etse de kırsal alanda kadınların eğitim ve istihdam koşullarının iyileştirilmesi, nesiller arası yoksulluk döngüsünün kırılması ve sürdürülebilir kalkınma açısından kritik önem taşımaktadır. Özellikle gelişmekte olan OECD ülkelerinde kırsal kadınların güçlendirilmesi, yalnızca tarımsal verimlilik açısından değil, kırsal dönüşüm ve göç dinamikleri açısından da belirleyici sonuçlar doğurmaktadır. Dolayısıyla tarımsal büyüme modeli, ana modellerin yerine geçen değil, onları tamamlayan bir analiz çerçevesi olarak kurgulanmıştır. Bu model, OECD ülkeleri içindeki yapısal heterojenliği ve sektörel eşitsizliklerin farklılaşan etkilerini daha açık biçimde ortaya koymak amacıyla dahil edilmiştir.

Bu çalışma, OECD ülkeleri için oluşturulan panel veri seti üzerinde şu sorulara yanıt aramaktadır: (i) Toplumsal cinsiyet eşitsizliği ekonomik büyümeyi nasıl etkilemektedir? (ii) Söz konusu etki, gelir düzeyi, AB üyeliği ve coğrafi bölge gibi boyutlarda farklılaşmakta mıdır? (iii) Eğitim, istihdam ve siyasal temsil alanlarındaki toplumsal cinsiyet eşitsizliklerinin büyüme üzerindeki göreli önemi nedir? (iv) Türkiye'nin OECD ülkeleri içindeki konumu nedir ve hangi politika dersleri çıkarılabilir? (v) Tarımsal büyüme bağlamında, kırsal alandaki toplumsal cinsiyet eşitsizliklerinin etkileri nasıl farklılaşmaktadır? Araştırma hipotezleri, büyüme teorisinin sermaye birikimi, beşerî sermaye ve kurumsal yapı vurgularına dayanmakta; toplumsal cinsiyet eşitsizliğinin büyüme

üzerinde anlamlı ve negatif etkiler yarattığını ve bu etkinin gelişmişlik düzeyiyle farklılaşabileceğini öngörmektedir. Ek bir hipotez ise kırsal alanda kadınların istihdam ve eğitim durumunun tarımsal büyüme üzerindeki etkisine odaklanmaktadır.

Çalışmanın katkısı beş yönlüdür. Birinci katkı, toplumsal cinsiyet eşitsizliğinin tek bir göstergeyle değil, eğitim, istihdam ve siyasal temsil gibi farklı boyutlarla birlikte ele alınmasıdır. İkinci katkı, ülke grupları arasında (yüksek/üst orta gelir; AB üyesi/olmayan; bölgesel kümeler) karşılaştırmalı analiz sunularak politika farklılaşmasının büyüme etkilerine nasıl yansıdığının ortaya konulmasıdır. Üçüncü katkı, Türkiye'nin OECD içindeki konumunun değerlendirilmesidir. Dördüncü katkı, bulguların OECD'nin toplumsal cinsiyete duyarlı kamu yönetişimi politika çerçeveleriyle ilişkilendirilerek somut ve uygulanabilir politika önerilerinin geliştirilmesidir. Beşinci katkı, tarımsal büyüme modelinin eklenmesiyle sektörel heterojenliğin ortaya konulmasıdır. Böylece çalışma, yalnızca toplumsal cinsiyet eşitsizliği ile büyüme arasındaki ilişkinin yönünü değil, bu ilişkinin hangi mekanizmalar ve hangi bağlamlar altında farklılaştığını da ortaya koymayı amaçlamaktadır.

2. Literatür

2.1. Teorik Çerçeve ve İletim Mekanizmaları

Toplumsal cinsiyet eşitsizliğinin ekonomik büyüme üzerindeki etkilerini açıklamak için farklı kuramsal yaklaşımları birlikte değerlendirmek gerekir. Bu konuda en kapsayıcı çerçeveyi feminist iktisat sunmaktadır. Feminist iktisat, ekonomik analizin kapsamını yalnızca piyasa temelli faaliyetlerle sınırlamamakta; bakım emeğini, toplumsal yeniden üretim süreçlerini, toplumsal cinsiyet ilişkilerini ve güç yapılarını analizin merkezine yerleştirmektedir (Benería, 1995: 1839, 1841-1845; Carrasco Bengoa, 2013: 39, 42-45). Bu yaklaşım, toplumsal cinsiyet eşitsizliğinin bireysel tercihlerden çok, kurumsal düzenlemeler, toplumsal yapı ve güç ilişkileri içinde üretilen yapısal bir olgu olarak ele alınmasını öngörmektedir (Babovic, 2018: 9; Villegas Plá, 2024: 7-8). Türkiye bağlamında (Dedeoğlu, 2000: 139-144) da kadın emeğinin konumunun aile, toplumsal cinsiyet rolleri ve hane içi işbölümüyle birlikte ele alınması gerektiğini göstererek bu bakışı desteklemektedir.

Feminist iktisada göre toplumsal cinsiyet eşitsizliği ekonomik yapının hem nedeni hem de sonucudur. Kadınların düşük ücretli işlerde yoğunlaşması, bakım yükünün orantısız biçimde kadınlar üzerinde toplanması, karar alma mekanizmalarına sınırlı erişim ve kadın emeğinin sistematik biçimde değersizleştirilmesi bu sürecin temel boyutlarıdır (Grimshaw et al., 2017: 4-6, 8, 21-22; Seguino, 2019: 4-5). Bu mekanizmalar beşerî sermaye birikimini zayıflatmakta, kaynak tahsisini bozmakta ve toplam verimliliği sınırlamaktadır. Bu nedenle toplumsal cinsiyet eşitsizliği yalnızca hak temelli bir mesele değil, büyüme ve refah performansını etkileyen yapısal bir ekonomik sorundur.

Neoklasik iktisat ise toplumsal cinsiyet farklılıklarını büyük ölçüde rasyonel seçim, bireysel verimlilik ve piyasa etkinliği çerçevesinde açıklamaktadır. Bu yaklaşımın saf biçiminde, rasyonel davranış varsayımı altında tam rekabetçi piyasalarda ücretlerin

verimlilik farklarına göre belirlendiği kabul edilmektedir (Ishizuka, 2018: 1916). Gözlenen farklılıklar neoklasik iktisatta çoğu zaman rasyonel seçim, göreli verimlilik ve uzmanlaşma mantığı ya da piyasa aksaklıkları çerçevesinde açıklanmaktadır (Dow, 2020: 57-58; Zachorowska-Mazurkiewicz, 2017: 121, 126-127). Ancak bu çerçeve bakım emeğini, ev içi işbölümünü ve toplumsal normların ekonomik kararlar üzerindeki etkisini yeterince dikkate almamaktadır. Bu nedenle toplumsal cinsiyet eşitsizliğinin tarihsel ve kurumsal derinliğini açıklamakta sınırlı kalmaktadır.

Kurumsal iktisat bu eksikliği önemli ölçüde gidermektedir. Bu yaklaşım, ekonomik sistemlerin doğal ve kendiliğinden işleyen yapılar değil, tarihsel olarak inşa edilmiş kurumsal düzenlemeler olduğunu kabul eder. İşgücü piyasaları da bu çerçevede yalnızca arz ve talep mekanizmasının işlediği alanlar olarak değil, refah rejimleri, ücret belirleme sistemleri, istihdam koruma düzenlemeleri ve toplumsal normlar tarafından şekillendirilen yapılar olarak görülmektedir (Folbre, 2020: 199-204; Grimshaw et al., 2017: 1-2, 7, 9-11). Türkiye bağlamında Ecevit (2012: 11-12, 17), sosyal politika yazınının uzun süre toplumsal cinsiyete duyarlı olmayan bir çerçevede geliştiğini; refah devleti, neoliberal işgücü piyasası ve ataerkil aile arasındaki ilişkinin feminist müdahalelerle daha görünür hale geldiğini belirtmektedir. Bu nedenle toplumsal cinsiyet eşitsizliği, yalnızca piyasaların değil, kurumsal yapıların ve politika tercihlerinin de ürünüdür.

Marksist-feminist iktisat ise toplumsal cinsiyet eşitsizliğini kapitalist üretim tarzının sömürüye dayalı yapısıyla ilişkilendirerek daha radikal bir eleştiri geliştirmektedir. Bu yaklaşıma göre kapitalizm, işgücünün günlük ve kuşaklar arası yeniden üretimi için kadınların ücretsiz emeğine yapısal olarak bağımlıdır (Wayong, 2016: 162-164). Kadınların hane içindeki ücretsiz emeği yalnızca bakım faaliyetlerini değil, ücretli emek gücünün yeniden üretimini de mümkün kılmaktadır. Bu nedenle kadınların görünmeyen emeği, piyasa ekonomisinin dışsal bir unsuru değil, temel dayanaklarından biridir. Sınıf baskısı ile toplumsal cinsiyet baskısının iç içe geçmiş yapısı da bu çerçevede görünür hale gelmektedir (Babovic, 2018: 17-18; Tasci, 2021: 707-708).

Kalkınma iktisadı literatürü de toplumsal cinsiyet meselesine zaman içinde farklı biçimlerde yaklaşmıştır. "Kalkınmada kadınlar" yaklaşımı, kadınların mevcut kalkınma projelerine entegrasyonunu savunurken, "kadınlar ve kalkınma" yaklaşımı ise kadınların zaten kalkınma sürecinin bir parçası olduğunu vurgulamaktadır. Daha sonra gelişen "toplumsal cinsiyet ve kalkınma" yaklaşımı, kadınlar ile erkekler arasındaki ilişkilerin nasıl toplumsal olarak kurulduğuna ve gücün nasıl dağıtıldığına odaklanmıştır (Kuma & Godana, 2023: 3-4; Ndonga et al., 2021: 80-81; Singh et al., 2021: 83-84). Daha yakın dönemde ise 'smart economics' yaklaşımı, toplumsal cinsiyet eşitliğini verimlilik, üretkenlik ve kalkınma çıktılarıyla ilişkilendirmiştir (Smith et al., 2023: 574, 578-579, 582-583).

Bu kuramsal çerçeveler birlikte değerlendirildiğinde, toplumsal cinsiyet eşitsizliği ile ekonomik büyüme arasındaki ilişkinin tek bir mekanizma ile açıklanamayacağı açıktır. Söz konusu ilişki, beşerî sermaye birikimi, işgücü piyasası verimliliği, ücret yapısı, bakım emeği, hane içi karar alma süreçleri, kurumsal kalite ve siyasal temsil gibi birbirini tamamlayan

kanallar aracılığıyla işlemektedir. Bu nedenle toplumsal cinsiyet eşitsizliğinin büyüme üzerindeki etkisini anlamak, yalnızca piyasa göstergelerine odaklanan dar bir yaklaşımı değil, toplumsal, kurumsal ve ekonomik süreçleri birlikte değerlendiren bütüncül bir analizi gerektirmektedir.

2.2. Ampirik Çalışmalar

Toplumsal cinsiyet eşitsizliği ile ekonomik büyüme arasındaki ilişkiye odaklanan ampirik literatür geniştir. Ancak bulguların yönü ve büyüklüğü tam olarak yeknesak değildir. Bu farklılık yalnızca kullanılan yöntemlerden değil, aynı zamanda eşitsizliğin hangi boyut üzerinden ölçüldüğünden de kaynaklanmaktadır. Eğitim, istihdam, ücret, siyasal temsil, kurumsal kalite ve mülkiyet hakları gibi göstergeler, toplumsal cinsiyet eşitsizliğinin farklı boyutlarını yansıttıkları için, bunların büyüme üzerindeki etkileri de farklı kanallar aracılığıyla ortaya çıkmaktadır. Bu nedenle ampirik literatürü tek tek çalışma özetleri şeklinde değil, ele aldıkları mekanizmalar ve bulgular bakımından sınıflandırarak değerlendirmek daha açıklayıcıdır.

İlk grup, beşerî sermaye ve eğitim kanalına odaklanan çalışmalardan oluşmaktadır. Bu literatürde ortak bulgu, kız çocuklarına erişimdeki ve kadınların eğitim düzeyindeki eşitsizliklerin büyümeyi olumsuz etkilediği yönündedir. Abu-Ghaida & Klasen (2004: 1075, 1077-1079, 1082-1084), Klasen (2002: 345-346, 351-353), Knowles vd. (2002: 118-119, 143) eğitim alanındaki toplumsal cinsiyet eşitsizliğinin beşerî sermaye birikimini zayıflattığını ve uzun dönem büyüme kapasitesini düşürdüğünü göstermektedir. Bu sonuçlar, toplumun üretken kapasitesinin yarısının eksik kullanılması biçiminde özetlenebilecek feminist iktisat tezini ampirik olarak desteklemektedir. Eğitimdeki eşitsizlik, yalnızca kadınların bireysel gelir fırsatlarını sınırlamakla kalmamakta, çocukların sağlık ve eğitim yatırımları ile nesiller arası beşerî sermaye aktarımı üzerinde de etkili olmaktadır. Türkiye için Yumusak vd. (2013: 1093, 1095, 1096) kadın eğitimindeki artışın beşerî sermaye düzeyini yükseltmenin yanı sıra doğurganlık oranlarını, çocuk sağlığını ve sonraki kuşakların eğitim düzeyini de etkilediğini göstermektedir. Benzer biçimde, Karaalp-Orhan (2018: 15-17, 28) Türkiye'de kadın beşerî sermayesinin ekonomik büyümeye yeterince yansımadığını ve kadınların üretken potansiyelinin eksik kullanıldığını ortaya koymaktadır. Bu iki bulgu birlikte değerlendirildiğinde, eğitim alanındaki toplumsal cinsiyet eşitsizliğinin Türkiye'de yalnızca eğitime erişim sorunu değil, aynı zamanda edinilen niteliklerin ekonomide etkin biçimde değerlendirilememesi sorunu da yarattığı anlaşılmaktadır.

İkinci grup işgücü piyasası, ücret yapısı ve kaynak tahsisi kanallarına odaklanmaktadır. Cavalcanti & Tavares (2016: 109-112), Cuberes & Teignier (2014: 265-266, 2016: 1-4), Esteve-Volart (2008: 2-7), Hsieh vd. (2019: 2-5) toplumsal cinsiyete dayalı dışlanmanın ve mesleki engellerin yeteneklerin etkin dağılımını bozduğunu, bunun da toplam faktör verimliliğini ve kişi başına gelir düzeyini düşürdüğünü göstermektedir. Bu sonuçlar, kadın emeğinin düşük ücretli işlerde yoğunlaşması, mesleki ayrışma ve karar alma

süreçlerinden dışlanma gibi mekanizmaların ekonomik maliyet yarattığını ortaya koymaktadır.

Bununla birlikte, kadınların işgücüne katılım oranına ilişkin bulgular daha heterojendir. Bunun temel nedeni, işgücüne katılım oranının tek başına güçlenmeyi ya da nitelikli istihdamı göstermemesidir. Kadınların işgücüne katılımı artsa bile, kayıt dışılık, düşük ücret, yarı zamanlı çalışma, bakım yükü ve mesleki ayrışma sürüyorsa büyüme üzerindeki etkiler zayıf ya da belirsiz kalabilmektedir. Türkiye bağlamında Dedeoğlu (2009: 41-42, 45-46, 53) kadın istihdamının düşüklüğünü yalnızca bireysel tercihlerle değil, toplumsal cinsiyet duyarlı makro politikaların yokluğu, sosyal devletin sınırlı yapısı ve bakım hizmetlerinin yetersizliği ile de açıklamaktadır. Benzer biçimde, Tatli & Tasci (2021: 225-227, 247-248) kadın işsizliğinin azaltılmasında insani gelişme bileşenlerinin belirleyici olduğunu ve bu alanda kamusal müdahalenin önemli bir rol oynadığını göstermektedir. Çalışma, eğitim, sağlık ve gelir düzeyini güçlendiren politikalar ile aktif istihdam önlemlerinin kadınların işgücü piyasasındaki konumunu destekleyebileceğini vurgulamaktadır. Bu nedenle işgücüne katılım oranına ilişkin zayıf ya da karmaşık bulgular, toplumsal cinsiyet eşitsizliğinin önemsizliğine değil, eşitsizliğin çok katmanlı doğasına işaret etmektedir.

Üçüncü grup, ücret eşitsizliği ile dış ticaret rekabeti arasındaki ilişkiyi ele alan çalışmalardır. Busse vd. (2006: 37-38, 42-45) ile Seguino (2000: 370-375) bazı yarı sanayileşmiş ve ihracata dönük ekonomilerde kadınlara ödenen düşük ücretlerin kısa vadede maliyet avantajı yaratabildiğini ve büyümeyi ya da ihracat performansını destekleyebildiğini ileri sürmektedir. Türkiye bağlamında Dedeoğlu (2022: 96-97, 101-102, 114) İstanbul hazır giyim sanayisinde kadınların ev eksenli ve parça başı çalışmalarının ihracata dayalı rekabetin görünmez emeğin temelini oluşturduğunu göstermektedir. Benzer biçimde, Toksöz (2011: 19, 25-27) ihracata yönelimli sanayileşmeye rağmen kadınların sanayi istihdamındaki payının sınırlı kaldığını ve tarımdan açığa çıkan kadın işgücünün tarım dışı sektörlerce yeterince emilemediğini ortaya koymaktadır. Bu çalışmalar birlikte değerlendirildiğinde, düşük ücretli ve güvencesiz kadın emeğine dayanan rekabet modellerinin kısa vadede kazanç sağlayabildiği, ancak uzun vadede verimlilik, refah ve kapsayıcı büyüme açısından önemli sınırlılıklar taşıdığı anlaşılmaktadır.

Dördüncü grup, siyasal temsil, yönetişim ve kurumsal kalite kanallarını inceleyen çalışmalardır. Dollar vd. (2001: 424, 427-428) ve Swamy vd. (2001: 39-45), kadınların siyasal ve kamusal temsili arttıkça yolsuzluğun azalabildiğini göstermektedir. Jayasuriya & Burke (2013: 304) ile Cabeza-García vd. (2018: 8-10) ise kadınların parlamentodaki ve siyasal yaşamdaki daha güçlü temsilinin ekonomik büyümeyi olumlu yönde etkileyebildiğini ortaya koymaktadır. Bu bulgular birlikte değerlendirildiğinde, toplumsal cinsiyet eşitsizliğinin yalnızca emek piyasasıyla sınırlı olmadığı, yönetişim ve siyasal temsil kanalları üzerinden de ekonomik performansı etkileyebildiği anlaşılmaktadır.

Ampirik literatürün en dikkat çekici yönlerinden biri, toplumsal cinsiyet eşitsizliği ile büyüme arasındaki ilişkinin her zaman doğrusal olmamasıdır. Kullanılan göstergeye,

ülke grubuna, üretim yapısına ve kurumsal bağlama göre bulguların yönü değişebilmektedir. Bu nedenle son yıllarda doğrusal olmayan ilişkiler ve özellikle U-şekilli ilişkiler tartışması öne çıkmıştır. Temel mesele, toplumsal cinsiyet eşitsizliğinin büyümeyi her zaman aynı yönde etkileyip etkilemediğidir. Literatürdeki bulgular, bunun böyle olmadığını düşündürmektedir. Kadın emeğinin düşük ücretle ve esnek biçimde sisteme dahil edildiği ekonomilerde kısa dönemli rekabet etkileri nedeniyle eşitsizlik ile büyüme arasında pozitif görünümlü ilişkiler ortaya çıkabilmektedir. Buna karşılık, eğitim, nitelikli istihdam, üretken kaynaklara erişim ve siyasal temsil alanlarında eşitliğin güçlendiği daha gelişmiş kurumsal yapılarda, toplumsal cinsiyet eşitliği büyümeyi daha açık biçimde desteklemektedir. Bu nedenle U-şekilli ilişki tartışması, eşitsizliğin düzeyine ve niteliğine göre farklı mekanizmaların baskın hale gelebildiğini göstermesi bakımından önemlidir.

Bu doğrusal olmayan yapı, görünürde çelişkili ampirik sonuçları da açıklamaktadır. Eğitim ve siyasal temsil göstergeleri çoğu zaman daha tutarlı biçimde pozitif etkiler üretirken, kadınların işgücüne katılımı ya da ücret farkı gibi göstergelerde sonuçlar daha değişken olabilmektedir. Bunun nedeni, bazı göstergelerin doğrudan güçlenmeyi ve kapasite artışını yansıtması, bazılarının ise hem fırsat genişlemesini hem de kırılgan emek biçimlerini aynı anda içerebilmesidir. Bu nedenle toplumsal cinsiyet eşitsizliğini tek bir göstergeyle temsil eden çalışmalar, ilişkinin karmaşık doğasını yeterince yansıtamaz.

Sonuç olarak, ampirik literatür toplumsal cinsiyet eşitsizliğinin ekonomik büyüme üzerindeki etkisinin ne tek yönlü ne de tek boyutlu olduğunu göstermektedir. Beşerî sermaye kayıpları, kaynak tahsisindeki verimsizlik, ücret ayrımcılığı, bakım emeğinin görünmezliği ve kurumsal dışlanma çoğu durumda büyümeyi zayıflatmaktadır. Buna karşılık bazı ülkelerde ve sektörlerde düşük ücretli kadın emeğine dayanan rekabetçi modeller kısa vadeli büyüme etkileri yaratabilmektedir. Bu ikili yapı, doğrusal olmayan ve özellikle U-şekilli ilişki tartışmasını kuramsal ve ampirik açıdan anlamlı kılmaktadır. Bu çalışma, OECD ülkelerinde toplumsal cinsiyet eşitsizliğini eğitim, istihdam ve siyasal temsil gibi farklı boyutlarıyla birlikte ele alarak hem bu heterojen yapıyı hem de olası doğrusal olmayan ilişkileri yeniden sınamayı amaçlamaktadır. Böylece yalnızca ilişkinin varlığını değil, bu ilişkinin hangi mekanizmalar ve hangi bağlamlar altında farklılaştığını da tartışmaya açmaktadır.

3. Veri ve Yöntem

3.1. Veri Seti

Bu çalışmada 38 OECD ülkesinin 1990-2021 dönemine ait yıllık verileri kullanılmıştır. Örneklem, dengeli panel veri yapısında olup N=38 ülke ve T=32 yıl olmak üzere toplam 1216 gözlemden oluşmaktadır. Analizde kullanılan değişkenlere ait veriler Dünya Bankası Kalkınma Göstergeleri ve Birleşmiş Milletler Kalkınma Programı'nın (UNDP) veritabanlarından derlenmiştir. Tablo 1 modellerde yer alan değişkenleri ve ilgili veri kaynaklarını göstermektedir.

Tablo: 1
Analizde Kullanılan Değişkenlere Ait Veritabanları (1990-2021)

Değişkenler	Açıklama	Kaynak
GDP	Kişi Başına GSYİH (1000 $) (2005 uluslararası sabit dolar cinsinden)	Dünya Bankası, World Development Indicators (WDI)
INV	GSYİH yüzdesi olarak yatırım (%)	Dünya Bankası, World Development Indicators (WDI)
POP	Nüfus artış oranı (%)	Dünya Bankası, World Development Indicators (WDI)
GII	Cinsiyet eşitsizlik endeksi (%)	UNDP
OPEN	GSYİH yüzdesi olarak toplam dış ticaret (%)	Dünya Bankası, World Development Indicators (WDI)
SEATS	Kadınların temsil oranı (%)	Dünya Bankası, World Development Indicators (WDI)
EDPRIM	Kadınların okula kayıtlanma oranı (%)	Dünya Bankası, World Development Indicators (WDI)
EDSEC	Kadınların okula kayıtlanma oranı (%)	Dünya Bankası, World Development Indicators (WDI)
RFLFP	Kadınların işgücüne katılımı (%)	Dünya Bankası, World Development Indicators (WDI)
AGDP)	Tarım, ormancılık ve balıkçılık, katma değer (GSYİH'nin %'si)	Dünya Bankası, World Development Indicators (WDI)
FPOP	Nüfus, kadın (toplam nüfusun %'si)	Dünya Bankası, World Development Indicators (WDI)
FPA	Tarımda istihdam, kadın (kadın istihdamının %'si)	Dünya Bankası, World Development Indicators (WDI)

Çalışmanın örneklemini oluşturan 38 OECD ülkesi şunlardır: Avustralya, Avusturya, Belçika, Kanada, Şili, Kolombiya, Kosta Rika, Çekya, Danimarka, Estonya, Finlandiya, Fransa, Almanya, Yunanistan, Macaristan, İzlanda, İrlanda, İsrail, İtalya, Japonya, Güney Kore, Letonya, Litvanya, Lüksemburg, Meksika, Hollanda, Yeni Zelanda, Norveç, Polonya, Portekiz, Slovakya, Slovenya, İspanya, İsveç, İsviçre, Türkiye, Birleşik Krallık ve Amerika Birleşik Devletleri.

Ülkeler analiz kapsamında gelişmişlik düzeyine göre iki gruba ayrılmıştır. Dünya Bankası'nın gelir sınıflandırmasına göre Kolombiya, Kosta Rika, Meksika ve Türkiye üst-orta gelir grubunda (4 ülke); geri kalan 34 ülke ise yüksek gelir grubunda yer almaktadır. Bu gruplandırma, toplumsal cinsiyet eşitsizliğinin ekonomik etkileri konusunda gelişmişlik düzeyine göre olası farklılıkların incelenmesine olanak tanımaktadır.

Alt grup analizlerinde ülkeler gelir gruplarına ve AB üyeliğine göre gruplandırılmıştır. Coğrafi bölgelere göre alternatif gruplandırmalar da mümkün olmakla birlikte, gelir düzeyine göre ayrım daha tutarlı ve anlamlı sonuçlar vermiştir. Coğrafi bölgelere göre gruplandırmada küçük örneklem boyutları (Asya için N=6, Amerika için N=6) ve Avrupa-AB üyeliği arasındaki yüksek örtüşme güvenilir sonuçların elde edilmesini zorlaştırmaktadır. Bu nedenle, alt grup analizleri gelişmişlik düzeyine ve AB üyeliğine göre yapılmıştır.

Tablo 2 çalışmada kullanılan değişkenlere ait betimsel istatistikleri sunmaktadır. Toplumsal Cinsiyet Eşitsizliği Endeksi ortalaması 0,18 olup, OECD ülkelerinde cinsiyet eşitsizliğinin görece düşük olduğunu, ancak ülkeler arasında önemli farklılıklar bulunduğunu göstermektedir. Kişi başına gelir ortalaması 35.593,80 US$ ve standart sapması 15.728,06 US$ olup, bu geniş dağılım gelir gruplarına göre ayrı analizlerin gerekliliğini ortaya koymaktadır. Cinsiyet eşitliği göstergeleri incelendiğinde, parlamentoda kadın temsil oranının %2,36 ile %49,84 arasında değişmesi, bu değişkenin Model 2 tahminlerinde güçlü bir açıklayıcı değişken olarak ortaya çıkmasını açıklamaktadır. İlköğretime kayıt paritesinin ortalaması 102,13 ve standart sapması 5,55 olup, bu değişkenin Model 2'de anlamsız çıkması beklenen bir sonuçtur. Zira OECD ülkelerinde ilköğretimde cinsiyet eşitliği sağlanmıştır. Buna karşın ortaöğretime kayıt paritesinin ortalaması 75,32 ve

standart sapması 20,47 olarak hesaplanmış olup, ülkeler arasında halen önemli farklılıklar bulunmaktadır.

Tablo: 2
Modelde Yer Alan Değişkenlere Ait Tanımlayıcı İstatistikler (1990-2021)

Değişkenler	N	Minimum	Maksimum	Ortalama	Std. Sapma
GII	1216	0,01	0,62	0,18	0,12
GDP ($)	1211	7932,95	93173,95	35593,80	15728,06
INV	1185	11,89	54,70	23,51	4,43
POP	1215	-2,57	6,02	,62	,80
OPEN	1185	15,81	388,12	86,02	51,50
SEAT	1216	2,36	49,84	22,80	10,97
EDPRIM	1093	77,27	129,80	102,13	5,55
EDSEC	1216	11,51	100,00	75,32	20,47
RLFP	1216	0,33	1,11	0,75	0,12
AGDP	1163	115893059.48	67637322892.20	12471426958.85	14270834921.13
FPOP	1216	48.70	54.47	50.99	1.02
FLAB	1216	0.14	2.54	0.59	0.37

Cinsiyet eşitsizliğinin ülke ve zaman boyutundaki dağılımı Ek Tablo 1 ve Ek Tablo 2'de ayrıntılı olarak sunulmaktadır. Ek Tablo 1, OECD ülkeleri arasında GII değerleri bakımından belirgin farklılıklar bulunduğunu göstermektedir. En düşük eşitsizlik düzeyleri İsveç (0.055) ve Danimarka (0.058) gibi İskandinav ülkelerinde gözlenirken, en yüksek değerler Türkiye (0.471) ve Kolombiya (0.480) gibi üst-orta gelir grubundaki ülkelerde görülmektedir. Gelir grupları itibarıyla değerlendirildiğinde, yüksek gelir grubunda GII ortalaması 0.156 iken, üst-orta gelir grubunda bu değer 0.435'e yükselmektedir. Bu belirgin fark, OECD içindeki yapısal heterojenliği açık biçimde ortaya koymakta ve alt grup analizlerinin gerekliliğini ampirik olarak desteklemektedir. Türkiye, 0.471'lik dönem ortalamasıyla OECD genel ortalamasının (0.186) yaklaşık 2,5 katına ulaşmakta ve örneklemde en yüksek eşitsizlik düzeyine sahip ülkeler arasında yer almaktadır.

Ek Tablo 2 ise GII'nin zaman içindeki seyrini beş yıllık aralıklarla göstermektedir. OECD genelinde GII ortalaması 1990'daki 0.267 düzeyinden 2021'de 0.108'e gerilemiş, böylece otuz yıllık dönemde cinsiyet eşitsizliği yaklaşık yüzde 60 oranında azalmıştır. Bu eğilim, OECD ülkelerinin toplumsal cinsiyet eşitliği alanında önemli ilerlemeler kaydettiğine işaret etmektedir. Bununla birlikte, ülkeler arası farklılıklar devam etmektedir. Nitekim varyasyon katsayısı (CV) 1990'daki 47.98 düzeyinden 2021'de 83.42'ye yükselmiştir. Bu bulgu, GII ortalamasının mutlak düzeyde düşmesine karşın ülkeler arasındaki göreli eşitsizliğin arttığını; bir başka ifadeyle bazı ülkelerin cinsiyet eşitliği alanında çok daha hızlı ilerleme kaydederken, diğerlerinin geride kaldığını ortaya koymaktadır. Dolayısıyla OECD içinde yakınsama değil, göreli ıraksama söz konusudur. Söz konusu zaman eğilimi, çalışmanın 1990-2021 dönemini kapsayan dinamik panel modeline bağlamsal bir zemin sunmakta ve farklılaştırılmış politika yaklaşımlarının gerekliliğini desteklemektedir.

3.2. Yöntem

Panel veri, ülkeler, firmalar ya da hanehalkları gibi kesit birimlerinin zaman içinde tekrarlanan gözlemlerinden oluşur. Bu yapı, kesit ve zaman serisi boyutlarını birleştirerek

yatay kesit ve zaman serisi analizlerine göre önemli avantajlar sağlamaktadır. Birincisi, panel veri yöntemleri birimler arasındaki gözlenemeyen heterojenliğin (örneğin ülkelere özgü kurumsal özellikler, kültürel faktörler) kontrol edilmesine olanak tanımaktadır. İkinci olarak, aynı birimlerin zaman içinde izlenmesi toplam gözlem sayısını artırmakta ve tahminlerin etkinliğini artırmaktadır. Üçüncü olarak, değişkenler arasındaki çoklu bağlantı (multicollinearity) sorunu kesit verilere kıyasla daha az ortaya çıkmaktadır. Son olarak, zaman boyutunun nispeten kısa olduğu veya kesit sayısının sınırlı kaldığı durumlarda bile güvenilir ekonometrik tahminler elde edilebilmektedir (Gujarati, 2004). Panel veri yöntemleri arasında dinamik panel veri analizleri, bağımlı değişkenin gecikmeli değerlerinin açıklayıcı faktör olarak alınmasına imkân tanıması nedeniyle iktisadi ilişkilerin incelenmesinde sıklıkla tercih edilmektedir.

Dinamik panel veri modellerinde bağımlı değişkenin bir dönem gecikmesi açıklayıcı değişkenler arasında yer almaktadır. Gecikmeli bağımlı değişken, içsellik problemini kontrol etmek ve geçmiş dönem değerlerinin cari dönem üzerindeki etkisini yakalamak amacıyla modele dahil edilmiştir. Bu tür modellerde, gecikmeli bağımlı değişkenin sabit etkilerle korelasyonu nedeniyle klasik tahmin yöntemleri yanlı ve tutarsız sonuçlar üretmektedir. Bu sorunu çözmek için Arellano & Bond (1991) tarafından geliştirilen Fark GMM (Genelleştirilmiş Momentler Yöntemi) yaygın olarak kullanılmaktadır.

İki aşamalı GMM tahminlerinde standart hataların aşağıya doğru sapmalı olması bilinen bir sorundur. Bu nedenle, standart hata sapmasını düzeltmek için Windmeijer (2005) tarafından önerilen sonlu örneklem düzeltmesi uygulanmıştır. Windmeijer düzeltmesi, küçük ve orta büyüklükteki örneklemlerde daha güvenilir standart hatalar ve dolayısıyla daha sağlıklı hipotez testleri sağlamaktadır. Bu çalışmada, Model 1 ve Model 2 için tüm OECD örneklemi ve yüksek gelir grubu analizlerinde Windmeijer düzeltmeli İki Aşamalı Fark GMM kullanılmıştır.

GMM tahminlerinde, bağımsız değişkenlerin ikinci ve üçüncü gecikmeleri enstrüman olarak kullanılmış ve enstrüman çoğalmasını önlemek amacıyla 'collapse' seçeneği uygulanmıştır. Araç değişkenlerin geçerliliği Hansen testi ile, dinamik modelin uygunluğu ise Arellano-Bond birinci ve ikinci derece otokorelasyon testleri (AR(1) ve AR(2)) ile kontrol edilmiştir. AR(1) testinde birinci derece otokorelasyonun bulunması beklenmekte; AR(2) testinde ise ikinci derece otokorelasyonun bulunmaması modelin tutarlılığını göstermektedir.

Küçük örneklem büyüklüğüne sahip alt grup analizlerinde, Blundell & Bond (1998) tarafından önerilen Sistem GMM tahmincisi kullanılmıştır. Sistem GMM, Fark GMM'ye göre zayıf enstrüman problemini azaltmakta ve küçük örneklemlerde daha etkin tahminler üretmektedir. Sistem GMM'de hem fark denklemleri hem de düzey denklemleri kullanılarak enstrüman seti genişletilmekte ve tahmin verimliliği artırılmaktadır. Bununla birlikte, üst-orta gelir grubu yalnızca dört ülkeden (Türkiye, Meksika, Kolombiya, Kosta Rika) oluşmaktadır. Bu örneklem büyüklüğünde enstrüman sayısı grup sayısını sistematik biçimde aşmakta, iki aşamalı GMM'nin kovaryans matrisi tekil hale gelmekte ve Hansen ile Sargan

testleri güvenilir biçimde yorumlanamaz değerler üretmektedir. Farklı enstrüman setleriyle yürütülen deneme tahminleri de bu yapısal kısıtı doğrulamıştır. Bu nedenle üst-orta gelir grubu için dinamik panel tahmini yapılamamıştır.

Panel veri analizinde sahte regresyon sorununu önlemek amacıyla değişkenlerin durağanlık özellikleri incelenmiştir. Im vd. (2003) panel birim kök testi kullanılarak değişkenlerin durağanlık seviyeleri test edilmiş ve test sonuçları Ek Tablo 3'te sunulmuştur. IPS testi, yatay kesit birimlerinin otoregresif katsayılarının heterojen olmasına izin vermesi nedeniyle tercih edilmiştir. Test sonuçlarına göre, değişkenlerin büyük çoğunluğu düzey değerlerinde durağan bulunmuştur (Ek Tablo 3).

3.3. Araştırmada Kullanılan Modeller ve Hipotezler

Bu çalışmada test edilen hipotezler şunlardır:

H_1: Cinsiyet eşitsizliği ekonomik büyümeyi etkiler.

H_2: Farklı gelişmişlik düzeylerine göre cinsiyet eşitsizliğinin ekonomik büyümeye etkisi farklıdır.

H_3: Kırsalda yaşayan kadınların istihdamı ve eğitimi tarımsal büyümeyi etkiler.

Bu hipotezleri test etmek amacıyla üç ana ekonometrik modelden yararlanılmıştır. Birinci model Toplumsal Cinsiyet Eşitsizliği Endeksi'nin (GII) kişi başına gelir üzerindeki etkisini incelemektedir. Model, Karoui & Feki (2018) yaklaşımına dayandırılarak dinamik biçimde kurgulanmıştır:

$$LNGDP_{it} = c + \sigma\, LNGDP_{i,t-1} + \beta 1 LNINV_{it} + \beta_2 LNPOP_{it} + \beta_3 GII_{it} + \varepsilon_{it} \quad (1)$$

Burada LNGDP kişi başına GSYİH'nın logaritmasını, LNINV brüt sermaye oluşumunun logaritmasını, LNPOP nüfusun logaritmasını, GII ise Toplumsal Cinsiyet Eşitsizliği Endeksi'ni ifade etmektedir. i ülkeleri (i=1,...,38), t ise zamanı (t=1990,...,2021) göstermektedir. GII, Birleşmiş Milletler Kalkınma Programı (UNDP) tarafından hesaplanan ve üreme sağlığı, güçlendirme (eğitim ve siyasal temsil) ve işgücü piyasası katılımı boyutlarını içeren bileşik bir endekstir. Endeks 0 ile 1 arasında değer almakta olup, 1'e yaklaştıkça toplumsal cinsiyet eşitsizliği artmaktadır.

İkinci model, toplumsal cinsiyet eşitsizliğinin bileşenlerini ayrıştırarak mekanizma düzeyinde etkilerini test etmektedir. Bu model, Altuzarra vd. (2021) çalışmasına dayandırılmıştır:

$$LNGDP_{it} = \alpha + \beta_1\, LNGDP_{i,t-1} + \beta_2 LNINV_{it} + + \beta_3 LNOPEN_{it} + \beta_4 LNSEATS_{it} + \beta_5 LNEDPRIM_{it} + \beta_6 LNEDSEC_{it} + \beta_7 LNRLFP_{it} + \beta_8 Regions_{it} + \varepsilon_{it} \quad (2)$$

Bu modelde LNOPEN, ticaret açıklığının logaritmasını; LNSEATS, ulusal parlamentoda kadınların sahip olduğu koltuk oranının logaritmasını; LNEDPRIM, ilköğretime kayıt oranındaki cinsiyet paritesinin logaritmasını; LNEDSEC, ortaöğretime

kayıt oranındaki cinsiyet paritesinin logaritmasını; LNRLFP ise kadın işgücüne katılım oranının logaritmasını ifade etmektedir. Bu model, toplumsal cinsiyet eşitsizliğinin eğitim, siyasal temsil ve işgücü katılımı kanallarıyla kişi başına geliri nasıl etkilediğini ortaya koymaktadır.

Model 2, gelişmişlik düzeyine göre farklılaşan etkileri incelemek amacıyla hem tüm OECD örneklemi için hem de gelir grupları (yüksek gelir ve üst-orta gelir) için ayrı ayrı tahmin edilmiştir. Bu yaklaşım, toplumsal cinsiyet eşitsizliğinin ekonomik etkilerinin ülkelerin kalkınma düzeyine göre nasıl değiştiğinin anlaşılmasına olanak tanır.

Model 2'de β_8Regions terimi kurumsal bağlamın etkisini yakalamak amacıyla öncelikle bölgesel kukla değişkenlerle test edilmiştir. Ancak bu spesifikasyon, Avrupa ve AB üyeliği arasındaki yüksek örtüşme ile küçük bölgesel alt örneklem büyüklükleri nedeniyle geçersiz sonuçlar üretmiştir. Bu nedenle bölgesel kukla yaklaşımı terk edilerek 2004 AB genişlemesini dikkate alan dinamik bir AB üyeliği değişkeni oluşturulmuştur. AB üyeliği değişkeni şu biçimde tanımlanmıştır: EU_üye_dinamik_it = {1, eğer ülke i, t yılında AB üyesi ise; 0, aksi durumda}. Bu değişken, 2004 yılında AB'ye katılan Çekya, Estonya, Macaristan, Letonya, Litvanya, Polonya, Slovakya ve Slovenya için zaman içinde değişmektedir. Söz konusu sekiz ülkede değişken 1990-2003 döneminde 0, 2004-2021 döneminde ise 1 değerini almaktadır. Örneklemdeki diğer AB üyesi ülkeler için değişken tüm dönem boyunca 1, AB üyesi olmayan ülkeler için ise tüm dönem boyunca 0 değerini almaktadır. Zaman içinde değişen bu yapısı sayesinde değişken Fark GMM tahmincisinde tanımlanabilmekte ve AB üyeliğinin büyüme üzerindeki doğrudan etkisi ayrıştırılabilmektedir.

Ek olarak, kırsal kadın istihdamı ve eğitiminin tarımsal katma değer üzerindeki etkisini incelemek amacıyla üçüncü bir model geliştirilmiştir. OECD ülkelerinde kırsal nüfus oranı düşük olsa da tarımsal üretim, gıda güvenliği ve kırsal kalkınma açısından stratejik öneme sahiptir. Özellikle gelişmekte olan OECD üyesi ülkelerde (Türkiye, Meksika, Şili, Kolombiya gibi) kadınların tarımsal istihdamı hâlâ önemli bir istihdam alanı oluşturmaktadır.

$$LNAGDP_{it} = \alpha + \beta_1 LNAGDP_{i,t-1} + \beta_2 LNFPA_{it} + + \beta_3 LNPOP_{it} + \beta_4 LNEDPRIM_{it} + \beta_5 LNEDSEC_{it} + \varepsilon_{it} \quad (3)$$

Bu modelde LNAGDP, tarımsal katma değerin logaritmasını; LNFPA ise tarımda kadın istihdamının logaritmasını göstermektedir. Model 3, Osabohien vd. (2021) ve Yu & Osabohien (2023) çalışmalarına dayandırılmıştır. Tüm modeller, uygun GMM tahmincileri kullanılarak tahmin edilmiş olup, tahmin sonuçları ve diagnostik test istatistikleri izleyen bölümde sunulmuştur.

4. Bulgular

Model 1, toplumsal cinsiyet eşitsizliğinin bileşik bir ölçütü olan GII'nin kişi başına gelir üzerindeki etkisini incelemektedir. Tablo 3 Windmeijer düzeltmeli İki Aşamalı Fark

GMM tahmin sonuçlarını göstermektedir. Gecikmeli kişi başına gelir değişkeni pozitif ve %1 düzeyinde anlamlıdır. Bu durum gelir düzeyinin bir önceki dönemden etkilendiğini göstermektedir. Yatırımlar değişkeni beklendiği gibi pozitif ve anlamlı bulunmuştur. Ancak GII değişkeninin katsayısı istatistiksel olarak anlamlı değildir. Bu bulgu, toplumsal cinsiyet eşitsizliğinin bileşik endeks olarak ele alındığında OECD ülkelerinde kişi başına gelir üzerinde anlamlı bir etkisinin tespit edilemediğini göstermektedir.

AR(1) testi sonuçları birinci derece otokorelasyonun varlığını, AR(2) testi sonuçları ise ikinci derece otokorelasyonun bulunmadığını göstermektedir. Hansen testi enstrümanların geçerli olduğunu ortaya koymaktadır. Bu diagnostik testler, tahmin sonuçlarının güvenilir olduğunu göstermektedir. Model 1'de GII'nin anlamsız çıkması, toplumsal cinsiyet eşitsizliğinin farklı boyutlarının kişi başına gelir üzerinde farklı etkiler yaratabileceği olasılığını gündeme getirmektedir. Bu nedenle, GII'nin bileşenlerinin ayrı ayrı incelenmesi gerekmektedir.

Tablo: 3
Model 1 Windmeijer Düzeltmeli Fark GMM Sonuçları

Bağımlı değişken: LGDP	
Bağımsız değişkenler	**Katsayı**
LNGDP(t-1)	0.003 (0.968)
LNINV	0.131*** (0.002)
LNPOP	-0.008** (0.039)
GII	-0.015 (0.483)
	Test istatistiği
Gözlem Sayısı	1216
Ülke Sayısı	38
Enstrüman Sayısı	16
Wald Testi ($\chi 2$)	23.42*** (0.001)
AR(1) p-değeri	0.008 (0.007)
AR(2) p-değeri	0.090 (0.090)
Hansen Test p-değeri	0.328

*Not: * p<0.10, ** p<0.05, *** p<0.01. AR(1) ve AR(2), Arellano-Bond (1991) tarafından geliştirilen birinci ve ikinci derece otokorelasyon testleridir. Hansen (1982) testi enstrümanların geçerliliğini test eder.*

Model 2, toplumsal cinsiyet eşitsizliğinin farklı boyutlarını ayrıştırarak eğitim, siyasal temsil ve işgücü katılımı kanallarının kişi başına gelir üzerindeki etkilerini incelemektedir. Tablo 4, tüm OECD ülkeleri için Windmeijer düzeltmeli İki Aşamalı Fark GMM tahmin sonuçlarını sunmaktadır. Gecikmeli kişi başına gelir değişkeni, Model 1'de olduğu gibi, pozitif ve %1 düzeyinde anlamlıdır. Yatırımlar ve ticari açıklık değişkenleri de beklenen şekilde pozitif ve anlamlı bulunmuştur.

Toplumsal cinsiyet eşitliği göstergeleri arasında parlamentoda kadın temsil oranı ile en güçlü ve ortaöğretime kayıt paritesi pozitif ve istatistiksel olarak anlamlı bulunmuştur. Ortaöğretime kayıt paritesi katsayı büyüklüğü bakımından en yüksek etkiye sahip cinsiyet değişkeni olarak öne çıkmaktadır. Parlamentoda temsil oranı ise pozitif ve %1 düzeyinde

anlamlıdır. Bu bulgular, kadınların siyasal alanda temsil edilmesinin ve ortaöğretim düzeyinde eğitime erişimlerinin ekonomik gelişme açısından önemini vurgulamaktadır. Buna karşın, ilköğretime kayıt paritesi ve kadın işgücüne katılım oranı istatistiksel olarak anlamlı değildir.

İlköğretim paritesinin anlamsız çıkması, betimsel istatistiklerde görülen tavan etkisi ile tutarlıdır. OECD ülkelerinde ilköğretimde cinsiyet eşitliği büyük ölçüde sağlanmış olup, bu değişkenin ülkeler arasındaki varyansı düşüktür. Kadın işgücüne katılım oranının anlamsızlığı, işgücü piyasasındaki yapısal faktörlerin ve nitelik farklılıklarının etkisini göstermektedir. AR(1) ve AR(2) testleri ile Hansen testi sonuçları model spesifikasyonunun uygun olduğunu ortaya koymaktadır.

Doğrusal olmayan etki testinde, kadın temsilinin karesel terimi modele eklenmiştir. Analiz U-şekilli bir ilişkiye işaret edebilecek katsayı işaretleri üretmiştir. Ancak her iki terim de istatistiksel olarak anlamlı değildir. Teorik olarak hesaplanan dönüm noktası %7,3[3] seviyesinde yer almaktadır. Bu da kritik kütle teorisinin[4] öne sürdüğü %15-30 eşiğinden önemli ölçüde düşüktür. Bu bulgunun OECD örneklemi bağlamında yorumlanması önemlidir. Örneklemde yer alan 38 ülkenin ortalama kadın temsil seviyeleri incelendiğinde, sadece 4 ülke (Türkiye %8,2, Macaristan %10,4, Güney Kore %8,2, Japonya %10,7) %11'in altında ortalamaya sahiptir. Ülkelerin büyük çoğunluğu (29 ülke) %15-40 aralığında yer almaktadır ve sadece 4 İskandinav ülkesi (İsveç %43,8, Finlandiya %38,7, Norveç %38,2, Danimarka %36,8) %36'nın üzerinde temsil seviyelerine ulaşmıştır (Ek Tablo 4). Bu dağılım, kritik kütle eşiğinin altındaki (%15) çok sınırlı varyasyon ve tavan etkisini test etmek için yeterli sayıda yüksek temsil gözleminin (%45+) bulunmaması nedeniyle (Ek Grafik 1), doğrusal olmayan ilişkileri güvenilir bir şekilde test etmeyi zorlaştırmaktadır. Dolayısıyla, doğrusal spesifikasyon OECD ülkelerinin mevcut temsil dağılımı için en uygun modeldir.

AB üyeliğinin ekonomik büyüme üzerindeki doğrudan etkisini test etmek için, 2004 genişlemesinden yararlanan dinamik bir AB üyeliği değişkeni oluşturulmuştur. Analiz sonuçları, AB'ye katılımın ekonomik büyüme üzerinde istatistiksel olarak anlamlı bir doğrudan etkisi olmadığını göstermiştir (Tablo 4). Bu bulgu, AB'nin ekonomik büyüme üzerindeki etkisinin doğrudan değil, dolaylı kanallar (ticaret, yatırım akışları, kurumsal uyum) aracılığıyla gerçekleştiğini düşündürmektedir. Nitekim, modelde ticari açıklık değişkeni güçlü ve anlamlı bir etkiye sahiptir. Bu da AB'nin ticaret entegrasyonu kanalıyla

---

[3] *Karesel terim modelinde ($y = \beta_0 + \beta_1 x + \beta_2 x^2 + ...$) dönüm noktası, birinci türevin sıfıra eşitlenmesiyle hesaplanır: $\partial y/\partial x = \beta_1 + 2\beta_2 x = 0$. Buradan $x^* = -\beta_1/(2\beta_2)$ elde edilir. Bu noktada, $\beta_2<0$ ise maksimum (ters U-şekilli), $\beta_2>0$ ise minimum (U-şekilli) vardır. Bu çalışmada lseats logaritmik değişken olduğundan, dönüm noktası exp(x*) dönüşümü ile orijinal ölçeğe (% olarak) geri çevrilmiştir. Örneğin, $\beta_1=-0.323$, $\beta_2=0.081$ için: $x^* = -(-0.323)/(2\times0.081) = 1.99$, dönüm noktası = exp(1.99) ≈ %7,3 kadın temsili.*

[4] *Kritik kütle teorisi Dahlerup (1988) tarafından kadınların parlamentoda temsiline uyarlanmış bir teoridir. Teoriye göre, azınlık bir grup %15-30 oranına ulaşana kadar "sembolik" konumda kalır ve etkili olamaz. Bu eşik aşıldığında, azınlık grup koalisyon oluşturabilir, politika gündemini etkileyebilir ve kurumsal değişim yaratabilir.*

büyümeye katkı sağladığını desteklemektedir. Temsiliyet (karesel) ve AB üyeliği spesifikasyonlarında AR(1) testi istatistiksel olarak anlamlı bulunmamıştır. Dinamik panel modellerinde birinci derece otokorelasyonun anlamlı olması beklenmektedir. Bu nedenle söz konusu sonuç, ilgili alt modellerin yorumlanmasında ihtiyatlı olunmasını gerektirmektedir. Bununla birlikte, her iki spesifikasyonda da AR(2) testleri ikinci derece otokorelasyonun bulunmadığını doğrulamakta ve Hansen testleri enstrümanların geçerliliğini desteklemektedir. Bu testlerin model tutarlılığını destekler nitelikte olması, AR(1) bulgusunun modelin yapısal bir sorununa değil, küçük örneklem büyüklüğünden kaynaklanan düşük test gücüne işaret edebileceğini düşündürmektedir. Bu nedenle temsiliyet ve AB üyeliği spesifikasyonlarına ilişkin bulgular, kesin çıkarımlar için değil, tamamlayıcı ve keşifsel kanıt niteliğinde değerlendirilmelidir.

Tablo: 4
Model 2 Windmeijer Düzeltmeli Fark GMM Sonuçları

Bağımlı değişken: LGDP			
Bağımsız değişkenler	**Tüm OECD**	**Temsiliyet (Karesel)**	**AB Üyeliği**
LNGDP(t-1)	0.668*** (0.000)	0.419*** (0.000)	0.396*** (0.000)
LNINV	0.155 (0.000)	0.123*** (0.009)	0.152*** (0.001)
LNOPEN	0.113*** (0.000)	0.343*** (0.000)	0.300*** (0.000)
LNSEATS	0.029** (0.027)	-0.323 (0.249)	0.134*** (0.001)
LNEDPRIM	0.041 (0.507)	0.075 (0.731)	0.083 (0.734)
LNEDSEC	0.167*** (0.006)	0.059 (0.601)	0.031 (0.750)
LNRLFP	0.083 (0.528)	0.115 (0.699)	0.316 (0.318)
AB üyeliği-dinamik	---	---	0.004 (0.732)
LNSEATS2	---	0.081 (0.109)	---
Test istatistiği **Test istatistiği** **Test istatistiği**			
Gözlem Sayısı	1178	1001	1001
Ülke Sayısı	38	38	38
Enstrüman Sayısı	38	46	45
Wald Testi ($\chi 2$)/F testi	633.03*** (0.001)	40.92*** (0.000)	35.60*** (0.000)
AR(1) p-değeri	0.001	0.195	0.127
AR(2) p-değeri	0.188	0.598	0.474
Hansen Test p-değeri	0.780	0.502	0.444

*Not: * p<0.10, ** p<0.05, *** p<0.01. AR(1) ve AR(2), Arellano-Bond (1991) tarafından geliştirilen birinci ve ikinci derece otokorelasyon testleridir. Hansen (1982) testi enstrümanların geçerliliğini test eder.*

Model 2, OECD ülkelerinin gelişmişlik düzeylerine göre farklı dinamiklere sahip olabileceği düşüncesiyle iki gelir grubunda ayrı ayrı tahmin edilmiştir. Tablo 5 yüksek gelir grubu (34 ülke) ve üst-orta gelir grubu (4 ülke) için tahmin sonuçlarını göstermektedir. Yüksek gelir grubunda Windmeijer düzeltmeli İki Aşamalı Fark GMM kullanılmıştır. Üst-orta gelir grubu için küçük örneklem nedeniyle (N=4) güvenilir tahminler elde edilememiş ve bu grubun sonuçları tabloya dahil edilmemiştir.

Yüksek gelir grubunda parlamentoda kadın temsili istatistiksel olarak anlamlı ve pozitif bulunmuştur. Bu bulgu, gelişmiş OECD ülkelerinde siyasi güçlenmenin ekonomik büyümeye katkı sağladığını göstermektedir. Ortaöğretime kayıt paritesi de anlamlıdır. Bu ülkelerde ilköğretim düzeyinde cinsiyet eşitliği tam olarak sağlanmış olup, ortaöğretim düzeyindeki gelişmeler ekonomik performans açısından önemli bir rol oynamaktadır.

Model tanı testleri tahminlerin geçerliliğini desteklemektedir. AR(1) testi anlamlı, AR(2) testi anlamsızdır (p=0.242); bu da enstrümanların geçerli olduğunu göstermektedir. Hansen testi enstrümanların dışsallığını doğrulamaktadır; ancak p-değerinin çok yüksek olması, enstrümanların zayıf olabileceğine işaret etmektedir. Enstrüman sayısı (52), ülke sayısından (34) fazladır; ancak collapse opsiyonu ile enstrüman patlaması kontrol altında tutulmuştur.

Tablo: 5
Toplumsal Cinsiyet Eşitsizliği Bileşenleri ve Ekonomik Büyüme: Gelir Gruplarına Göre Sonuçlar

Bağımlı Değilken: LGDP	
Bağımsız Değişkenler	**Yüksek Gelir (34 Ülke)**
LNGDP(t-1)	0.647*** (0.000)
LNINV	0.145*** (0.000)
LNOPEN	0.123*** (0.000)
LNSEATS	0.032** (0.020)
LNEDPRIM	0.061 (0533)
LNEDSEC	0.140* (0.088)
LNRLFP	0.239 (0.320)
Gözlem Sayısı	947
Ülke Sayısı	34
Enstrüman Sayısı	52
F testi	517.91***
AR(1) p-değeri	0.001
AR(2) p-değeri	0.242
Hansen Test p-değeri	0.903

*Not: Standart hatalar parantez içinde gösterilmiştir. * p<0.10, ** p<0.05, *** p<0.01. Yüksek gelir grubu: Windmeijer düzeltmeli İki Aşamalı Fark GMM. Üst-orta gelir grubu: İki Aşamalı Sistem GMM. Bağımsız değişkenlerin ikinci ve üçüncü gecikmeleri enstrüman olarak kullanılmış ve collapse seçeneği ile enstrüman çoğalması önlenmiştir. Enstrüman sayısı grup (ülke) sayısından az tutulmuştur. Üst-orta gelir grubu Kolombiya, Kosta Rika, Meksika ve Türkiye'yi içermektedir.*

Model 3 tarımsal üretim ile kadın istihdamı arasındaki ilişkiyi incelemektedir. OECD ülkelerinde kırsal nüfus oranı düşük olmakla birlikte, tarımsal üretim gıda güvenliği ve sürdürülebilir kalkınma açısından stratejik öneme sahiptir. Özellikle Türkiye, Meksika, Şili ve Kolombiya gibi gelişmekte olan OECD üyesi ülkelerde kadınların tarımsal istihdamdaki rolü hâlen önemlidir. Tablo 6, Sistem GMM tahmin sonuçlarını sunmaktadır.

Tarımda kadın istihdamı değişkeni pozitif ve %1 düzeyinde anlamlıdır. Bu bulgu, kadınların tarımsal üretimdeki doğrudan katkısının ekonomik açıdan ölçülebilir düzeyde olduğunu ortaya koymaktadır. İlköğretime kayıt paritesi de tarımsal katma değeri pozitif yönde etkilemektedir. Kırsal kesimde kız çocuklarının eğitim düzeyinin yükselmesi tarımsal

verimliliği artırabilecektir. Model 3 bulguları, kırsal kalkınma politikalarında kadınların rolünün güçlendirilmesinin önemini vurgulamaktadır. Tarımda çalışan kadınlara yönelik eğitim programları, kredi imkânları ve teknolojiye erişimin artırılması tarımsal üretkenliği artırabilir. AR(1) ve AR(2) testleri dinamik modelin uygunluğunu; Hansen testi ise enstrümanların geçerliliğini doğrulamaktadır.

Tablo: 6
Model 3 Genelleştirilmiş Momentler Tahmincisi Analiz Sonuçları

Bağımlı değişken:AGDP	
Bağımsız değişkenler	**Katsayı**
LNAGDP(t-1)	0.683*** (0.000)
LNFPOP	-0.058 (0.129)
LNEDPRIM	0.588** (0.045)
LNEDSEC	-0.079 (0.404)
LNFPA	0.140*** (0.004)
	Test istatistiği
Gözlem Sayısı	977
Ülke Sayısı	38
Enstrüman Sayısı	7
F Testi	503.10***
AR(1) p-değeri	0.000
AR(2) p-değeri	0.141
Hansen Test p-değeri	0.299

5. Tartışma

Küresel ölçekte eğitim, istihdam ve gelir alanlarında toplumsal cinsiyet eşitsizlikleri varlığını sürdürmektedir. ILO verileri, kadınların işgücüne katılım oranlarının erkeklerin gerisinde kaldığını ve ücret farklarının farklı gelişmişlik düzeylerinde devam ettiğini göstermektedir. Parlamentoda kadın temsili artış eğiliminde olsa da OECD ülkelerinde dahi yasama organlarındaki sandalyelerin önemli bir bölümü hâlâ erkekler tarafından tutulmakta; bakanlık ve yürütme düzeyinde ise bu asimetri daha belirgin hâle gelmektedir (WEF, 2020). Bu görünüm, siyasal temsil alanındaki ilerlemenin işgücü piyasasında aynı hızda bir dönüşüm üretmediğini göstermektedir. Aynı zamanda, mevcut çalışmada parlamentoda kadın temsilinin en güçlü ve en tutarlı etkiye sahip değişken olarak öne çıkmasının daha geniş bir kurumsal bağlam içinde değerlendirilmesi gerektiğine işaret edilmektedir.

Model 1 bulgularına göre, bileşik Cinsiyet Eşitsizliği Endeksi'nin (GII) OECD ülkelerinde kişi başına gelir üzerinde istatistiksel olarak anlamlı bir etkisi bulunmamaktadır. Bu sonuç ilk bakışta literatürdeki genel eğilimle çelişiyor gibi görünse de aslında örneklemin yapısı dikkate alındığında beklenmedik değildir. Amin vd. (2015: 2), 107 ülkeyi kapsayan panel analizleri, toplumsal cinsiyet eşitsizliğinin büyüme üzerindeki olumsuz etkisinin yalnızca düşük gelirli ülkelerde anlamlı olduğunu, yüksek gelirli ülkelerde ise bu ilişkinin zayıfladığını göstermiştir. Benzer biçimde Kazandjian vd. (2019: 9-18), GII'nin genişletilmiş versiyonuyla yaptıkları analiz olumsuz etkinin büyük ölçüde düşük gelirli ülkelerde yoğunlaştığını ortaya koymuştur. OECD örnekleminin büyük çoğunluğunun

yüksek gelir grubunda yer alması, mevcut bulgunun bu çalışmalarla uyumlu biçimde yorumlanmasını mümkün kılmaktadır. Bunun yanı sıra, bileşik endeks kullanımının doğasından kaynaklanan ölçüm sınırlılıkları da göz önünde bulundurulmalıdır. GII, üreme sağlığı, güçlenme ve işgücü piyasası gibi farklı boyutları tek bir değerde topladığından, birbirini kısmen dengeleyen bileşenler OECD gibi görece homojen örneklemlerde toplam etkinin istatistiksel olarak görünmez hale gelmesine yol açabilmektedir. Bu nedenle GII'nin anlamsız çıkması, toplumsal cinsiyet eşitsizliğinin önemsiz olduğunu değil, bileşik ölçüm yaklaşımının bu örneklemde sınırlı açıklayıcılığa sahip olduğunu göstermektedir. Bu çerçevede H_1 hipotezi bileşik endeks düzeyinde doğrulanmamakla birlikte, aşağıda tartışılan bileşen analizleri aracılığıyla kısmen desteklenmektedir.

Model 2'nin bulguları bu yorumu daha somut hale getirmektedir. GII bileşenleri ayrıştırıldığında, parlamentoda kadın temsil oranı ile ortaöğretime kayıt paritesi hem tam örneklemde hem de yüksek gelirli ülkeler grubunda pozitif ve anlamlı sonuçlar vermektedir. Klasen (2002: 345) eğitimdeki toplumsal cinsiyet eşitsizliğinin beşerî sermaye birikimini sınırlandırarak büyümeyi hem doğrudan hem de yatırım ve nüfus artışı kanalları üzerinden yavaşlattığını göstermiştir. Ortaöğretim düzeyindeki cinsiyet paritesinin anlamlı çıkması bu mekanizmayla tutarlıdır. OECD ülkelerinde ilköğretimde toplumsal cinsiyet eşitliği büyük ölçüde sağlandığı için ilköğretim paritesinin anlamsız çıkması tavan etkisiyle açıklanabilir. Buna karşılık, ortaöğretim düzeyinde ülkeler arası farklar sürmekte ve bu farklılıklar büyüme performansındaki ayrışmanın bir bölümünü açıklamaktadır.

Parlamentoda kadın temsil oranı, katsayı büyüklüğü bakımından en yüksek etkiye sahip değişken olmamakla birlikte, anlamlı çıktığı tüm model spesifikasyonlarında pozitif yönde tutarlı bir etki sergilemiş ve %1 ile %5 anlamlılık düzeyleri arasında istatistiksel geçerliliğini korumuştur. Bu tutarlılık, söz konusu değişkeni politika açısından özellikle önemli kılmaktadır. Bu bulgu, yalnızca emek arzı kanalının değil, daha derinde işleyen kurumsal bir mekanizmanın da devreye girdiğine işaret etmektedir. Dollar vd. (2001: 427, 428), kadınların karar alma süreçlerine katılımı arttıkça yolsuzluğun azaldığını ve kamu kaynaklarının toplumsal refahı önceleyen biçimlerde tahsis edildiğini göstermiştir. Hsieh vd. (2019: 2-5) ise mesleki ayrışmanın azaltılmasının uzun dönem büyüme üzerinde ölçülebilir etkiler yarattığını ABD verisi üzerinden ortaya koymuştur. AB üyeliği analizinde temsil kanalının olumlu ve anlamlı bulunması, kurumsal çerçevenin bu etkiyi güçlendirdiğini düşündürmektedir. Nitekim Llena-Nozal vd. (2019: 10), toplumsal cinsiyet eşitliğinde sağlanacak ilerlemenin AB için 2050 yılına kadar GSYİH'nin %9,6'sına ulaşan ek büyüme potansiyeli yaratabileceğini tahmin etmektedir. Buna karşılık AB üyeliğine ilişkin dinamik değişkenin anlamsız çıkması, bu etkinin doğrudan değil, daha çok ticaret entegrasyonu ve kurumsal uyum gibi dolaylı kanallar üzerinden gerçekleştiği yönündeki yorumu desteklemektedir.

Kadın işgücüne katılım oranının hem tam örneklemde hem de yüksek gelir grubunda anlamsız çıkması, kaba bir katılım göstergesinin istihdamın niteliğini yansıtmada yetersiz kalmasından kaynaklanmaktadır. Altuzarra vd. (2021: 1, 4, 5, 12-16), kadınların işgücüne katılım oranının tek başına ekonomik büyümeyi açıklamada yeterli olmadığını, buna karşılık

eğitimde toplumsal cinsiyet eşitliğinin daha güçlü ve tutarlı bir büyüme etkisi yarattığını göstermektedir. Bu bulgu, kadınların işgücü piyasasındaki varlığının niteliğinin ve ekonomik yapıyla kurduğu ilişkinin, yalnızca katılım oranından daha belirleyici olabileceğini düşündürmektedir. Cuberes ve Teignier (2016: 1-3, 17, 18, 22) OECD ülkelerindeki gelir kayıplarının önemli bölümünün katılım oranlarından değil, yetenek tahsisindeki çarpıklıklardan kaynaklandığını göstermektedir. Bu nedenle katılım oranının anlamsız çıkması, toplumsal cinsiyet eşitsizliğinin etkisiz olduğunu değil, kullanılan göstergenin bu etkiyi yeterince yansıtmadığını göstermektedir.

U-şekilli ilişki hipotezi karesel terim modelinde istatistiksel olarak doğrulanmamıştır. Ancak bu bulgu, OECD örnekleminin yapısı dikkate alınmadan yorumlanmamalıdır. Kritik kütle teorisine göre bir azınlık grubunun karar alma mekanizmaları üzerinde gerçek bir etki yaratabilmesi için %15 ile %30 arasında değişen bir eşiği aşması gerekmektedir (Dahlerup, 1988: 275). Bu eşiğin altında kalan ülkelerde kadın temsilciler çoğu zaman sembolik düzeyde kalmakta ve politika çıktılarını anlamlı biçimde yönlendirememektedir. OECD örneklemindeki 38 ülkenin büyük çoğunluğu bu eşiğin üzerinde yer almaktadır. Yalnızca dört ülke, Türkiye, Macaristan, Güney Kore ve Japonya, %11'in altında ortalama temsil düzeyine sahiptir. Bu dağılım, eğrinin alt kolundaki varyasyonu ciddi biçimde daraltmaktadır. Öte yandan %45 ve üzerindeki gözlem sayısının sınırlı olması, eğrinin üst kolunun da güvenilir biçimde sınanmasını zorlaştırmaktadır. Bu nedenle karesel terimin anlamsız çıkması, doğrusal olmayan ilişkinin yokluğunu kanıtlamamakta; yalnızca OECD'nin mevcut temsil dağılımında doğrusal modelin daha uygun olduğunu göstermektedir. Lechman & Kaur (2015: 1), 162 ülkeyi kapsayan geniş örneklemde kadın işgücüne katılım ile büyüme arasında U-şekilli bir ilişki belgelemiştir. Mevcut çalışmanın örneklemi ise büyük ölçüde bu eğrinin orta ve üst kesimlerinde yoğunlaşmaktadır. Dolayısıyla burada gözlenen doğrusal ilişki, teorik U-şekilli yapıyı çürütmemekte; gelişmiş ülkelerin eğrinin olgunlaşmış bölümünde yer aldığını düşündürmektedir. U-şekilli ilişkinin daha güvenilir biçimde sınanabilmesi için gelecekte daha geniş gelişmişlik düzeylerini kapsayan örneklemlere ihtiyaç vardır.

Seguino (2000: 37, 38 ,42-45) ile Busse ve Spielmann (2006: 370-375), ihracata yönelik emek yoğun ekonomilerde kadınlara ödenen düşük ücretlerin rekabet avantajı yaratabildiğini ve bunun katılım ile büyüme arasındaki ilişkiyi tersine çevirebildiğini göstermişlerdir. Kazandjian vd. (2016: 9-18) da benzer bir mekanizmayı yarı sanayileşmiş ve ihracata yönelmiş ekonomiler için ortaya koymaktadır. Bu ülkelerde kadın istihdamının tarım, tekstil ve kayıt dışı hizmetler gibi düşük verimli sektörlerde yoğunlaşması, katılım oranındaki artışın nitelikli istihdama geçişi yansıtmadığını göstermektedir. Türkiye'deki yapısal engellere ilişkin benzer bulgular Dedeoğlu (2009: 41, 42, 45, 46, 53) ve Karaalp-Orhan (2018: 15-17, 28) tarafından da vurgulanmıştır. Buna karşılık, yüksek gelir grubunda ortaöğretim paritesi ile parlamentoda kadın temsilinin belirleyici hale gelmesi, gelişmişlik düzeyine bağlı olarak politika önceliklerinin değiştiğini göstermektedir. Bu sonuçlar birlikte değerlendirildiğinde, H_2 hipotezinin ampirik olarak güçlü biçimde desteklendiği söylenebilir.

Model 3 bulguları, tarımda kadın istihdamının ve ilköğretim paritesinin tarımsal katma değeri artırdığını göstermektedir. Bertay vd. (2020: 2), kadın istihdamı payının yüksek olduğu sektörlerin, toplumsal cinsiyet eşitliğinin daha güçlü olduğu ülkelerde daha hızlı büyüdüğünü göstermiştir. Mevcut bulgu da bu sektörel büyüme kanalıyla uyumludur. Kırsal kesimde kız çocuklarının eğitime erişiminin tarımsal verimliliği desteklemesi, beşerî sermaye birikimi yaklaşımıyla da örtüşmektedir. Buna karşılık, ortaöğretim paritesinin katsayısı negatif olmakla birlikte istatistiksel olarak anlamlı değildir. Bu nedenle ortaöğretim kanalına ilişkin güçlü nedensellik çıkarımları yapılmaktan kaçınılmalıdır. Bununla birlikte, katsayının işareti ortaöğretim düzeyinde eğitim alan kadınların tarım dışı sektörlere yönelebileceğine ve bunun tarımsal işgücü arzını daraltabileceğine işaret eden bir yapısal geçiş etkisiyle teorik olarak tutarlıdır. Ancak bu yorumun istatistiksel destek almadığı göz önünde bulundurularak keşifsel bir değerlendirme olarak ele alınması gerekmektedir. Bu nedenle H_3 hipotezi ilköğretim ve istihdam kanalları bakımından desteklenmekte; ortaöğretim kanalında ise istatistiksel olarak doğrulanamayan ancak teorik açıdan anlamlı bir ayrışma gözlemlenmektedir.

Üç hipotez birlikte değerlendirildiğinde, H_1'in bileşen analizleri aracılığıyla kısmen doğrulandığı, H_2'nin gelir grupları arasındaki asimetrik bulgularla güçlü biçimde desteklendiği ve H_3'ün tarım ile ilköğretim kanalları açısından geçerli olduğu anlaşılmaktadır. Genel tablo açık biçimde şunu göstermektedir: bileşik endeks OECD düzeyinde anlamlı bir etki üretmezken, ayrıştırılmış bileşenler mekanizma düzeyinde daha tutarlı sonuçlar vermektedir. Bu durum, toplumsal cinsiyet eşitsizliğinin ekonomik büyüme üzerindeki etkisinin bağlamdan ve ölçüm aracından bağımsız olarak değerlendirilemeyeceğini ortaya koymaktadır. Dolayısıyla politika tasarımında, ülkelerin gelişmişlik düzeyine, üretim yapısına ve kurumsal bağlamına duyarlı, farklılaştırılmış yaklaşımların benimsenmesi gerekmektedir.

6. Politika Değerlendirmesi

Bu çalışma, OECD ülkeleri için toplumsal cinsiyet eşitsizliği ile ekonomik büyüme arasındaki ilişkiyi dinamik panel veri yöntemleriyle incelemiştir. Tartışma bölümünde değerlendirilen bulgular birlikte ele alındığında, bu ilişkinin ne tek boyutlu ne de bağlamdan bağımsız biçimde açıklanabileceği anlaşılmaktadır.

Hipotez sonuçları üç temel bulgu etrafında toplanmaktadır. İlk olarak, H_1 bileşik, Toplumsal Cinsiyet Eşitsizliği Endeksi düzeyinde doğrulanmamış; ancak eğitim ve siyasal temsil bileşenleri ayrıştırıldığında kısmen desteklenmiştir. Bu sonuç, Amin vd. (2015) ile Kazandjian vd. (2016) tarafından özellikle yüksek gelirli ülkeler için ortaya konan örüntüyle uyumludur ve bileşik endekslerin görece homojen örneklemlerde sınırlı açıklayıcılığa sahip olabileceğini göstermektedir. İkinci olarak, H_2 güçlü biçimde desteklenmiştir. Yüksek gelirli ülkelerde ortaöğretim paritesi ile parlamentoda kadın temsili büyümenin temel kanalları olarak öne çıkmaktadır. Üçüncü olarak, H_3 tarımda kadın istihdamı ve ilköğretim kanalları bakımından desteklenmiş, ortaöğretim kanalında ise eğitim düzeyi yükselen kadınların tarım dışı sektörlere yönelmesiyle açıklanabilecek yapısal bir ayrışma gözlenmiştir.

Türkiye, üst-orta gelir grubunda yer alan dört OECD ülkesinden (Kolombiya, Kosta Rika, Meksika, Türkiye) biridir. Bu çalışmada, üst-orta gelir grubu için küçük örneklem nedeniyle (N=4) güvenilir ekonometrik tahminler elde edilememiş olsa da, Türkiye'nin toplumsal cinsiyet eşitliği göstergeleri ile ekonomik gelişme düzeyi arasındaki ilişki, ülkenin mevcut durumunu anlamak bakımından önemli ipuçları sunmaktadır. Türkiye, OECD ülkeleri arasında toplumsal cinsiyet eşitsizliği bakımından en kırılgan ülkelerden biridir. Parlamentoda kadın temsili %8,2 ile örneklem içindeki en düşük düzeylerden birine karşılık gelmektedir. Yüksek gelir grubunda parlamentoda kadın temsilinin ekonomik büyümeye anlamlı katkı sağladığı bulgusuna dayanarak, Türkiye'nin bu alandaki gecikmişliğinin potansiyel bir ekonomik kayıp yarattığı değerlendirilebilir. Siyasi karar alma süreçlerinde kadınların yetersiz temsili, toplumsal cinsiyet eşitliğine duyarlı politika yapımını zorlaştırmaktadır. Eğitim alanında önemli ilerlemeler kaydedilmiştir. 2000'li yıllarda zorunlu eğitim reformlarıyla sağlanan ilerlemeler ilköğretimde cinsiyet paritesini önemli ölçüde yükseltmiştir. Ancak bu kazanımlar, ortaöğretim ve yükseköğretim düzeyinde aynı oranda sürdürülememiştir. Kırsal kesimlerde ve düşük sosyoekonomik gruplarda kız çocuklarının okulu erken terk etme oranları hâlâ yüksektir. Bu durum, eğitimde sağlanan niceliksel iyileşmelerin istihdam piyasasına ve ekonomik büyümeye yeterince yansıtılmadığını göstermektedir.

Türkiye'de kadın işgücüne katılım oranı OECD ortalamasının altındadır. Ayrıca, istihdam edilen kadınların önemli bir kısmı tarım, tekstil ve kayıt dışı hizmetler gibi düşük verimli sektörlerde yoğunlaşmaktadır. Bu durum, kadın istihdamındaki niceliksel artışların nitelikli ve verimli büyümeye dönüşmesini engellemektedir. Ücret eşitsizliği, cam tavan etkisi, kariyer gelişimini engelleyici yapısal faktörler ve ücretsiz bakım yükünün dengesiz dağılımı, kadınların ekonomik potansiyellerini tam olarak kullanmalarının önündeki başlıca engellerdir. COVID-19 pandemisi, mevcut toplumsal cinsiyet farklarını daha da derinleştirmiştir. Evde bakım ve ev içi sorumlulukların artması, kadınların işgücü piyasasından çekilmesine veya kayıt dışı, düşük ücretli işlere yönelmesine neden olmuştur. Pandemi sonrası dönemde kadın istihdamında gözlenen kısmi toparlanma, bu yapısal sorunların tam olarak çözülmediğini göstermektedir.

Bu çerçevede Türkiye için öncelikli politika alanları üç başlık altında toplanabilir. İlk olarak, kız çocuklarının ortaöğretimi tamamlama oranlarının artırılması ve mesleki-teknik eğitimde toplumsal cinsiyet duyarlılığının güçlendirilmesi gerekmektedir. İkinci olarak, parlamentoda ve üst yönetim kademelerinde kadın temsilini artıracak kurumsal düzenlemeler ile bakım hizmetleri altyapısının geliştirilmesi önem taşımaktadır. Üçüncü olarak, kadınların düşük verimli sektörlerden nitelikli istihdama geçişini destekleyen aktif işgücü piyasası politikaları ile eşit işe eşit ücret ilkesinin etkin biçimde uygulanması gerekmektedir. Kırsal alanda ise ilköğretimin niteliğinin yükseltilmesi ve kadınların üretken kaynaklara erişiminin güçlendirilmesi tarımsal verimlilik üzerinde doğrudan etkiler yaratabilecektir.

Yüksek gelirli OECD ülkelerinde politika öncelikleri daha çok ortaöğretim sonrası eğitime, yükseköğretimdeki mesleki ayrışmanın azaltılmasına ve kadınların üst düzey karar

alma pozisyonlarına erişiminin güçlendirilmesine yöneliktir. Parlamentoda kadın temsilinin büyüme üzerinde en tutarlı etkiye sahip değişken olarak öne çıkması, siyasal temsilin yalnızca demokratik bir temsil meselesi değil, aynı zamanda ekonomik performansla ilişkili bir kurumsal unsur olduğunu göstermektedir. AB üyeliğini temsil eden dinamik değişkenin anlamsız çıkması, bu etkinin doğrudan değil, daha çok kurumsal uyum, yönetişim kalitesi ve ticaret entegrasyonu gibi dolaylı kanallar üzerinden işlediğini düşündürmektedir. Bu yorum, Llena-Nozal vd. (2019: 10) tarafından Avrupa Birliği için öngörülen ve toplumsal cinsiyet eşitliğinde kaydedilecek ilerlemenin 2050 yılına kadar GSYİH üzerinde %9,6'ya ulaşan ek büyüme potansiyeli yaratabileceğini gösteren bulgularla da desteklenmektedir.

Çalışmanın bazı sınırlılıkları gelecekte yapılacak araştırmalar açısından yol göstericidir. İlk olarak, cinsiyete duyarlı istatistiklerin kapsamının genişletilmesi, özellikle kır-kent ayrımı, sektör içi verimlilik ve bakım ekonomisi göstergeleri açısından ampirik literatürü zenginleştirecektir. İkinci olarak, U-şekilli ilişki hipotezi OECD örnekleminde güvenilir biçimde sınanamamıştır. Bu hipotezin, daha geniş bir gelişmişlik yelpazesini kapsayan ve daha yüksek varyasyon sunan örneklemlerle yeniden test edilmesi, kuramsal tartışmayı ilerletecektir. Sonuç olarak, toplumsal cinsiyet eşitsizliği ile ekonomik büyüme arasındaki ilişkinin ülkelerin gelişmişlik düzeyine, üretim yapısına ve kurumsal bağlamına göre değiştiği açıkça görülmektedir. Bu nedenle hem büyüme hem de eşitlik hedeflerine aynı anda ulaşabilmek için tek tip değil, bağlama duyarlı ve farklılaştırılmış politika yaklaşımlarına ihtiyaç vardır.

Kaynaklar

Abu-Ghaida, D. & S. Klasen (2004), The Costs of Missing the Millennium Development Goal on Gender Equity", *World Development*, 32(7), 1075-1107.

Altuzarra, A. et al. (2021), "Is Gender Inequality a Barrier to Economic Growth? A Panel Data Analysis of Developing Countries", *Sustainability*, 13(1), 367.

Amin, M. et al. (2015), "Gender Inequality and Growth: The Case of Rich vs Poor Countries", World Bank Group, Policy Research *Working Paper*, No. 7172.

Arellano, M. & S. Bond (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", *The Review of Economic Studies*, 58(2), 277-297.

Babovic, M. (2018), "Gender and economic inequalities: Trends in feminist economics and sociology at the centre and semi-periphery of the global knowledge production system", *Sociologija*, 60(1), 11-34.

Baer, D.L. & D.A. Bositis (1983), "The Political Socialization of Gender: What Contribution Biology? Politics and the Life Sciences", 1(2), 125-134.

Benería, L. (1995), "Toward a greater integration of gender in economics", *World Development*, 23(11), 1839-1850.

Benería, L. (1999), "The enduring debate over unpaid labour", *International Labour Review*, 138(3), 287-309.

Bertay, A.C. et al. (2020), "Gender Inequality and Economic Growth: Evidence from Industry-Level Data", WP/20/119, July 2020, IMF *Working Papers* WP/20/119.

Blundell, R. & S. Bond (1998), "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, 87(1), 115-143.

Busse, M. & C. Spielmann (2006), "Gender Inequality and Trade", *Review of International Economics*, 14(3), 362-379.

Cabeza-García, L. et al. (2018), "Gender Factors and Inclusive Economic Growth: The Silent Revolution", *Sustainability*, 10(2), 121.

Carrasco Bengoa, C. (2013), "El cuidado como eje vertebrador de una nueva economía", *Cuadernos de Relaciones Laborales*, 31(1), 39-56.

Cavalcanti, T. & J. Tavares (2016), "The Output Cost of Gender Discrimination: A Model-based Macroeconomics Estimate", *The Economic Journal*, 126(590), 109-134.

Cerra, V. et al. (2021), "Links Between Growth, Inequality, and Poverty", in: V. Cerra et al. (eds.), *How to Achieve Inclusive Growth* (1. ed.) (32-73), Oxford University Press.

Çolak, Z. (2021), "Türkiye'de Toplumsal Cinsiyet Eşitsizliği-Ekonomik Büyüme İlişkisi Üzerine Ekonometrik Analiz", *MANAS Sosyal Araştırmalar Dergisi*, 10(2), 1094-1105.

Cuberes, D. & M. Teignier (2012), *Gender Inequality and Economic Growth*, World Bank, Washington, DC.

Cuberes, D. & M. Teignier (2014), "Gender Inequality and Economic Growth: A Critical Review", *Journal of International Development*, 26(2), 260-276.

Cuberes, D. & M. Teignier (2016), "Aggregate Effects of Gender Gaps in the Labor Market: A Quantitative Estimate", *Journal of Human Capital*, 10(1), 1-32.

Dahlerup, D. (1988), "From a Small to a Large Minority: Women in Scandinavian Politics", *Scandinavian Political Studies*, 11(4), 275-298.

Dedeoğlu, S. (2000), "Toplumsal Cinsiyet Rolleri Açısından Türkiye'de Aile ve Kadın Emeği", *Toplum ve Bilim*, 86(3), 139-170.

Dedeoğlu, S. (2009), "Eşitlik mi Ayrımcılık mı? Türkiye'de Sosyal Devlet, Cinsiyet Eşitliği Politikaları ve Kadın İstihdamı", *Çalışma ve Toplum*, 21(2), 41-54.

Dedeoğlu, S. (2022), "Women's Home-based Work in Istanbul's Garment Industry", in: Home-Based Work and Home-Based Workers (1800-2021) (96-114), BRILL.

Dollar, D. et al. (2001), "Are women really the "fairer" sex? Corruption and women in government", *Journal of Economic Behavior & Organization*, 46(4), 423-429.

Dow, S. (2020), "Gender and the future of macroeconomics: An evolutionary approach", *Review of Evolutionary Political Economy*, 1(1), 55-66.

Durutürk, B. (2020), "Toplumsal Cinsiyet Rollerinin 'Şifreleme-Deşifreleme' Kuramı Üzerinden Değerlendirilmesi", *Türkiye Sosyal Araştırmalar Dergisi*, 24(1), 53-64.

Ecevit, Y. (2012), "Türkiye'de sosyal politika çalışmalarının toplumsal cinsiyet bakış açısıyla gelişimi", in: *Türkiye'de refah devleti ve kadın*, İletişim Yayınları.

Elson, D. (1999), "Labor Markets as Gendered Institutions: Equality, Efficiency and Empowerment Issues", *World Development*, 27(3), 611-627.

Esteve-Volart, B. (2008), Gender discrimination and growth: Theory and evidence from India", *Research Paper* No. DEDPS 42, STICERD Suntory and Toyota International Centres for Economics and Related Disciplines.

Ferber, M.A. & J.A. Nelson (eds.) (1993), *Beyond economic man: Feminist theory and economics*, The University of Chicago Press.

Folbre, N. (2006), "Measuring Care: Gender, Empowerment, and the Care Economy", *Journal of Human Development*, 7(2), 183-199.

Folbre, N. (2020), "Cooperation & Conflict in the Patriarchal Labyrinth", *Daedalus*, 149(1), 198-212.

Galor, O. & D.N. Weil (1996), "The Gender Gap, Fertility, and Growth", *American Economic Review*, 86(3), 374-387.

Grimshaw, D. et al. (2017), "A new labour market segmentation approach for analysing inequalities: Introduction and overview", in: D. Grimshaw et al. (eds.), *Making work more equal* (1-32), Manchester University Press.

Grown, C. et al. (2000), "Introduction", *World Development*, 28(7), 1145-1156.

Gujarati, D.N. (2004), *Basic econometrics* (4th ed.), McGraw-Hill/Irwin.

Hallward-Driemeier, M. (2013), *Enterprising women: Expanding economic opportunities in Africa*, Africa Development Forum, Washington, DC; World Bank.

Hill, M.A. & E. King (1995), "Women's education and economic well-being", *Feminist Economics*, 1(2), 21-46.

Hsieh, C.-T. et al. (2019), "The Allocation of Talent and U.S. Economic Growth", *Econometrica*, 87(5), 1439-1474.

Im, K.S. et al. (2003), "Testing for unit roots in heterogeneous panels", *Journal of Econometrics*, 115(1), 53-74.

Ishizuka, H. (2018), "An Empirical Analysis of Substitution and Complementarity of Gender Labor Demand of Enterprises in Japan, Korea, and China: With a Factor Decomposition of Gender Wage Differentials", *Theoretical Economics Letters*, 08(10), 1905-1934.

Jayasuriya, D.S. & P.J. Burke (2013), "Female parliamentarians and economic growth: Evidence from a large panel", *Applied Economics Letters*, 20(3), 304-307.

Kabeer, N. (1999), "Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment", *Development and Change*, 30(3), 435-464.

Kabeer, N. (2003), *Gender mainstreaming in poverty eradication and the Millennium Development Goals: A handbook for policy-makers and other stakeholders*, Canadian International Development Agency, Commonwealth Secretariat & International Development Research Centre, Canada.

Karaalp-Orhan, H.S. (2018), "The Impact of Gender-Specific Human Capital on Economic Growth: An Empirical Investigation for Turkey", *Zagreb International Review of Economics and Business*, 21(s1), 15-30.

Karoui, K. & R. Feki (2018), "The impacts of gender inequality in education on economic growth in Tunisia: An empirical analysis", *Quality & Quantity*, 52(3), 1265-1273.

Kazandjian, R. et al. (2019), "Gender Equality and Economic Diversification", *Social Sciences*, 8(4), 118.

Klasen, S. & F. Lamanna (2009), "The Impact of Gender Inequality in Education and Employment on Economic Growth: New Evidence for a Panel of Countries", *Feminist Economics*, 15(3), 91-132.

Klasen, S. (2002), "Low Schooling for Girls, Slower Growth for All? Cross-Country Evidence on the Effect of Gender Inequality in Education on Economic Development", *The World Bank Economic Review*, 16(3), 345-373.

Knowles, S. et al. (2002), "Are educational gender gaps a brake on economic development? Some cross-country empirical evidence", *Oxford Economic Papers*, 54(1), 118-149.

Kuma, B. & A. Godana (2023), "Factors affecting rural women economic empowerment in Wolaita Ethiopia", *Cogent Economics & Finance*, 11(2), 2235823.

Lagerlof, N.-P. (2003), "Gender Equality and Long-Run Growth", *Journal of Economic Growth*, 8(4), 403-426.

Lechman, E. & H. Kaur (2015), "Economic Growth and Female Labor Force Participation Verifying the U-Feminization Hypothesis. New Evidence for 162 Countries Over the Period 1990-2012", *SSRN*, https://doi.org/10.2139/ssrn.2551476

Llena-Nozal, A. et al. (2019), "The economy of well-being: Creating opportunities for people's well-being and economic growth", OECD Statistics *Working Papers* 2019/02.

Ndonga, D. et al. (2021), "Integration of Gender Practices and Promotion of Diversity in Customs and Trade: The Case of East and Southern Africa", *World Customs Journal*, 15(1), 77-92.

OECD (2018), "OECD Toolkit for Mainstreaming and Implementing Gender Equality: Implementing the 2015 OECD Recommendation on Gender Equality in Public Life", *Report*, OECD Publishing.

OECD (2023), "Toolkit for Mainstreaming and Implementing Gender Equality 2023", *Report*, OECD Publishing.

Osabohien, R. et al. (2021), "Female participation in agriculture and economic development in 33 African Countries", *African Journal of Reproductive Health / La Revue Africaine de la Santé Reproductive*, 25(5), 107-115.

Santos Silva, M. & S. Klasen (2021), "Gender inequality as a barrier to economic growth: A review of the theoretical literature", *Review of Economics of the Household*, 19(3), 581-614.

Seguino, S. (2000), "Accounting for Gender in Asian Economic Growth", *Feminist Economics*, 6(3), 27-58.

Seguino, S. (2019), "Feminist and stratification theories' lessons from the crisis and their relevance for post-Keynesian theory", *European Journal of Economics and Economic Policies: Intervention*, 16(2), 193-207.

Singh, K.P. et al. (2021), "Gendered Dimensions of Trade: Evidence from Arunachal Pradesh, India", *Space and Culture, India*, 9(1), 80-96.

Smith, R. et al. (2023), "Neoliberal ideologies and philanthrocapitalist agendas: What does a 'smart economics' discourse empower?", *Third World Quarterly*, 44(3), 574-594.

Swamy, A. et al. (2001), "Gender and corruption", *Journal of Development Economics*, 64(1), 25-55.

Tasci, G. (2021), "Reflections on women in internationalization", *Cypriot Journal of Educational Sciences*, 16(2), 703-724.

Tatli, H. & K. Tasci (2021), "The short and long-term relation between human development and female unemployment: The case of Turkey", *Argumenta Oeconomica*, 2021(1), 225-252.

Toksöz, G. (2011), "Women's Employment in Turkey in the Light of Different Trajectories in Development-Different Patterns in Women's Employment", *Fe Dergi*, 3(2), 19-32.

Uberti, L.J. & E. Douarin (2023), "The Feminisation U, cultural norms, and the plough", *Journal of Population Economics*, 36(1), 5-35.

Villegas Plá, B. (2024), "Dependency theory meets feminist economics: A research agenda", *Third World Quarterly*, 45(8), 1325-1342.

Wayong, M. (2016), "Theoretical Viewpoints on Women's Segregation in the Workplaces", *JICSA Journal of Islamic Civilization in Southeast Asia*, 5(2), 161-174.

WEF (2020), *Global Gender Gap Report 2020*, <https://www.weforum.org/publications/gender-gap-2020-report-100-years-pay-equality/in-full/global-gender-gap-index-2020/?gad_source=1&gad_campaignid=22228224717&gbraid=0AAAAAoVy5F5BEfbuyCm3skSGNLR6sqolq&gclid=CjwKCAjw-J3OBhBuEiwAwqZ_hyGQ-hcj2b9p9SZduR5RVvHk0NaAZ63rm2qUvAy1ctFm9i1T7x7NHxoCa4sQAvD_BwE>, 25.05.2025.

Windmeijer, F. (2005), "A finite sample correction for the variance of linear efficient two-step GMM estimators", *Journal of Econometrics*, 126(1), 25-51.

Yu, Z. & R. Osabohien (2023), "Investigating the Impact of Education and Women in Agriculture on Human Capital Outcomes in Africa: An Interaction Analysis", *Problemy Ekorozwoju*, 18(2), 242-248.

Yumusak, I.G. et al. (2013), "The Impacts of Gender Inequality in Education on Economic Growth in Turkey", *Procedia - Social and Behavioral Sciences*, 103, 1093-1103.

Zachorowska-Mazurkiewicz, A. (2017), "Gender, unpaid labour and economics", *Acta Universitatis Lodziensis Folia Oeconomica*, 6(326), 121-132.

Ekler:

Ek Tablo: 1
OECD Ülkelerinde Cinsiyet Eşitsizliği Endeksi Dönemsel İstatistikleri (1990-2021)

Ülke	Ortalama	Minimum	Maksimum	Gelir Grubu
Avustralya	0.138	0.073	0.185	Yüksek
Avusturya	0.125	0.052	0.204	Yüksek
Belçika	0.110	0.048	0.180	Yüksek
Kanada	0.135	0.069	0.193	Yüksek
Şili	0.369	0.187	0.512	Yüksek
Kolombiya	0.480	0.423	0.531	Üst-Orta
Kosta Rika	0.370	0.256	0.478	Üst-Orta
Çekya	0.176	0.120	0.293	Yüksek
Danimarka	0.058	0.013	0.094	Yüksek
Estonya	0.236	0.092	0.400	Yüksek
Finlandiya	0.073	0.031	0.108	Yüksek
Fransa	0.150	0.073	0.229	Yüksek
Almanya	0.113	0.073	0.183	Yüksek
Yunanistan	0.190	0.118	0.299	Yüksek
Macaristan	0.270	0.221	0.339	Yüksek
İzlanda	0.113	0.043	0.187	Yüksek
İrlanda	0.161	0.073	0.213	Yüksek
İsrail	0.171	0.083	0.270	Yüksek
İtalya	0.143	0.054	0.212	Yüksek
Japonya	0.133	0.080	0.164	Yüksek
Güney Kore	0.154	0.067	0.298	Yüksek
Letonya	0.275	0.149	0.419	Yüksek
Litvanya	0.210	0.105	0.331	Yüksek
Lüksemburg	0.127	0.044	0.213	Yüksek
Meksika	0.419	0.309	0.505	Üst-Orta
Hollanda	0.070	0.025	0.122	Yüksek
Yeni Zelanda	0.172	0.088	0.241	Yüksek
Norveç	0.075	0.014	0.132	Yüksek
Polonya	0.176	0.109	0.278	Yüksek
Portekiz	0.157	0.067	0.256	Yüksek
Slovakya	0.210	0.180	0.282	Yüksek
Slovenya	0.146	0.054	0.285	Yüksek
İspanya	0.116	0.056	0.188	Yüksek
İsveç	0.055	0.023	0.101	Yüksek
İsviçre	0.075	0.018	0.130	Yüksek
Türkiye	0.471	0.272	0.621	Üst-Orta
Birleşik Krallık	0.189	0.098	0.255	Yüksek
Amerika Birleşik Devletleri	0.252	0.178	0.299	Yüksek
Yüksek Gelir Grubu Ortalaması (34 ülke)	0.156	0.013	0.512	
Üst-Orta Gelir Grubu Ortalaması (4 ülke)	0.435	0.256	0.621	
OECD Genel	0.186	0.013	0.621	

Kaynak: Yazarların kendi hesaplamaları; UNDP GII veritabanı (1990-2021). GII değeri 0'a yaklaştıkça cinsiyet eşitliği artmakta, 1'e yaklaştıkça eşitsizlik artmaktadır. Yüksek gelir ve üst-orta gelir grubu sınıflandırması Dünya Bankası gelir gruplarına göre yapılmıştır.

Ek Tablo: 2
OECD Ülkelerinde Cinsiyet Eşitsizliği Endeksinin Dönemsel Seyri (1990-2021)

Yıl	Ortalama	Minimum	Maksimum	Standart Sapma	CV
1990	0.267	0.090	0.611	0.128	47.98
1995	0.243	0.075	0.604	0.129	53.18
2000	0.213	0.060	0.553	0.118	55.49
2005	0.184	0.047	0.531	0.114	61.98
2010	0.165	0.049	0.464	0.104	62.81
2015	0.135	0.033	0.430	0.098	72.14
2021	0.108	0.013	0.424	0.090	83.42
Dönem Ortalaması	0.186	0.013	0.621	0.123	62.43

Kaynak: Yazarların kendi hesaplamaları; beş yıllık aralıklarla seçilmiş dönemler sunulmuştur.

Ek Tablo: 3
IPS Panel Birim Kök Test Sonuçları

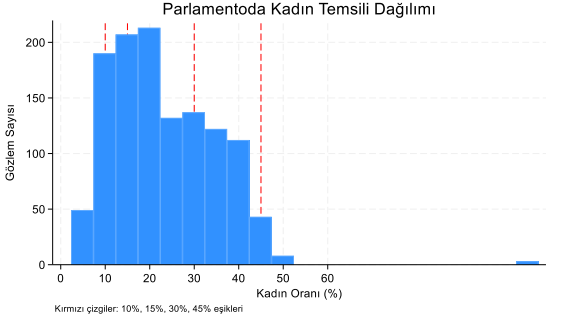
Değişken	Düzey		Birinci derece fark	
	W-t-bar istatistiği	p- değeri	W-t-bar istatistiği	p- değeri
LNGDP	0.3835	0.6493	-15.8674	0.0000*
GII	12.2828	1.0000	-12.2131	0.0000*
LNINV	-6.1307	0.0000*	-19.7420	0.0000*
LNPOP	-7.5389	0.0000*	-19.5538	0.0000*
LNOPEN	-1.0679	0.1428	-20.4496	0.0000*
LNSEATS	-16.8126	0.0000*	-16.0402	0.0000*
LNEDPRIM	-7.2904	0.0000*	-14.4473	0.0000*
LNESSEC	-24.3015	0.0000*	-7.9942	0.0000*
LNRFLFP	-2.8960	0.0019*	-16.0402	0.0000*
LNAGDP	1.155	0.876	-18.021	0.0000*
LNFPA	2.407	0.992	-15.541	0.0000*
LNFPOP	-12.597	0.000*	-20.991	0.000*

Not: Tüm değişkenler logaritmik dönüşüm uygulandıktan sonra test edilmiştir. GII değişkeni bileşik endeks niteliği taşıdığından, logaritmik dönüşüm uygulanmamıştır.

Ek Tablo: 4
OECD Ülkelerinde Ulusal Parlamentolarda Kadın Temsilinin Dönemsel Ortalamaları (%, 1990-2021)

Ülke	Ortalama (%)	Ülke	Ortalama
İsveç	43.8	Birleşik Krallık	19.1
Finlandiya	38.7	Polonya	18.9
Norveç	38.2	Estonya	18.7
Danimarka	36.8	İtalya	18.3
İzlanda	34.2	Fransa	18.2
Hollanda	34.0	Letonya	17.9
İsviçre	33.7	Slovakya	17.2
Yeni Zelanda	32.6	İrlanda	17.1
Belçika	30.9	Çekya	16.7
Almanya	30.4	İsrail	16.1
Kosta Rika	30.2	Amerika Birleşik Devletleri	16.0
İspanya	29.7	Slovenya	14.6
Avusturya	29.0	Yunanistan	13.3
Avustralya	27.3	Kolombiya	13.2
Meksika	25.9	Şili	12.8
Kanada	25.5	Japonya	10.7
Portekiz	23.8	Güney Kore	10.5
Lüksemburg	22.4	Macaristan	10.4
Litvanya	19.4	Türkiye	8.2

Ek Grafik: 1
OECD ülkelerinde Parlamentoda Kadın Temsili Dağılımı



NOTES FOR CONTRIBUTORS

1. Articles not published or submitted for publication elsewhere, accepted in either *Turkish* or *British English*.

2. Manuscripts should be, at most, single-spaced and 24 A4 pages with Times New Roman 11-point font. Article submissions are welcome only on the DergiPark platform.

3. The first page of the Word file to be submitted should include (i) the title of the article, (ii) an abstract of not more than 100 words; (iii) the keywords; and (iv) the JEL Codes; also (i) the full name(s) of the author(s); (ii) the ORCID ID numbers; (iii) institutional affiliation(s) of the author(s); (iv) the e-mail address and phone numbers of the author(s) should be indicated on a separate page. An "Ethics Committee Permission Certificate" obtained from the relevant institution for studies that require ethical approval and are based on questionnaires should be uploaded at the time of submission.

4. Tables, figures, and graphs should be numbered consecutively and contain full references. The titles of the tables, figures, and charts should be placed at their headings; the references for tables, figures, and graphs should be listed at the bottom. A comma should separate decimals. Equations should be numbered consecutively. Equation numbers should appear in parentheses at the right margin. The complete derivation of the formulas (if abbreviated in the text) should be provided on a separate sheet for the referee's use.

5. Footnotes should be placed at the bottom of the page.

6. All references should be cited in the text (not in footnotes) and conform to the following examples:

It has been argued (Alkin, 1982: 210-215) …
Griffin (1970a: 15-20) states …
(Gupta et al., 1982: 286-287).
(Rivera-Batiz & Rivera-Batiz, 1989: 247-249; Dornbusch, 1980: 19-23).

7. References should appear at the end of the text as follows:

Books: Kenen, P.B. (1989), *The International Economy*, Englewood Cliffs, N.J.: Prentice-Hall, Inc.

Periodicals: Kapıcıoğlu, R. & H. Ekelik (2026), "Hofstede's Cultural Dimensions and Tax Compliance: Analysis Using the CART Algorithm at the Country Level", *Sosyoekonomi*, 34(68), 59-80. DOI: 10.17233/sosyoekonomi.2026.02.03

Articles in edited books: Krugman, P. (1995), "The Move Toward Free Trade Zones", in: P. King (ed.), *International Economics and International Economic Policy: A Reader* (163-182), New York: McGraw-Hill, Inc.

Other sources: Central Bank of the Republic of Turkey (2003), *Financial Stability*, Press Release, March 24, Ankara, <http://www.tcmb.gov.tr>.

Chang, R. (1998), "The Asian Crisis", *NBER Discussion Paper*, 4470, National Bureau of Economic Research, Cambridge, MA.

8. Cited web pages should exist in the References with their complete address and cited date as follows:

……, <http://www.sosyoekonomijournal.org>, 18.12.2025.

YAZARLARA DUYURU

1. Sosyoekonomi Dergisi'nde *Türkçe* ve *İngilizce* makaleler yayımlanmaktadır. Dergiye gönderilen makaleler başka bir yerde yayımlanmamış veya yayımlanmak üzere gönderilmemiş olmalıdır.

2. Yazılar A4 boyutunda kâğıda, tek aralıkla, *Times New Roman* karakterinde, 11 puntoyla ve 24 sayfayı geçmeyecek şekilde yazılmalıdır. DergiPark platformu dışından yapılan gönderiler kabul edilmemektedir.

3. Gönderilecek Word dosyasının ilk sayfasında Türkçe ve İngilizce olarak şu bilgiler yer almalıdır: (i) yazının başlığı; (ii) en çok 100 kelimelik özet; (iii) anahtar sözcükler; (iv) çalışmanın JEL kodları; ayrı bir Word dosyasında ise (i) yazar(lar)ın adı; (ii) ORCID ID numaraları; (iii) yazar(lar)ın bağlı bulunduğu kurumun açık adı; (iv) yazar(lar)ın e-mail adresi ve telefon numarası belirtilmelidir. Etik onayı gerektiren ve ankete dayalı çalışmalarda ilgili kurumdan alınan "Etik Kurul İzin Belgesi" başvuru anında sisteme yüklenmelidir.

4. Tablo, şekil ve grafiklere başlık ve numara verilmeli; başlıklar tablo, şekil ve grafiklerin üzerinde yer almalı; kaynaklar ise tablo, şekil ve grafiklerin altına yazılmalıdır. Rakamlarda ondalık kesirler virgül ile ayrılmalıdır. Denklemlere verilecek sıra numarası, parantez içinde sayfanın sağ eninde yer almalıdır. Denklemlerin türetilişi, yazıda açıkça gösterilmemişse, hakemlerin değerlendirmesi için türetme işlemi bütün basamaklarıyla ayrı bir sayfada verilmelidir.

5. Yazılarda yapılan atıflara ilişkin dipnotlar sayfanın altında yer almalıdır.

6. Kaynaklara göndermeler dipnotlarla değil, metin içinde, sayfa numaralarını da içererek, aşağıdaki örneklerde gösterildiği gibi yapılmalıdır:

…… belirtilmiştir (Alkin, 1982: 210-215).
…… Griffin (1970a: 15-20) ileri sürmektedir.
(Gupta vd., 1982: 286-287).
(Rivera-Batiz & Rivera-Batiz, 1989: 247-249; Dornbusch, 1980: 19-23).

7. Metinde gönderme yapılan bütün kaynaklar, sayfa numaraları, varsa DOİ adresleri ya da internet adresleri ile birlikte, "Kaynaklar" ("Kaynakça" diye yazılmayacak) başlığı altında ve aşağıdaki örneklere uygun olarak belirtilmelidir:

Kitaplar: Kenen, P.B. (1989), *The International Economy*, Englewood Cliffs, N.J.: Prentice-Hall, Inc.

Dergiler: Kapıcıoğlu, R. & H. Ekelik (2026), "Hofstede's Cultural Dimensions and Tax Compliance: Analysis Using the CART Algorithm at the Country Level", *Sosyoekonomi*, 34(68), 59-80. DOI: 10.17233/sosyoekonomi.2026.02.03

Derlemeler: Krugman, P. (1995), "The Move Toward Free Trade Zones", içinde: P. King (ed.), *International Economics and International Economic Policy: A Reader* (163-182), New York: McGraw-Hill, Inc.

Diğer Kaynaklar: Türkiye Cumhuriyet Merkez Bankası (2001), *2002 Yılında Para ve Kur Politikası ve Muhtemel Gelişmeler*, Basın Duyurusu, 2 Ocak, Ankara, <http://www.tcmb.gov.tr>.

Chang, R. (1998), "The Asian Crisis", *NBER Discussion Paper*, 4470, National Bureau of Economic Research, Cambridge, MA.

8. Kaynaklar kısmında web sitelerine yapılan atıflar muhakkak alındıkları tarih itibarıyla gün, ay ve yıl olarak, tam adresleriyle birlikte belirtilmelidir.

……, <http://www.sosyoekonomijournal.org>, 18.12.2025.