Referees of This Issue / Bu Sayının Hakemleri

Content

Executive Summary

Our journal aims to reveal more current, higher quality and more original research studies and to publish them in the light of accurate publishing principles. In our 31st volume, 55th issue, we present twenty-five studies, including socioeconomic-based findings and reviews, which broadly contains research papers. Research papers provide a clear contribution to knowledge in the field with solid theoretical and/or methodological support and provide a critical, concise, comprehensive, and contemporary examination of economics in real life and its applications.

The first study of our journal examines the nexus between nurses' communication, knowledge sharing and organisational ambidexterity levels. As a result of the study conducted with 318 nurses working in university hospitals in the TRC1 Region using simple random sampling, it was determined that the mastery degrees of the new generations were lower than the old ones, even still a linear and significant relationship was presented. The second study of this issue, which also has the characteristics of a research article, aims to illuminate a relationship as the first article. It strives to determine whether there is a correlation between the safety climate and performance indicators by surveying 195 employees in a manufacturing company. The third study evaluates the factors affecting credit risks in the Turkish banking system between 2003 and 2018. The following study similarly focuses on the Turkish banking system and investigates the performance of 13 commercial banks before and after the Pandemic. Especially the recent ongoing debates on the profitability of Turkish public-owned banks raise the conspicuousness of this article.

The fifth study is about the Metaverse, a developing trend recently gaining importance in the literature. Although the authors have not expressed it in the article, it has been used as a preference explanation mechanism that has a significant and positive effect on the perceived usefulness of compatibility, fun and trust. Hence this study is notable for testing set patterns of understanding that can be extended, including tax compliance. The sixth study is about inflation, which never falls off the agenda and does not compromise its importance, especially in economic instability in the last few decades. The study, which proposes to establish the link between the cold progressive proportionality and inflation in the Turkish income tax between 2006 and 2021, is valuable in revealing the distorting effects of inflation on the tax system. The seventh article of this issue is about the oil-stocks study, which is a popular research method and differs in that it reveals asymmetric shock effects. In this study, the effect of crude oil prices and other selected macroeconomic variables on the Turkish stock market in the period 2005:01-2021:06 has been determined. The eighth study is on the exclusion effect of public debt and investments in Turkey using the ARDL method, while the ninth study is on the non-performing loans used by banks and the sectoral effects of these loans.

Our issue's tenth and eleventh studies are solely public finance studies on the informal economy and taxation. The tenth study explores the interactive impact of financial development and institutional quality on the informal economy, using 2002-2017 data from 67 developing countries. The eleventh study has carried out a legislative review in the context of time spent in virtual games, which has become one of the biggest endeavours of the twenty-first century. Moreover, the twelfth study, another of the international econometric studies of this issue, investigates the validity of the relationship between service exports and economic growth in the South Caucasus countries. Another study approaching from a multinational perspective is Tosun and Yılmaz's work on non-profit sectors. The economic and social factors affecting the size of NGOs in OECD and 20 member countries between 1995-2019 has investigated.

While the exchange rate and household consumption expenditures study of Koçak and Karış researched via ARDL and ARCH is the fifteenth study in this issue, Taşgit et al.'s study is called the mediating role of strategic capability on the relationship between strategic awareness and strategic agility is the sixteenth article of the issue. On the other hand, the article of Akkoç et al. on indirect tax burden in Turkey and their increasing proportionality, and Polat and Bulut's article on second-hand car price increase are the seventeenth and eighteenth studies, respectively. The eighteenth article, which aims to present a market analysis of used-car prices based on the example of Van, proved the supply chain's increasing effect on the price by trying to make a supply-side analysis as a survey applied to authorised dealers and dealers. Bekar's study on the exchange rate, which is the twentieth article in this issue, is noteworthy in that it can identify the model that gives the closest result to the righteous prediction in the estimation of exchange rate variability in Turkey in the 2005-2021 period.

Our issue consists of econometric-based studies that can be easily tested for robustness in the national and international literature, indicating our journal's effort to offer better quality research to its readers. In this context, the twentieth article, which conducts a spatial analysis of the environmental protection expenditures of local governments, reveals that the environmental protection expenditures per capita in Türkiye are concentrated in

certain regions and cause the free-riding problem. As an econometric study, the following study tests the closed-circle theory on Turkey from the developing countries between 1980-2019. The twenty-second study has included this group using panel data analysis on the relationship between "Internet Penetration, Foreign Direct Investments, Foreign Trade and Economic Growth" in "BRICS-T Countries".

The twenty-third article is about a bleeding wound of our country, terrorism. It has shown that terrorism is a phenomenon that affects the economy for the 1970-2020 period by using OECD and GTD data such as the number of events, the number of deaths and the number of injured. The twenty-fourth article evaluates the framing theory, mostly used in other fields of social sciences, in the context of tax penalties in public finance. The last study of our issue investigates Turkey's structural breaks and the volatile index between 2009:6 and 2021:12.

Dear researchers, scientists, and readers, we know that publishing in quality academic and scientific journals like Sosyoekonomi is always challenging. However, please do not let the waiting time of the evaluation process on your determination to succeed. No one knows better than you are how difficult and arduous the road to success is.

We hope you will share our enjoyment and academic pleasure while reading this issue. We are truly grateful for your ongoing interest in our journal.

Sevilay Ece GÜMÜŞ-ÖZUYAR
Editorial Board Member

Editörün Notu

Dergimizin amacı, güncel, kaliteli ve özgün araştırma makaleleri yayınlamaktır. 31. cildimizin 55. sayısında sosyoekonomik temelli bulgu ve incelemeleri içeren yirmi beş çalışmayı sunuyoruz, ki sayı genel olarak araştırma makalelerini içermektedir. Araştırma makaleleri, sağlam teorik ve/veya metodolojik destekle alandaki bilgiye açık bir katkı sağlar ve gerçek hayatta ve uygulamalarında ekonominin eleştirel, özlü ancak kapsamlı ve çağdaş bir incelemesini gerçekleştirir.

Dergimizin ilk çalışması, bir araştırma makalesi olarak iletişim ve bilgi paylaşımı ile örgütsel ustalık arasındaki ilişkiyi incelemiştir. Basit tesadüfi örnekleme yoluyla TRC1 Bölgesi'ndeki üniversite hastanelerinde çalışan 318 hemşire ile yapılan çalışma sonucunda yeni jenerasyonların ustalık derecelerinin eskilere kıyasla daha düşük olduğu ancak yine de doğrusal ve anlamlı bir ilişki saptanmıştır. Bir araştırma makalesi özelliği taşıyan bu sayının ikinci çalışması da birinci çalışmada olduğu üzere bir ilişkiyi aydınlatma gayesi taşımaktadır. Güvenlik iklimi ve performans göstergeleri arasında bir bağıntı olup olmadığını bir imalat firmasındaki 195 çalışan ile anket yapmak suretiyle belirlemeye gayret etmektedir. Üçüncü çalışma ise 2003-2018 yılları arasında bankacılık sistemini konu ederek, kredi risklerini etkileyen faktörleri Türkiye üzerinde değerlendirmiştir. Takip eden çalışma da benzer şekilde Türk bankacılık sistemini konu edinmiştir ve Pandemi öncesi ile sonrasında 13 ticari bankanın performansını incelemiştir. Özellikle son dönemde Türk kamu bankalarının kârlılığına ilişkin süregelen tartışmalar bu makalenin dikkat çekiciliğini artırmaktadır.

Beşinci çalışma, günümüz dünyasında gelişen bir trend olan ve literatürde yer bulmaya başlayan metaverse hakkındadır. Makalede yazarlar dile getirmese de bir tercih açıklatma mekanizması olarak kullanılan metaverse sisteminin uyumluluk, eğlence ve güvenin algılanan fayda üzerinde anlamlı ve pozitif bir etkiye sahip olduğu ortaya konulmuştur. Bu bağlamda bu çalışma vergide uyum da dahil olmak üzere genişletilebilecek anlayış kalıplarının testi için dikkate değerdir. Altıncı çalışma ise gündemden hiç düşmeyen ve özellikle son birkaç on yıldır yaşanan ekonomik istikrarsızlıklar dahilinde öneminden ödün vermeyen enflasyon ile ilgilidir. 2006-2021 döneminde Türk Gelir vergisinde soğuk artan oranlılık ile enflasyon arasındaki bağı kurmaya çalışan çalışma, enflasyonun vergi sistemi üzerindeki bozucu etkilerini ortaya koyması bakımından değerlidir. Bu sayının yedinci makalesi de popüler bir araştırma yöntemi olan ve asimetrik şok etkilerini ortaya koyması bakımından farklılaşan petrol-hisse senedi çalışmasıdır. Bu çalışmada, 2005:01-2021:06 döneminde ham petrol fiyatları ile diğer seçilmiş makroekonomik değişkenlerin Türkiye hisse senedi piyasası üzerindeki etkisi belirlenmiştir. Sekizinci çalışma ise kamu borç ve yatırımlarının Türkiye'deki dışlama etkisi üzerine ARDL yöntemi kullanılarak yürütülen bir araştırma iken dokuzuncu çalışma da bankalardan kullanılan kredilerin takibe düşüşü ve bu kredilerin sektörel etkileri üzerinedir.

Sayımızın onuncu ve on birinci çalışmaları tamamen kamu maliyesi çalışmaları olup sırasıyla kayıt dışı ekonomi ve vergilendirme üzerinedir. Onuncu çalışmada 67 gelişmekte olan ülkenin 2002-2017 verilerini kullanarak finansal gelişme ve kurumsal kalitenin kayıt dışı ekonomi üzerindeki interaktif etkisini araştırmaktadır. Onbirinci çalışmada, yirmi birinci yüzyılın en büyük uğraşlarından biri haline gelen sanal oyunlarda geçirilen süre bağlamında bir mevzuat incelemesi yapılmıştır. Ayrıca bu konudaki uluslararası ekonometrik çalışmalardan bir diğeri olan on ikinci çalışma, Güney Kafkasya ülkelerinde hizmet ihracatı ile ekonomik büyüme arasındaki ilişkinin geçerliliğini araştırmaktadır. Çok uluslu bir bakış açısıyla yaklaşan bir diğer eser ise Tosun ve Yılmaz'ın kâr amacı gütmeyen sektörler çalışmasıdır. 1995-2019 yılları arasında OECD ve üye 20 ülkede STKların büyüklüğünü etkileyen ekonomik ve sosyal faktörler araştırılmıştır.

Koçak ve Karış'ın ARDL ve ARCH ile araştırdığı döviz kuru ve hane halkı tüketim harcamaları çalışması bu sayıda on beşinci çalışma olarak yer almaktayken, Taşgit vd.'nin stratejik farkındalık ve stratejik çeviklik ilişkisinde stratejik yeteneğin aracılık rolü isimli çalışması ise on altıncı çalışma olarak sayıda yer bulmuştur. Öte yandan Akkoç vd.'nin Türkiye'de dolaylı vergi yükü ve bunların artan oranlılığı ile Polat ve Bulut'un ikinci el otomobil fiyat artışına dair makalesi sırasıyla on yedinci ve onsekizinci çalışmalardır. İkinci el araba fiyatları ile ilgili Van örneğinden yola çıkarak bir piyasa analizi sunmayı hedefleyen on sekizinci makale, aslında temelde yetkili satıcı ve galericilere uygulanan bir anket olarak arz yönlü bir analiz yapma gayretiyle tedarik zincirinin fiyat üzerindeki artırıcı etkisini ispatlamıştır. Bekar'ın döviz kuru üzerine olan ve bu sayıda yirminci makale olarak yer alan çalışması ise 2005-2021 döneminde Türkiye'de kur değişkenlik tahmininde doğru tahminlemeye en yakın sonuç veren modeli saptayabilmesi bakımından dikkate değerdir.

Sayımızın ulusal ve uluslararası literatürde kolaylıkla sağlamlık testinin yapılabileceği ekonometrik temelli güçlü çalışmalardan oluşması, dergimizin siz okuyucularına daha kaliteli araştırmalar sunmaya çalışma gayretinin de bir göstergesidir. Bu bağlamda yapılan bir diğer çalışma, yerel yönetimlerin çevre koruma harcamaları üzerine mekânsal bir inceleme yapan yirminci makaledir, ki bu makale Türkiye'de kişi başı çevre koruma harcamalarının belli bölgelerde yoğunlaştığını ve bedavacılık problemine yol açtığını göstermektedir. Takip eden

çalışma da ekonometrik bir çalışma olarak, 1980-2019 yılları arasında gelişmekte olan ülkelerden Türkiye'deki kapalı döngü teorisini test etmektedir. Yirmi ikinci çalışma da bu bahsi geçen gruba "BRICS-T Ülkeleri'nde İnternet Penetrasyonu, Doğrudan Yabancı Yatırımlar, Dış Ticaret ve Ekonomik Büyüme" ilişkisine dair araştırmada panel veri analizi kullanımı ile dahil olmuştur.

Yirmiüçüncü makale, ülkemizin kanayan yarası terörizme dair bir çalışmadır. Bu makalede terörizmin ölçülebilen boyutları olarak adlandırılan olay sayısı, vefat sayısı, yaralanan sayısı gibi OECD ve GTD verileri kullanarak 1970-2020 dönemleri arasında terörizmin ekonomiyi etkileyen bir olgu olduğunu göstermiştir. Yirmidördüncü makale ise genellikle sosyal bilimlerin diğer alanlarında kullanılan çerçeveleme kuramını kamu maliyesi alanında vergi cezaları bağlamında değerlendirmektedir. Son olarak, sayımızın son çalışması ise 2009:6 ile 2021:12 arasında Türkiye'de yapısal kırılmalar ile volatilite endeksini araştırmaktadır.

Değerli araştırmacılar, bilim insanları ve okuyucular, Sosyoekonomi gibi kaliteli akademik ve bilimsel dergilerde yayın yapmanın ne kadar zor olduğunun her zaman bilincindeyiz. Ancak ne bekleme süresinin ne de değerlendirme süresinin sizin başarılı olma kararlılığınızı etkilemesine izin vermeyin. Başarıya giden yolun ne derece zahmetli ve meşakkatli olduğunu sizlerden daha iyi kimse bilemez.

Bu sayımızı okurken aldığımız zevke ve akademik zevkimize ortak olacağınızı umuyoruz. Dergimize gösterdiğiniz ilgiye samimiyetle minnettarız.

Sevilay Ece GÜMÜŞ-ÖZUYAR
Yayın Kurulu Üyesi

Examining the Relationship Between Communication and Information Sharing and Organisational Ambidexterity: A Study on Nurses in TRC1 Region

Gülşen KIRPIK *(https://orcid.org/0000-0003-4785-9624), Adıyaman University, Türkiye; gkirpik@adiyaman.edu.tr*

Yasin ÇETİN *(https://orcid.org/0000-0001-5783-5701), Adıyaman University, Türkiye; yasin8544@hotmail.com*

İletişim ve Bilgi Paylaşımı ile Örgütsel Ustalık Arasındaki İlişkinin İncelenmesi: TRC1 Bölgesi Hemşireleri Üzerinde Bir Araştırma

Abstract

This study aimed to determine the relationship between communication and knowledge-sharing levels and organisational ambidexterity levels of nurses working in university hospitals in the TRC1 (Gaziantep, Adıyaman, Kilis) Region of Turkey. Through simple random sampling, 318 nurses working in university hospitals in the TRC1 Region were reached. As a result of the analysis, a positive linear and significant relationship was determined between communication and information sharing and organisational ambidexterity. In addition, it is a remarkable result of this study that the communication, knowledge sharing, and organisational ambidexterity levels of the Y-generation nurses are at the lowest level compared to the other generation nurses.

Keywords : Communication and Information Sharing, Organisational Ambidexterity, Nurse.

JEL Classification Codes : M12, D83, D23.

Öz

Bu çalışmada, Türkiye'nin TRC1 (Gaziantep, Adıyaman, Kilis) bölgesindeki üniversite hastanelerinde çalışan hemşirelerin iletişim ve bilgi paylaşım düzeyleri ile örgütsel ustalık düzeyleri arasındaki ilişkinin belirlenmesi amaçlanmıştır. Basit tesadüfi örnekleme yoluyla TRC1 Bölgesi'ndeki üniversite hastanelerinde çalışan 318 hemşireye ulaşılmıştır. Analiz sonucunda iletişim ve bilgi paylaşımı ile örgütsel ustalık arasında pozitif yönde doğrusal ve anlamlı bir ilişki saptanmıştır. Ayrıca Y kuşağı hemşirelerin iletişim, bilgi paylaşımı ve örgütsel ustalık düzeylerinin diğer kuşak hemşirelere göre en düşük düzeyde olması bu çalışmanın dikkat çekici bir sonucudur.

Anahtar Sözcükler : İletişim ve Bilgi Paylaşımı, Örgütsel Ustalık, Hemşire.

1. Introduction

Globally, the health system is an indispensable chain of methods as long as humanity exists. One of the critical links of this chain is the communication and information sharing that ensures coordination between multidisciplinary professional groups in the provision of health services. Since nurses, who comprise most healthcare professions, are expected to be systematic, qualified, and share in patient care services, communication and information sharing are very important for nurses (Turkelson et al., 2017). Nurses with individual and team-based skills in providing healthcare services work in coordination and communication with different healthcare professional groups. If there is a deficiency or impairment in communication or coordination, medical errors may arise in areas with severe working conditions, such as intensive care and emergency services. For this reason, effective communication prevents unwanted situations that may occur during the working process of nurses before they turn into a disaster for the patient (Turkelson et al., 2017). In addition, according to Ruhomauly et al. (2019), effective communication is also important regarding patient safety, which has an important place in nursing care services. Moreover, according to Pun et al. (2020), the patient handover process is another example of effective communication between nurses in conveying critical information such as patient care, treatment, and recovery. In this process, a setback or delay in sharing the patient's information may cause negative consequences for the patient. Similarly, Ekambaram et al. (2018) reported that communication and information management are vital in enabling organisations to cope with changes effectively, increase their productivity, and pave the way to development and innovation. In this context, it can be said that effective communication and information sharing have an important role in terms of the continuity of nursing services and the complete fulfilment of responsibilities.

The concept of organisational ambidexterity, which is as important as communication and information sharing in management systems, such as increasing the performance of the organisation, using the resources of the organisation systematically, and revealing the talents of the organisation members (Ahammad et al., 2019), making use of the existing capabilities of the organisations and ensuring that they are always open to innovations, providing opportunities for discovery and innovation, offers opportunities (Jeskey et al., 2011) in line with the interests of the organisation and staff. According to Jeskey et al. (2011), the monitoring system used for continuous patient monitoring after surgery mediates nurses' improvement and development efforts as an example of organisational ambidexterity behaviours.

Technological and political developments, manifested today with constant change and transformation, have affected sectors such as the economy, security, education, and health. This change and transformation have also caused some changes in the roles and functions of nurses, the largest health sector workforce. It is seen that especially preventive health services come to the forefront in nurses compared to curative health services, and services for healthy individuals and their families increase instead of providing care to the sick individual. Thus, besides the primary caregiver role of nurses, functions such as

educators, consultants, decision-makers, managers, and coordination have emerged. Therefore, the nursing profession gets rid of the traditional nursing understanding and quickly assumes a contemporary professional identity (Dinç et al., 2007; Korkmaz, 2010). This contemporary professional identity has led to the establishment of the concept of professionalism in nurses, and they have reached a situation where they can perform their functions, such as scientific research, theory development, and participation in professional associations, as well as providing care services. Of course, while providing care services, nurses act with ethical principles as well as exhibit behaviours toward professional values (Göriş et al., 2014; Saraçoğlu, 2010). The International Union of Nurses (ICN), one of the pioneers of the nursing profession, constitutes an important force worldwide to increase the service standards of the members of the profession on behalf of the professionalisation of the nursing profession (Korkmaz, 2010). Therefore, nurses should know professional, ethical values and should be professional member who carries out care and practice in line with their professional standards and acts with the awareness to increase the quality of continuous service. Nurses must acquire a special skill to carry out care and all these professional requirements together. In this direction, it is important to determine the organisational ambidexterity behaviours of nurses to gain not only a specific subject but also different organisational skills within the organisation. Another originality of our research is investigating the factors that can effectively gain other professional competencies of nurses. In addition, due to the important contributions of information sharing, such as increasing individual and organisational performance and job satisfaction, it has been discussed mainly among nurses together with organisational ambidexterity (Gehrke & Hasan, 2020; Sönmez-Çakır & Adıgüzel, 2020).

In addition, when the literature was examined, it was observed that communication and information sharing in the nursing field and organisational ambidexterity research were discussed separately (Altındiş & Veysel, 2011; Wasilewski, 2019). However, no study has been conducted on nurses considering both concepts together. Therefore, this research can be evaluated as original research since it is the first research in the health field. Thus, with its results, this research will contribute to filling the gap in the literature, being a guide for other researchers, and increasing managerial skills in the nursing field.

2. Conceptual Framework

2.1. Communication and Information Sharing

Communication and information sharing are very important in ensuring the safety of patient care aimed at providing health care, providing quality health care service, and meeting the increasing demand for health care. Therefore, healthcare providers must communicate effectively with multidisciplinary teams, patients, and their families (Palanisamy & Verville, 2015; Quan et al., 2013). In health, effective communication was defined as the doctor-nurse game (Stein, 1968), which was first used in 1967. However, difficulties in effective communication among health professionals remain (O'Daniel & Rosenstein, 2008). The lack of effective communication causes a decrease in job

satisfaction, wear and tear in business life, and medical errors for the nurse. In contrast, it causes prolongation of the patient's hospital stay, delay in patient treatment, and psychological wear on the patient. (Palanisamy & Verville, 2015).

Information-sharing behaviour can be determined by certain factors within the organisation (Ipe, 2003). To exhibit these behaviours, the desire to share the information acquired by the nurse within the organisational culture and to have the information obtained by others are important factors affecting information sharing (Pai & Tsai, 2016). Therefore, the organisation should have an organisational culture that will provide mutual interest, trust, and openness to ensure information sharing (Al-Alawi et al., 2007). In addition, it has been reported by Marri et al. (2019) that effective communication and information sharing among the organisation members positively contribute to the nurses in terms of gaining creativity, developing their specialist skills, increasing their motivation, and gaining different perspectives.

In the health centre, care providers share all patient-related information, usually during shift changes. In the study conducted by Coughlan et al. (2007), it was stated that when the shift change interviews were conducted in the patient room, patients also participated in information sharing. In this way, it was noted that communication between different health centre stakeholders increased, and better participation was achieved. Research has demonstrated that an organisational environment that cares about communication and information sharing and provides effective information management is critically important in generating creative and innovative ideas, competitive product success, and, therefore, competitive advantage (Ouakouak & Ouedraogo, 2017; Ferreira, 2014). It was stated by Ferreira (2014) that the development of communication and information technology allows the flow of information in the organisational environment to increase cooperation and interaction. On the other hand, heterogeneity among healthcare professionals can pose difficulties in communication and information sharing. For example, in the study by Kauppila et al. (2011), it was stated that heterogeneity between groups poses difficulties in communication and information sharing because people with different functions always discuss concerns, priorities, and even problems that are different from each other. However, according to Wu et al. (2015), managers stated that even if they face potential inefficiencies in communication and information sharing, they can maintain communication and information sharing by creating a common communication symbol and method.

In light of the information above, it can be said that communication and information sharing are vital driving forces for a successful business outcome in nursing services. Because effective communication and information sharing not only provide successful cooperation among nurses but also has a positive relationship with service success, organisational success, personal satisfaction, and survival (Alshawabkeh, 2020; Yang et al., 2012; Raisch & Birkinshaw, 2008; Kotlarsky & Oshri, 2005).

2.2. Organisational Ambidexterity

Organisational ambidexterity is the willingness of an organisation to simultaneously navigate the market and surrounding environment (Alshawabkeh et al., 2020; Petro, 2017) and reallocate resources and competencies to address new opportunities and threats (O'Reilly & Tushman, 2011). Although, according to Ojha et al. (2018), organisational ambidexterity is shown as a static process, when similar studies (Ojha et al., 2018; Brown & Eisenhardt, 1998; March, 1991) in the literature are examined, it is seen that organisational ambidexterity is a dynamic and sequential process. Anyway, organisational ambidexterity, which is of great importance for the long-term success of organisations operating in an uncertain and dynamic environment (Marri et al., 2019), is expected to be dynamic in terms of adaptation to the environment, not static. Similarly, in the studies conducted by Fahrudi (2018) and Raisch & Birkinshaw (2008), organisations' efficient management of current business demands in the face of dynamic external environments and the development of adaptability skills that enable organisations to survive are supported in terms of the dynamism of organisational ambidexterity. In addition, in the literature (Alshawabkeh et al., 2020; Tamayo-Torres et al., 2017; Güttel & Konlechner, 2007; Gibson & Birkinshaw, 2004), it was stated that the concept of organisational ambidexterity should have an effective organisational functioning related to having dynamic capabilities. According to Alshawabkeh et al. (2020) and Gibson and Birkinshaw (2004), this is ambidextrous organisations can cope with environmental challenges and effectively meet today's demands. Ambidextrous organisations also can be actively familiar with environmental challenges while adapting to their existing processes to tackle market conditions. On the other hand, in some studies (Wasilewski, 2019; Fahrudi, 2018), organisational ambidexterity is expressed as the ability of the organisation to make its existing knowledge effective and compatible with new knowledge.

The continuity of innovations and discoveries is critical for organisations to maintain organisational welfare and organisational success (Baškarada et al., 2016). Duncan (1976) introduced the term organisational ambidexterity to the literature based on the idea that different structures are required for innovation and discovery. In this direction, he argued that organisations should initiate innovation and change their structures to ensure continuity and success. Since organisational ambidexterity is important for the continuity and success of organisations, it is seen that research on this concept has attracted attention, especially in recent years, and has been defined by many researchers (Lis et al., 2018; Wasilewski, 2019). In this context, it can be said that organisational ambidexterity expresses both innovation (Wasilewski, 2019; Ekambaram et al., 2018; Fahrudi, 2018; Lis et al., 2018; Ojha et al., 2018; Baškarada et al., 2016; Jeskey et al., 2011; Duncan, 1976) and exploratory ability of the organisation (Wasilewski, 2019; Fahrudi, 2018; Ojha et al., 2018; Baškarada et al., 2016; Borzillo et al., 2012). Moreover, organisational ambidexterity includes flexibility, autonomy, and experimentation within the organisation, creating a synergistic environment in the organisation by aiming to provide continuous improvement with efficiency and control (Subaciute & Rao, 2019; Baškarada et al., 2016).

When the studies of the premises of organisational ambidexterity (Ojha et al., 2018; Lin et al., 2017; Li, 2013; Kortmann, 2015) are evaluated together, it can be said that among the building blocks of organisational ambidexterity, there are factors such as cooperation of knowledge assets, diversity of senior management and strategic orientations in decision making. When the studies in the literature are examined in terms of the dimensions of organisational ambidexterity, it is seen that organisational ambidexterity has been classified as temporal, structural, and contextual (Wasilewski, 2019; Fahrudi, 2018; O'Reilly & Tushman, 2013; Turner& Lee-Kelley, 2013) for the last 20 years to determine how individuals will evaluate their time between innovation and discovery activities within the organisation. This classification can be summarised as follows:

- Temporal Ambidexterity: It refers to the adaptation of organisations to the new process in a systematic order in the face of change (O'Reilly & Tushman, 2013).
- Structural Ambidexterity: It is the separation of individuals within the organisation according to their field and function (Good & Michel, 2013). In the study by Marri et al. (2019), it was stated that the structural differentiation of an organisation through structural ambidexterity. However, it is advocated and supported to achieve organisational ambidexterity but is criticised for its negative effect on organisations with limited resources. Similarly, it has been stated in some studies (Chang & Hughes, 2012; Kyriakopoulos & Moorman, 2004; Raisch & Birkinshaw, 2008) that achieving organisational ambidexterity may depend on the availability of sufficient resources, especially as the complexity of operations increases.
- Contextual Ambidexterity: It refers to the combined use of both temporal and structural ambidexterity behaviours by the organisation's goals (Duncan, 1976; O'Reilly & Tushman, 2013; Wasilewski, 2019).

Although mostly positive organisational results regarding organisational ambidexterity are given in the literature, Guettel & Konlechner (2007) mentioned that ambidextrous organisations face constant tensions due to strategic contradictions. In addition, the difficulties of achieving organisational ambidexterity are also mentioned in the literature. For example, according to Fahrudi (2018), achieving organisational ambidexterity is very important for large organisations that want to provide better customer service. However, large organisations often find it difficult to discover new learning due to the complexity of structures and bureaucracies. Accordingly, it can be said that nurses may have difficulty in achieving organisational ambidexterity since the institutions where nurses work are generally large and complex organisations.

When "communication and knowledge sharing", "organisational ambidexterity", and "nurse" are written in the Google Scholar database, only the research conducted by Subaciute & Rao (2019) has been reached. When the same concepts were written in Science Direct (2020), Sobiad (2020), and Taylor & Francis (2020) databases, no studies were found. With the exclusion of the "Nurse" concept, 61 studies were found in the Google Scholar (2020) database, and two studies were found in the Science Direct (2020) database.

However, no research has been found in Sobiad's (2020) and Taylor & Francis's (2020) databases. It was observed that both studies (Ojha et al., 2018; Chang & Hughes, 2012) accessed in the SCI database also exist in the Google Scholar database. Therefore, in the conceptualisation of this research and in examining communication and knowledge sharing research and organisational ambidexterity research, 63 studies have formed the universe of literature reviews. However, only relevant studies were used to achieve the purpose of the study. When these studies are examined, no research on nurses related to "communication and information sharing" or "organisational ambidexterity "has been encountered. This situation reveals the originality of this research.

3. Methodology

3.1. Aim of the Research

The primary purpose of this study is to reveal whether there is a relationship between the level of communication and information sharing and the organisational ambidexterity level of nurses working in hospitals affiliated with universities in the TRC1 Region (Gaziantep, Adıyaman, Kilis). The secondary objectives of the research can be listed as follows:

a) Examining whether there is any difference between the communication and information sharing levels in terms of the socio-demographic characteristics of the nurses.
b) Examining whether there is any difference between the perceived organisational ambidexterity levels in terms of the socio-demographic characteristics of the nurses.
c) Sharing the results obtained within the scope of the research with the managers of the university hospitals to contribute to the managers of the relevant institutions.
d) Contributing to the knowledge in the literature and future research with the information obtained.

As a result of the research conducted in the literature, it has been observed that similar studies (Katou et al., 2020; Hughes et al., 2020; Yılmaz & Yıldırım, 2018; Cingöz & Akdoğan, 2015; Anthoine et al., 2014; Lubatkin et al., 2006) have been conducted in both national and foreign literature. However, Turkey's Southeast, particularly in TRC1 (Gaziantep, Adıyaman, Kilis), did not reveal a similar survey. Accordingly, it can be said that this study is the first study conducted in the TRC1 region in terms of its subject and study of the universe, and it shows originality in this context. In the discussion part of the study, the findings of this research were compared with those of other studies in the literature, and differences and similarities were emphasised. However, in different regions of Turkey, since it is assumed to have differences in socio-demographic and cultural variables, this study in this context must be considered a limited study.

3.2. Sample of the Research

Nurses working in university hospitals in TRC1 Region (Gaziantep, Adıyaman, Kilis) constitute the main population of this study. However, although Kilis province is located in TRC1 Region, it is not included in the scope of this study since it does not have a university hospital. Considering that there are a total of 1250 nurses, 500 in Adıyaman and 750 in Gaziantep, the sample size determined by Yazıcıoğlu & Erdoğan (2004) was taken as a basis. Accordingly, it was aimed to reach at least 471 volunteer nurses between June and August 2020 when the study was conducted. However, due to the intensity experienced in the health sector due to the COVID-19 Pandemic, the total number of target samples could not be reached. 160 volunteer nurses from Adıyaman and 158 from Gaziantep participated in this study, which can be done online due to the Covid-19 pandemic. Therefore, the sample size of our study consisted of 318 people. 67.5% of the targeted sample and 25.4% of the main mass were reached.

3.3. Research Model and Hypotheses

The model below developed depending on the purpose of the research, can be considered a predictive model for the hypothesis that nurse-perceived communication and information sharing are related to organisational ambidexterity.

Figure: 1

When the literature is examined, it is seen that information sharing has important effects on long-term relationships and organisational and individual performance, job satisfaction, organisational success, and competitive advantage (Gehrke & Hasan, 2020; Sönmez-Çakır & Adıgüzel, 2020; Ji & Zou, 2017; Harsono, 2016; Tong et al., 2013; Im & Rai, 2008). In addition, in the study conducted by Al-Shawabkeh (2018), which is very similar to this research, it was revealed that knowledge sharing has a mediating role in organisational ambidexterity. Similarly, in the study conducted by Aamir et al. (2021), it was determined that the effect of knowledge sharing on sustainable performance was mediated by employee ambidexterity. Therefore, when all studies are evaluated together, it can be predicted that there is a positive relationship between knowledge sharing and organisational ambidexterity.

The main hypotheses and sub-hypotheses developed depending on the above evaluations and previous research (Aamir et al., 2021; Gehrke & Hasan, 2020; Sönmez-

Çakır & Adıgüzel, 2020; Al-Shawabkeh, 2018; Minister et al., 2017; Ji & Zou, 2017; Vrontis et al., 2017; Savolainen, 2017; Tan et al., 2017; Harsono, 2016; Tong et al., 2013; Im & Rai, 2008) on these issues and the purpose of this research are given below:

Main hypotheses:

1. **H_1: There is a significant relationship between nurses' communication and information sharing and organisational ambidexterity levels.**

2. **H_1: There is a significant difference between the communication and information-sharing levels in terms of the socio-demographic characteristics of the nurse.**

   2.1. H_1: There is a significant difference between the communication and information-sharing levels in terms of the generation status of the nurse.
   2.2. H_1: There is a significant difference between the levels of communication and information sharing in terms of the education level of the nurse.

3. **There is a significant difference between the organisational ambidexterity levels in terms of the socio-demographic characteristics of the nurse.**

   3.1. H_1: There is a significant difference between the organisational ambidexterity levels in terms of the generation status of the nurse.
   3.2. H_1: There is a significant difference between the organisational ambidexterity levels in terms of the education level of the nurse.

4. **H_1: There is a significant difference between the communication and information-sharing levels of the nurse in terms of the characteristics of business life.**

   4.1. H_1: There is a significant difference between the communication and information-sharing levels in terms of the seniority of the nurse.
   4.2. H_1: There is a significant difference between the communication and information-sharing levels regarding working style.
   4.3. H_1: There is a significant difference between the communication and information-sharing levels regarding the voluntary choice of the working unit.
   4.4. $H1$: There is a significant difference between the communication and information-sharing levels regarding the desire to leave the unit.

5. **H_1: There is a significant difference between the organisational ambidexterity levels of the nurse in terms of the characteristics of business life.**

   5.1. H_1: There is a significant difference between organisational ambidexterity levels in terms of the seniority of the nurse.
   5.2. H_1: There is a significant difference between organisational ambidexterity levels regarding working style.

5.3. H_1: There is a significant difference between the levels of organisational ambidexterity in terms of voluntary choice of the working unit.

5.4. H_1: There is a significant difference between organisational ambidexterity levels regarding the desire to leave the unit.

3.4. Data Collecting

The data were collected through a questionnaire. The research questionnaire consists of three parts and 33 questions in total. The questionnaire was sent online via "Google Forms" to the participants' corporate e-mail addresses. The study data set was reached by completing the online questionnaire of the participants. In the first part of the questionnaire form, multiple choice questions were included, consisting of 11 questions, measuring the participants' socio-demographic and business life characteristics. In determining the generation status, one of the nurses' socio-demographic characteristics, the age ranges of the participants were taken as the basis. The classification made by Andrea et al. (2016) was used to define generation status by age range.

3.5. Scales

In the second and third parts of the questionnaire, the communication and information sharing scale (10 expressions) used by Yılmaz & Yıldırım (2018) in the form of a 5-point Likert-type scale ranging from 1 "Strongly Disagree" to 5 "Strongly Agree" (10 expressions) Cronbach's Alpha value is. Lubatkin et al. (2006), the organisational ambidexterity scale (12 expressions) Cronbach's Alpha value is 0.948. The Cronbach's alpha value of the research was determined as 0.887. Therefore, it can be said that the scales used in the research are highly reliable (Gottems et al., 2018; Taber, 2018; Gliem & Gliem, 2003).

3.6. Analysis of Data

The data obtained were analysed using the SPSS 22.0 package program. A standard distribution test was conducted to determine which analyses would be applied to the data set. The standard distribution feature was examined with the "Kolmogorov-Smirnov test", and it was determined that the data did not show normal distribution ($p \leq 0,01$). In this context, Mann Whitney U and Kruskal Wallis H tests, non-parametric analysis methods, were used to test the research hypotheses.

3.7. Ethical Approval

For the study, the ethics committee approval was obtained from the Non-Invasive Clinical Research Ethics Committee of Adıyaman University, dated 21.04.2020, and numbered 2020 / 3-29. In addition, the voluntary principle was fulfilled by obtaining the consent of the participants before the research.

4. Results

Descriptive characteristics regarding gender, education, marital status, generation status, seniority, working unit, working status, working style, and similar socio-demographic and work-life characteristics of the nurses participating in the study are shown in the table below.

Table: 1
Descriptive Characteristics of the Participants

Characteristics		n	%	Characteristics		n	%
Gender	Male	90	28,3	Marital Status	Married	222	69,8
	Female	228	71,7		Single	96	30,2
	Total	318	100,0		Total	318	100,0
Generation Status	X	99	31,1	Working Style	Continuous Daytime Work	121	38,1
	Y	201	63,2		Continuous Night Work	23	7,2
	Z	18	5,7		On Duty	174	54,7
	Total	318	100,0		Total	318	100,0
Education Status	High school	41	12,9	Seniority Status	Less than 5 years	112	35,2
	Associate Degree	44	13,8		Between 5 and 10 years (10 years not included)	120	37,7
	License	217	68,2		Between 10 and 15 years (15 years not included)	41	12,9
	Master and Doctorate	16	5,0		15 years and above	45	14,2
	Total	318	100,0		Total	318	100,0
Working Unit	Policlinic	10	3,1	Working Status	Service (Clinic) Nurse	241	75,8
	Service (Clinic)	237	74,5		Executive Nurse	36	11,3
	Intensive care	46	14,5		Private Branch Nurse	41	12,9
	Operating room	20	6,3		Total	318	100,0
	Administrative Units	5	1,6	Voluntary Preference of the Working Unit	Voluntary Choice	191	60,1
	Total	318	100,0		Not Voluntary Choice	127	39,9
Weekly Working Time	Less than 40 hours	11	3,5		Total	318	100,0
	40 hours	210	66,0	Request to Leave the Working Unit	Request to leave	101	31,8
	More than 40 hours	97	30,5		No request to leave	217	68,2
	Total	318	100,0		Total	318	100,0

When the information given in Table 1 is evaluated together, it is seen that most of the nurses participating in the study are female, married, and from Generation Y. Also, most work 40 hours a week and are on duty. In addition, it can be said that most participants worked as clinical nurses, voluntarily preferred the unit they worked in, and did not want to leave the unit.

4.1. Testing Hypotheses

The main and sub-hypotheses of the study are tested below, respectively. Since the data did not show a normal distribution, Spearman's rho correlation test was used to test the relationship's hypotheses. The Mann Whitney U and Kruskal Wallis H tests were used to testing the hypotheses examining differences. In this study, for evaluating the general average levels of communication and information sharing of nurses and the general average levels of organisational ambidexterity of nurses, the value ranges in the studies conducted by Güllüoğlu (2012), and Yaman & Tekin (2010) were used. Accordingly, the general average level of communication and information sharing of nurses is 3.26, and the general average level of organisational ambidexterity of nurses is 2.94. Since both scores are in the range of 2.61-3.40, it has been concluded that both the communication and information

sharing level of nurses and their organisational ambidexterity level is at the average level; that is, they are not high.

4.1.1. Analysis of the Relationship Between Communication and Information Sharing and Organisational Ambidexterity Levels

The first primary hypothesis of the study, Hypothesis 1.H1, was analysed with Spearman's rho correlation test, and the analysis results are shown in Table 2 below.

Table: 2
Analysis of the Relationship Between Communication and Information Sharing and Organisational Ambidexterity Levels

Spearman's rho Correlation Test		Average Communication and Information Sharing	Average Organisational Ambidexterity
Average Communication and Information Sharing	Correlation Coefficient	1,000	**,210**[**]
	Sig. (2-tailed)	.	,000
	N	318	318
Average Organisational Ambidexterity	Correlation Coefficient	**,210**[**]	1,000
	Sig. (2-tailed)	,000	.
	N	318	318

** Correlation is significant at the 0.01 level (2-tailed).

As a result of the analysis, it was determined that there is a low-level positive linear and significant relationship (Senthilnathan, 2019; Schober et al., 2018; Connelly, 2012) between communication and knowledge sharing and organisational ambidexterity (r = 210 and p =0.00<0.05). Therefore, the first main hypothesis of the research was accepted as 1.H$_1$.

The study's second, third, fourth, and fifth main hypotheses and the sub-hypotheses developed based on these main hypotheses were analysed according to the Mann Whitney U and Kruskal Wallis H tests, respectively, below.

4.1.2. Analysis of Differences Between Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of the Generation Status of the Nurse

Whether there is a significant difference between the communication and information sharing and organisational ambidexterity levels in terms of the generation status of the nurse was revealed as a result of the analysis made with the Kruskal Wallis H test.

According to the results in Table 3, it has been determined that there is a significant difference between the communication and knowledge-sharing levels as well as the organisational ambidexterity levels in terms of the generation status of the nurse (p=0,005 and 0,000<0,05). Accordingly, hypotheses 2.1.H$_1$ and 3.1.H$_1$ were accepted. When the average rank values are examined, it is seen that in terms of communication and information sharing levels, Generation Z nurses have the highest value, and Generation Y nurses have the lowest value.

Table: 3

Analysis of Communication and Information Sharing and Organisational Ambidexterity Level Differences in Terms of the Generation Status of the Nurse

Generation Status		N	Mean Rank	Chi-Square	df	Asymp. Sig.
Average Communication and Information Sharing	X	99	168,38	10,423	2	**,005***
	Y	201	149,90			
	Z	18	217,92			
	Total	318				
Average Organisational Ambidexterity	X	99	201,02	29,441	2	**,000***
	Y	201	140,24			
	Z	18	146,19			
	Total	318				

On the other hand, in terms of organisational ambidexterity, it is seen that Generation X nurses have the highest value and Generation Y nurses have the lowest value. When both results are evaluated together, it is striking that the communication, information sharing, and organisational ambidexterity levels of the Y-generation nurses are the lowest compared to the other generation nurses.

4.1.3. Analysis of Differences Between Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of Nurse's Educational Status

Whether there is a significant difference between the levels of communication and information sharing and organisational ambidexterity in terms of the educational status of the nurse was revealed as a result of the analysis made with the Kruskal Wallis H test.

Table: 4

Analysis of Differences in Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of the Educational Status of the Nurse

Educational Status		N	Mean Rank	Chi-Square	df	Asymp. Sig.
Average Communication and Information Sharing	High school	41	161,18	8,446	3	**,038***
	Associate Degree	44	194,72			
	License	217	151,27			
	Master and Doctorate	16	169,94			
	Total	318				
Average Organisational Ambidexterity	High school	41	163,61	5,961	3	,114
	Associate Degree	44	148,41			
	License	217	164,59			
	Master and Doctorate	16	110,41			
	Total	318				

According to the results in Table 4, it was determined that there is a significant difference between the levels of communication and information sharing in terms of the education status of the nurse (p=0,038<0,05). Accordingly, when the mean rank values are examined, it is seen that the communication and information-sharing levels of the associate degree graduates are the highest compared to the other nurses, while the communication and information-sharing levels of the undergraduate nurses are the lowest compared to the other nurses. On the other hand, it has been revealed that there is no significant difference between the organisational ambidexterity levels in terms of the education level of the nurses

(p=0,114>0,05). Based on these results, the 2.2.H_1 hypothesis was accepted. However, the 3.2.H_1 hypothesis was rejected.

4.1.4. Analysis of Differences Between Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of Nurse's Seniority

The analysis of the Kruskal Wallis H test revealed a significant difference between the levels of communication and information sharing and organisational ambidexterity levels regarding the seniority status of the nurse.

Table: 5
Analysis of Differences in Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of Nurse's Seniority

Seniority Status (Years)		N	Mean Rank	Chi-Square	df	Asymp. Sig.
Average Communication and Information Sharing	Less than 5 years	112	157,97	12,132	3	,007*
	Between 5 and 10 years (10 years not included)	120	148,79			
	Between 10 and 15 years (15 years not included)	41	147,98			
	15 years and above	45	202,37			
	Total	318				
Average Organisational Ambidexterity	Less than 5 years	112	127,89	52,530	3	,000*
	Between 5 and 10 years (10 years not included)	120	164,75			
	Between 10 and 15 years (15 years not included)	41	139,22			
	15 years and above	45	242,66			
	Total	318				

According to the results in Table 5, it has been determined that there is a significant difference between the levels of communication and information sharing and the organisational ambidexterity levels in terms of the nurse's seniority status (p=0,007 and 0,000<0,05). Accordingly, when the mean rank values are examined, it is seen that the communication and information sharing and organisational ambidexterity levels of nurses with 15 years and more seniority are the highest compared to other nurses. Therefore, it can be said that the nurse's seniority level makes a difference in the levels of communication and information sharing and organisational ambidexterity. According to the analysis results, hypotheses 4.1.H_1 and 5.1.H_1 were accepted.

4.1.5. Analysis of Differences Between Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of Working Style

Whether there is a significant difference between the communication and information sharing and organisational ambidexterity levels in terms of the working style of the nurses participating in the study was revealed as a result of the analysis made with the Kruskal Wallis H test.

Table: 6

Analysis of Differences Between Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of Working Style

Working Style		N	Mean Rank	Chi-Square	df	Asymp. Sig.
Average Communication and Information Sharing	Continuous Daytime Work	121	177,76	7,843	2	**,020***
	Continuous Night Work	23	154,11			
	On Duty	174	147,51			
	Total	318				
Average Organisational Ambidexterity	Continuous Daytime Work	121	185,40	16,107	2	**,000***
	Continuous Night Work	23	157,33			
	On Duty	174	141,78			
	Total	318				

According to the results in Table 6, it has been observed that there is a significant difference between the communication and information sharing levels and the organisational ambidexterity levels in terms of the working style of the nurse (p=0,020 and 0,000<0,05). Hence, hypotheses 4.2.H_1 and 5.2.H_1 were accepted. Accordingly, when the mean rank values are examined, it is seen that the communication and information sharing levels and organisational ambidexterity levels of the nurses whose working style is "continuous day" are the highest. However, it has been determined that nurses whose working style is "on duty" have the lowest levels of communication, information sharing, and organisational ambidexterity.

4.1.6. Analysis of Differences in Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of Voluntary Preference of the Working Unit

Whether there is a significant difference between the communication and information sharing and organisational ambidexterity levels in terms of the nurse's preference of the unit he/she works in was revealed as a result of the analysis made with the Mann-Whitney U test.

Table: 7

Analysis of Differences in Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of Voluntary Preference of the Working Unit

Voluntary Preference of the Working Unit		n	Mean Rank	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Average Communication and Information Sharing	Voluntary Choice	191	177,13	8761,000	-4,202	**,000**
	Not Voluntary Choice	127	132,98			
	Total		318			
Average Organisational Ambidexterity	Voluntary Choice	191	179,94	8224,000	-4,867	**,000**
	Not Voluntary Choice	127	128,76			
	Total		318			

According to the results in Table 7, it has been observed that there is a significant difference between the levels of communication and information sharing and organisational ambidexterity levels in terms of voluntarily choosing the unit in which the nurse works (p = 0.000 and 0.000 <0.05). Hence, hypotheses 4.3.H_1 and 5.3.H_1 were accepted. According to the mean rank values, it is seen that nurses who voluntarily choose their unit of work have

high levels of communication and information sharing, as well as organisational ambidexterity.

4.1.7. Analysis of Differences in Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of the Desire to Leave the Unit

Whether there is a significant difference between the levels of communication and information sharing and organisational ambidexterity in terms of the nurse's desire to leave her/his unit was revealed as a result of the analysis made with the Mann-Whitney U test.

According to the results in Table 8, it has been determined that there is a significant difference between the levels of communication and information sharing and organisational ambidexterity levels in terms of the nurse's desire to leave the unit where he/she works (p = 0.000 and 0.001 <0.05). Hence, 4.4. H_1 and 5.4. H_1 hypotheses were accepted. Accordingly, when the mean rank values are examined, it is seen that the communication and information sharing and organisational ambidexterity levels of the nurses who do not want to leave the unit they work in are higher than those who want to leave.

Table: 8
Analysis of Differences in Communication and Information Sharing and Organisational Ambidexterity Levels in Terms of the Desire to Leave the Unit

Request to Leave the Working Unit		N	Mean Rank	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Average Communication and Information Sharing	Request to leave	101	126,12	7587,000	-4,426	**,000**
	No request to leave	217	175,04			
	Total	318				
Average Organisational Ambidexterity	Request to leave	101	134,71	8454,500	-3,284	**,001**
	No request to leave	217	171,04			
	Total	318				

When the above analysis results are evaluated together, it can be said that there are most significant differences in terms of sociodemographic characteristics and work-life characteristics of the nurses participating in the study, according to the second, third, fourth, and fifth main hypotheses of the study and the related sub-hypothesis results. Therefore, the research's second, third, fourth, and fifth main hypotheses were widely accepted.

5. Discussion

This study, in Turkey, in the TRC1 region, was conducted on nurses working in university hospitals. The study aimed to determine the relationship between communication, information sharing, and organisational ambidexterity levels. As a result of the Spearman rho correlation test found a positive, significant, and linear relationship between communication and information sharing and organisational ambidexterity levels. This result supports the studies by Pun et al. (2020) and Zhang et al. (2011). In addition, when this study was examined according to the working style of the participant nurses, significant differences (p <0.020 and 0.000 <0.05) were revealed between the communication and information sharing levels and the organisational ambidexterity levels. Accordingly, it was

found that the communication and information sharing levels and the organisational ambidexterity levels of the nurses who work continuously during the day are much higher than the other nurses. It is thought that this may be due to the high seniority level of daytime working nurses, their administrative duties, and/or their ownership of their work.

In the study conducted by Ferreira et al. (2016), it was emphasised that communication and information sharing between nurses and patients are very important in health care delivery. It was also reported that nurses effectively communicated with patients on issues such as obtaining information, understanding their thoughts, and answering questions. Thus, it was also emphasised that nurses would understand patient differences and focus on patient-specific nursing care. However, when we look at the communication and information-sharing levels of the nurses participating in our study, a medium level of communication and information-sharing was found (3.26<3.41). Accordingly, as stated by Skok & Thir (2010), the reasons for the low level of communication and information sharing among nurses may include job security, insecurity and competition, lack of education about information sharing, the inadequacy of the reward system, and other perceived negative attitudes and behaviours.

Another striking finding of our study is that communication and information sharing differ significantly according to the socio-demographic characteristics of the nurses participating in the study ($p < 0.05$). However, in the study by Parlayan & Dökme (2016) on patient and nurse communication, it was reported that the socio-demographic characteristics of nurses did not affect communication in patient evaluation. Therefore, our study findings do not match the findings of the study conducted by Parlayan & Dökme (2016).

When the communication and information-sharing levels were examined according to socio-demographic characteristics in our study, it was determined that there were significant differences between different generations of nurses. The highest difference was Generation Z's communication and information-sharing level ($p < 0.05$). In addition, it was determined that there were significant differences between the levels of communication and information sharing in terms of the education levels of the nurses, and the highest difference was at the associate's degree level ($p < 0.05$). It is thought that the reason for the high level of communication and information sharing of generation Z may be due to the higher usage dominance of technological tools in communication compared to other generations.

Organisations attach importance to the sharing of information, continuous education, professional development, and communication of their nurses and follow them continuously (Gray & Laidlaw, 2004; Wasko & Faraj, 2005). It has been reported that effective communication in nursing is very important in providing conscientious and high-quality nursing care (Bramhall, 2014). The important steps of effective communication for nurse administrators are to express their ideas sufficiently and understand the individuals they communicate with (Whitman & Davis, 2009). In the research conducted by Hara & Hew (2007) on nurses, it has been reported that the need to verify this information with others who share similar information, the desire better to understand current knowledge and best

practices in the field, the existence of a non-competitive environment, the communication environment and the role of the manager are effective in maintaining information sharing. In this direction, the relationship between communication and information sharing, one of our research objectives, and organisational ambidexterity behaviours, one of the important organisational behaviours in the organisation, was examined. A linear, positive and significant relationship was found between communication, knowledge sharing, and organisational ambidexterity ($p<0,05$). Accordingly, as the nurse's communication and information-sharing level increases, the organisational ambidexterity level will increase, or as the nurse's communication and information-sharing level decrease, the organisational ambidexterity level will also decrease. Significant differences were found between the organisational ambidexterity levels of the nurses participating in the study regarding generation status ($p<0.05$). However, there were no significant differences between the organisational ambidexterity levels of the nurses participating in the study regarding educational status ($p>0,05$). It is thought that the difference between generations may be due to reasons such as revisions in nursing education and technological developments.

When the researches about organisational ambidexterity are examined, organisational ambidexterity is a talent (Alshawabkeh et al., 2020; Tamayo-Torres et al., 2017; Güttel & Konlechner, 2007; Mannor, 2007; Gibson & Birkinshaw, 2004), it increases the competitiveness of organisations and maintains their competitive advantage (Ojha et al., 2018; Bolisani et al., 2014; O'Reilly & Tushman, 2011; Raisch & Birkinshaw, 2008), is used in increasing and maintaining organisational performance (Ojha et al., 2018; Boumgarden et al., 2012; Junni et al., 2013; Patel et al., 2013; Raisch & Birkinshaw, 2008; Andersen & Nielsen, 2007), ensuring organisational success and continuity (Alshawabkeh, 2020; Marri et al., 2019; Wasilewski, 2019; Lis et al., 2018; Ouakouak & Ouedraogo, 2017; Baškarada et al., 2016; Yang et al., 2012; Raisch & Birkinshaw, 2008; Kotlarsky & Oshri, 2005; Duncan, 1976), discovering new knowledge (Wasilewski, 2019; Fahrudi, 2018; Lis et al., 2018; Ojha et al., 2018; Borzillo et al., 2012), and developing new products (Lis et al., 2018; Ojha et al., 2018; Ouakouak & Ouedraogo, 2017; Wei et al., 2014), and it has been seen to emerge as a versatile organisation concept (Lis et al., 2018) with positive effects.

In our study, organisational ambidexterity levels were examined in terms of whether the nurses wanted to leave the unit where they worked, and it was found that the organisational ambidexterity levels of nurses who did not want to leave the unit they worked were found to be significantly higher than other nurses who wanted to leave (Table 8). This result of our study is in parallel with the literature. For example, in the study conducted by Rana & Malik (2017), it was reported that organisational ambidexterity is an important concept in human resources management in the health sector, which is in constant change and development processes and has a high hierarchy. In addition, in a study conducted by Wasilewski (2019) on nursing and other healthcare managers, it was reported that organisational ambidexterity behaviours exhibited within the organisation were a result of the leadership characteristics of the managers and were always open to innovations. Considering the studies conducted by Wasilewski (2019) and Rana & Malik (2017), it can be said that nurses, who make up the majority of healthcare workers, especially in the

hospital organisation, deal with difficult events in the workplace and also nursing leaders can lead nurses to create a collaborative environment of synergy for innovation and thus positive organisational outcomes can occur. In this context, organisational ambidexterity can provide an important focus for leaders who seek positive organisational outcomes through innovative approaches.

6. Conclusion

As a result, in this study, a significant relationship was found between communication and information sharing of nurses, which are the cornerstones of health care services, and organisational ambidexterity behaviour. In this direction, it can be said that communication and information sharing can be increased to increase organisational ambidexterity behaviour among nurses, which ensures the development of organisational performance, service quality, harmony among nurses, and managerial skills. Communication and information sharing between nurses and between nurses and patients improves organisational ambidexterity behaviours and the quality of care, which is the focus of nursing services, enhances solidarity among nurses, and increases patient satisfaction. Therefore, it can also provide to gain highly beneficial behaviours for the organisation.

Accordingly, among nurses;

- It should be ensured that the experience, knowledge, and experience of especially the executive nurses in the field and the senior nurses in the unit with the nurses who are just starting or whom they think are inadequate, should be constantly shared,
- Executive nurses should encourage the sharing of information and creating a culture according to the needs of other health professionals and other nurses with a multidisciplinary approach, starting with themselves,
- Executive nurses should support the creation of an innovative "I can" culture to encourage communication and information sharing among staff in terms of institutionalising learning,
- For a multifaceted orientation of organisational ambidexterity, senior management may suggest providing the necessary support to nurses.

7. Limitations

The scope of this study, only one of which is Turkey's 2nd level sub-region, is the region TRC1. Therefore, this study is limited to Turkey's TRC1 region. In addition, this study was limited to only the health sector as a sector, only nurses as nurses, and only university hospitals as an institution. For this reason, research findings and results may not be generalisable for all times, regions, or even countries where labour and organisational opportunities and threats may differ. Moreover, another limitation is that this study is answer-centred due to the survey used to obtain the data set. However, it was assumed that

the nurses who answered the questions understood the questionnaire questions, in the same way, were sincere and impartial in their answers, and also had a rational and rational attitude.

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The Relationship Between Safety Climate and Safety Performance Indicators: A Field Study

Salih DURSUN *(https://orcid.org/0000-0002-8597-3340), Karadeniz Technical University, Türkiye;*
sdursun@ktu.edu.tr

Belemir ŞENGÜL *(https://orcid.org/0000-0002-2223-2393), Ankara Hacı Bayram Veli University, Türkiye;*
belemir.sengul@hbv.edu.tr

Güvenlik İklimi ve Güvenlik Performansı Göstergeleri Arasındaki İlişki: Bir Alan Araştırması

Abstract

In recent years, there has been an increased interest in studying the importance of human factors in occupational accidents. This study examines the relationship between safety climate and performance indicators. The study sample consists of 195 employees working in a manufacturing company. The analysis revealed a statistically significant positive relationship between the safety climate and safety behaviours, one of the safety performance indicators. This study's results can guide relevant parties in increasing employees' safety awareness, creating a safe working environment, and preventing occupational accidents.

Keywords : Occupational Accidents, Safety Climate, Safety Performance, Safety Behaviour.

JEL Classification Codes : J28, D23, I12.

Öz

Son yıllarda iş kazalarında insan faktörünün öneminin araştırılmasına ilgi artmıştır. Bu çalışma güvenlik iklimi ile güvenlik performansı göstergeleri arasındaki ilişkiyi incelemeyi amaçlamaktadır. Araştırmanın örneklemini bir imalat firmasındaki 195 çalışan oluşturmaktadır. Yapılan analizler sonucunda güvenlik iklimi ile güvenlik performansı göstergelerinden biri olan güvenlik davranışı arasında istatiksel olarak anlamlı pozitif bir ilişki tespit edilmiştir. Bu çalışmada elde edilen sonuçlar çalışanların güvenlik bilincinin artırılması, güvenli bir çalışma ortamının oluşturulması ve iş kazalarının önlenmesi konusunda ilgili taraflara rehberlik edebilir.

Anahtar Sözcükler : İş Kazaları, Güvenlik İklimi, Güvenlik Performansı, Güvenlik Davranışı.

1. Introduction

Occupational accidents are one of the most significant problems in today's workplaces. According to the International Labor Organization (ILO), approximately 2.3 million people worldwide die yearly from occupational accidents and diseases. In addition, 340 million people have occupational accidents annually, and 160 million are exposed to negative consequences of occupational diseases (ILO, 2020).

Over many years, workplaces in Turkey have made some progress in solving the problem of occupational accidents, but much improvement is still needed. Approximately 142,469 people died from occupational accidents and diseases between 1946 and 2005 (Yardım et al., 2007). Looking at more up-to-date statistics published by the Social Security Institution (SGK) in Turkey, 13,876 employees lost their lives to occupational accidents between 2009 and 2018; 422,453 occupational accidents occurred in 2019, and 1,147 people died in these accidents (SGK, 2020).

Research focuses on the causes of occupational accidents due to their high number around the world; studies categorise these causes as follows: unsafe environment (an item left out in the open haphazardly, slippery floor, lack of protective devices on machines, etc.) and unsafe behaviour (failure to comply with safety rules, failure to use personal protective equipment, etc.) (Bilir, 2016). Although study results vary, 88% of occupational accidents are caused by unsafe behaviours of employees, 10% by unsafe environments, and 2% by unexpected reasons (Seo, 2005).

These rates show that employees' unsafe behaviours play an important role in occupational accidents. Therefore, studies focus on issues impacting employees' unsafe behaviours (Dodoo & Al-Samarraie, 2019). The concept of safety climate, in which the first empirical studies were conducted in the 1980s (Zohar, 1980), is one of the key concepts associated with the safe behaviour of employees and work accidents.

Recently, there has been an increasing interest in studies examining the relationship between safety climate and occupational safety outcomes in Turkey. In these studies, it is seen that the relationship between safety climate and a single performance criterion such as safe behaviour is generally examined (Yücebilgiç, 2007; Sadullah & Kanten, 2009; Yorulmaz et al., 2016; Ören & Er, 2016). In this sense, a methodologically important contribution of the current research is using two different safety performance criteria: safe behaviour and employee-reported near misses and work accidents.

This study examines the relationship between safety climate and performance indicators. It will contribute to the limited literature on this subject in Turkey and guide further studies to aid in preventing occupational accidents.

2. Theoretical Framework and Hypotheses

Safety climate is generally considered an important organisational factor in ensuring safety within an organisation. Zohar (1980), who pioneered empirical studies on safety climate, defines it as "a summary of molar [holistic-basic] perceptions that employees share about their work environments… [and] a frame of reference for guiding appropriate and adaptive task behaviours." According to another definition, safety climate refers to the perception of policies, procedures, and practices related to safety in a workplace (Neal & Griffin, 2000: 69). These shared perceptions derive from several factors, including organisational safety norms and expectations; management decision-making; and safety practices, policies, and procedures, which together serve to convey an organisational commitment to safety (Hahn & Murphy, 2008).

Various tools are used to measure employees' perceptions of occupational safety, including two scales to measure safety climate: scales with one dimension and scales with more than one dimension. For example, Garcia et al. (2004), Dejoy et al. (2004), and Probst & Estrada (2010) evaluate safety climate using scales with one single dimension, whereas Neal et al. (2000), Cooper & Philips (2004), Evans et al. (2005), Wu et al. (2008), Yule et al. (2007), Vinodkumar & Bhasi (2008), and Zhu et al. (2010) evaluate safety climate using scales with more than one dimension.

Safety performance, another concept discussed in this study, is considered a subset of organisational performance (Wu et al., 2008). Generally, safety performance is defined as "actions or behaviours that individuals exhibit in almost all jobs to promote the health and safety of workers, clients, the public, and the environment" (Burke et al., 2002). Safety performance measurement is one of the basic components of an occupational health and safety management system. This measurement helps organisations achieve their occupational health and safety objectives and allows them to determine which departments or employees perform by occupational health and safety rules and identify and improve existing problem areas (Lingard et al., 2011). Various indicators are used to measure safety performance (Yule, 2003):

- Company accident statistics that allow a comparison of companies with low and high accident rates,
- Near-miss incidents and accidents reported by employees,
- Safety behaviours reported by employees,
- Determination of an employee's safety performance rate by a manager or an expert.

Studies on the relationship between safety climate and safety performance reveal that positive or negative safety climate perception affects safety performance. Results of these studies suggest that there is a positive relationship between safety climate and safety behaviours (Neal et al., 2000; Neal & Griffin, 2000; Garcia et al., 2004; Cooper & Philips, 2004; Wu et al., 2008; Zhu et al., 2010; Lu & Yang, 2011; Kundu et al., 2015; Froko &

Umar, 2015; Jusoh & Panatik, 2016; Al-Zubaidi & İmamoğlu, 2017; Hosny et al., 2017; Boshoff et al., 2017; Lyu et al., 2018; Lee et al., 2019; Changquan et al., 2020; Elmoujaddidi & Bachir, 2020; Saedi & Majid, 2020; Yücebilgiç, 2007; Sadullah & Kanten, 2009; Yorulmaz et al., 2016; Ören & Er, 2016). In addition, some studies have reported a significant relationship between safety climate and exposure to occupational accidents or near-miss incidents (Williamson et al., 1997; Evans et al., 2005; Hahn & Murphy, 2008; Vinodkumar & Bhasi, 2008; Karadal & Merdan, 2017).

The main hypotheses of this study are established as follows:

H_1: There is a significant relationship between safety climate and exposure to occupational accidents.

H_2: A significant relationship exists between safety climate and exposure to near-miss incidents.

H_3: A significant relationship exists between safety climate and employees' safety behaviours.

3. Research Methodology

Under this heading is information about the research sample, data collection tools and data analysis. The steps followed in the research are shown in Figure 1.

Figure: 1
Methodological Steps

Step 1. Literature review on safety climate and safe performance	Step 2. Developing hypothesis	Step 3. Selection of valid and reliable tools	Step 4. Data collection	Step 5. Analyzing the data
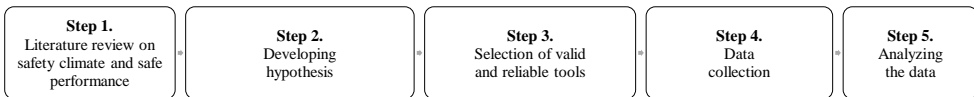
Before starting the research, the relationships between safety climate and safety performance were examined. In the second step, hypotheses were developed using the research results in the literature. In the third stage of the research, valid and reliable measurement tools used in the relevant literature were examined, and a questionnaire was developed. Data collection in a determined business was completed in the following research stage. The data were analysed and reported in the last stage of the research.

3.1. Research Sample

This study, which was conducted to measure the relationship between safety climate and safety performance, was carried out in a manufacturing company in Trabzon, Turkey. The study sample consists of blue-collar employees in two different factories of this company. A total of 299 employees, including 14 white-collar and 285 blue-collar, are

employed in the company. The questionnaire used in this study was administered in line
with the purposive sampling method during one-on-one interviews with blue-collar
employees during working hours in the fourth week of October 2018 and the first week of
November 2018. An occupational safety expert from the company accompanied the
researcher during the administration of the questionnaire. The purpose and importance of
the questionnaire were explained to each employee, whereby they were informed that the
questionnaire was not about the company and would be used for scientific research. The
questionnaire was applied to 195 blue-collar participants, excluding the cafeteria and
security staff. The return rate for the questionnaires was 100%. Four questionnaires were not
evaluated and were excluded from the study because they contained missing data. The
evaluations and analyses were carried out using a total of 191 questionnaires.

3.2. Data Collection Tools

The survey method was used to collect data within the scope of the study. The first
part of the questionnaire asks for personal information, including demographic questions
about the employee's age, gender, marital status, education level, working years, and
working unit.

The safety climate scale, which was developed by Lingard et al. (2009), adapted into
Turkish by Türen et al. (2014), and consists of 14 questions and two dimensions
(management perspective and rules; co-workers and safety training), was used to measure
the employee's perception of safety climate. The management perspective and rules
dimension consist of 10 items to measure management's opinions about occupational safety
and employees' perceptions regarding occupational safety rules in the organisation (sample
item: "Sufficient resources are available for health and safety here"). The co-workers and
safety training dimension consist of 4 items to measure the employee's perceptions of their
co-workers' ideas about occupational safety and occupational safety training (sample item:
"It is important for me to work safely if I want to be respected by others on my team"). This
is a 5-point Likert-type scale (1: strongly disagree; 5: absolutely agree). As the scores
obtained from the scale increase, the perception of the safety climate increases.

This study used two tools to measure safety performance:

1. Exposure to occupational accidents and near-miss incidents: The participants were
asked whether they had had an occupational accident or experienced a near-miss incident
during work. The response to this question included only "yes" or "no" options.

2. Safety Behaviour Scale: This scale was developed by Neal et al. (2000) and
adapted into Turkish by Dursun (2012). It includes questions to evaluate the safety
behaviours of employees. The scale consists of 6 questions in total and has two different
dimensions: safety compliance and safety participation (sample item: "I use all necessary
safety equipment while I do my job"). This is a 5-point Likert-type scale. A higher scale
score indicates a safer behaviour level.

3.3. Data Analysis

The data were analysed using the Statistical Product and Service Solutions (SPSS) 16.0 program. Before analysing the data, the normal distribution of the data was examined to decide on analysis techniques. This study used skewness and kurtosis values to determine whether the data were distributed normally. Hair et al. (2014) assume that if the skewness and kurtosis values are between -1 and +1, the data are normally distributed.

In the normality analysis, the skewness and kurtosis values were divided by the standard errors of skewness and kurtosis, and the data were found to be not normally distributed. Therefore, non-parametric Mann-Whitney U and Spearman Correlation analyses were used to evaluate the data.

4. Results

Table 1 presents the employees' demographic characteristics, including gender, marital status, age, education level, working year, and working unit.

Table: 1
Demographic Characteristics of the Participants

Variable	Category	N	%	Variable	Category	N	%
Gender	Male	191	100	Working years	0-5 years	118	62.8
	Female	0	0		6-10 years	46	24.5
Marital status	Married	128	67.0		11 years and above	24	12.7
	Single	63	33.0		Injection	30	16.0
Age	18-30 years	63	33.2		Cutting	10	5.3
	31-44 years	94	49.5		Machine	27	14.4
	45 years and above	33	17.3	Working unit	Assembly	40	21.3
Education level	Literate	3	1.6		Packaging	39	20.7
	Primary school	103	53.9		Delivery	7	3.7
	High school	69	36.1		Strobe	26	13.8
	University	16	8.4		Other	9	4.8

All the employees are male; this may be because the manufacturing industry is generally prone to male employment due to its characteristic structure. In addition, 67% of the employees are married, and 33% are single. Regarding their education level, 1.6% of the employees are literate, 53.9% are primary school graduates, 36.1% are high school graduates, and 8.4% are university graduates; a significant portion has only a high school degree or below. The overall low level of education may be because people working in the manufacturing industry are usually blue-collar workers. The employees' ages range from 21 to 54, and their mean age is 35±8.12 years. The employees' working years vary between 1 and 15 years and the mean working years are 5±3.60 years. Finally, 16% of the participants work in injection, 5.3% in cutting, 14.4% in the machine, 21.3% in assembly, 20.7% in packaging, 3.7% in delivery, 13.8% in strobe, and 4.8% in other departments.

Table 2 shows the relationship between safety climate variables according to exposure to occupational accidents in any period of working life.

Table: 2
Difference between Participants' Safety Climate Perceptions and Exposure to Occupational Accidents

Scales	Occupational Accident								Mann-Whitney U	P
	Yes				No					
	N	Mean Rank	Mean	Sd	N	Mean Rank	Mean	Sd		
Management's perspective and rules	20	80.25	3.19	1.10	171	97.84	3.51	.96	1395.0	.178
Co-workers and safety training	20	93.60	3.58	1.11	171	96.25	3.61	1.05	1668.0	.857

Sd: Standard deviation.

Accordingly, employees who have not had an occupational accident have higher mean perceptions of safety climate in both dimensions than those who have had an occupational accident. However, the difference is not statistically significant ($p>0.05$).

Table 3 presents the relationship between safety climate perception and near-miss incidents, another safety performance variable discussed in this study.

Table: 3
Difference between Participants' Safety Climate Perception and Exposure to Near-miss Incidents

Scales	Near-miss Incidents								Mann- Whitney U	P
	Yes				No					
	N	Mean Rank	Mean	Sd	N	Mean Rank	Mean	Sd		
Management's perspective and rules	37	80.41	3.21	.94	154	99.75	3.54	.98	2272.0	.056
Co-workers and safety training	37	92.50	3.50	1.15	154	96.84	3.64	1.03	2719.5	.666

Sd: Standard deviation.

Accordingly, employees who have not had a near-miss incident have a higher mean perception of the safety climate in both dimensions than those who have had a near-miss incident. However, the difference is not statistically significant ($p>0.05$).

Table 4 shows the correlation analysis results regarding the relationship between safety climate and safety behaviour.

Table: 4
Results of Spearman Correlation Analysis between Safety Climate and Safe Behaviours of Employees

Scales	Management's Perspective and Rules	Co-workers and Safety Training	Safety Compliance	Safety Participation
Management's perspective and rules	1			
Co-workers and safety training	.715**	1		
Safety compliance	.643**	.695**	1	
Safety participation	.567**	.625**	.704**	1

** p<0.01.

Accordingly, safety compliance and participation significantly relate to safety climate dimensions. There is a moderate positive correlation between safety compliance, management's perspective and rules ($r = .643$), and co-workers and safety training ($r = .695$). There is also a moderate positive correlation between safety participation, management's perspective and rules ($r = .567$), and co-workers and safety training ($r = .625$).

5. Discussion

Today, tens of thousands of people die yearly from occupational accidents despite precautions and regulations. Therefore, it may be insufficient to consider occupational accidents only from a technical perspective or to deal with them within legal regulations, suggesting that the human factor should also be emphasised. Based on the impact of the human factor, safety climate -a concept expressed as the basic perceptions shared by employees about their workplace- is important in preventing occupational accidents.

This study examined the relationship between safety climate and safety performance indicators. Employees who did not have near-miss incidents or occupational accidents have higher mean scores in both safety climate dimensions than those who had a near-miss incident or occupational accident. Still, this difference is statistically insignificant (p>0.05). Williamson et al. (1997) examined the effect of safety climate on occupational accidents and perception of workplace danger. They determined significant differences in positive safety practices, risk justifications, and optimism levels among those who were exposed to occupational accidents and those who were not. They found no significant difference between them in terms of fatalism and personal motivation for safety.

As a result of the correlation analysis conducted to determine the relationship between the dimensions of safety climate and safety compliance, a significant positive relationship was found between safety compliance and both dimensions of safety climate (p<0.01). In their study with workers in the construction industry, Lyu et al. (2018) examined the effect of safety climate on employees' safety behaviours. They found a positive relationship between the perceptions of construction workers about safety climate and their safety compliance levels. In their study with hospital staff, Neal et al. (2000) concluded that safety climate directly affects employees' compliance with safety behaviours. These results are similar to those of other studies in the literature.

According to the correlation analysis results regarding the relationship between dimensions of safety climate and safety participation, there is a significant relationship between safety participation and both dimensions of safety climate (p<0.01). Froko & Umar (2015) found a significant relationship between the control practices dimension of safety climate and safety participation in their studies with mine workers. In addition, in their study with workers from the manufacturing and mining industries, Neal & Griffin (2000) have concluded that safety climate directly affects safety performance (safety compliance and safety participation).

6. Theoretical and Practical Implications

The current research examines the relationships between safety climate and safety performance. Studies in this area have examined the relationship between a safe climate and the safe behaviour of employees. Although safe behaviour is an important occupational safety performance criterion, it is seen that there are different performance criteria in the

measurement of safety performance (Yule, 2003). The current research contributes to the literature examining the relationship between safety climate and multiple performance criteria, such as safe behaviour and near-miss incidents and occupational accidents that employees are exposed to. As a result, the variables discussed in the research contribute to the theories to be developed in the field of occupational safety.

This research also has practical implications for occupational safety experts and occupational safety managers working in the sector. The results of the study show that the behaviours of the employees related to occupational safety are related to the safety climates of the organisations. In this sense, managers and experts need to improve the security climate of their institutions for employees to exhibit safer behaviours while doing their jobs. In addition, the research results have important implications for policymakers working in the field of occupational safety. To prevent social and economic losses caused by occupational accidents, it is seen that it is important to improve the perceptions of employees about occupational safety in studies to be carried out at the country or sector level.

7. Limitations and Future Research Directions

This study has some limitations. First, because the survey was conducted only in a company in the manufacturing sector, its results cannot be generalised to all industries. In addition, the study was conducted only in the province of Trabzon. It included only blue-collar workers, among whom there were no female participants. Moreover, only the study's survey method was used as a data collection tool. Another limitation is that only male employees participated in the survey. Including female participants in different studies will reveal gender differences in the perception of occupational safety. Finally, a vital research limitation is the correlation analysis between safe climate and safe behaviour only. While correlation analysis gives information about a relationship between variables, it does not show a cause-effect relationship between variables.

Researchers who want to study this subject in the future can obtain more detailed information by including people working in different provinces and sectors within the scope of their studies. They can form a sampling group by including both female and male employees. Similarly, they can obtain more effective results by increasing the sample size if they want to use the survey method. In addition, they can use qualitative methods such as interviews and focus group interviews as data collection tools and thus can address the subject from different angles.

8. Conclusion

Occupational accidents are one of the important problems of today's working life. As a result of work accidents, millions of employees lose their lives or become temporarily and permanently disabled, causing significant economic losses. The research results show that a safe climate is important in creating a healthy and safe working environment. These results indicate that it is important to develop the perceptions and attitudes of the employees in the

arrangements to be made to prevent occupational accidents. This is important to prevent significant human and economic losses that occupational accidents may cause.

Consequently, regulations, activities, and investments aimed at ensuring occupational health and safety within the organisation, rather than being considered a cost factor, should be deemed a process that will contribute to the realisation of organisational goals and objectives, increase profit margins in the long term, have a positive effect on the corporate reputation in front of the public, and increase the employees' organisational commitment, job satisfaction, and work performance.

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Determinants of Credit Risk in the Turkish Banking Sector: Does Ownership Matter?

İbrahim YAĞLI (https://orcid.org/0000-0001-8985-0172), Nevşehir Hacı Bektaş Veli University, Türkiye; ibrahimyagli@nevsehir.edu.tr

Mert TOPCU (https://orcid.org/0000-0001-8236-9810), Alanya Alaaddin Keykubat University, Türkiye; topcu.mert@yahoo.com

Türk Bankacılık Sektöründe Kredi Riskinin Belirleyicileri: Sahiplik Yapısı Önemli Mi?

Abstract

This study aims to determine the internal and external factors affecting credit risk in the Turkish banking sector from 2003-2018. Unlike previous literature, we employ the Augmented Mean Group estimator with allowance for heterogeneity and cross-sectional dependence to analyse the effect of external factors within a dynamic framework. Findings indicate that internal and external factors affect credit risk, and the impact of these factors varies dramatically across ownership structures. These results suggest that one regulation does not fit all to overhaul credit risk management in the Turkish banking sector.

Keywords : Credit Risk, Turkish Banking Sector, Ownership Structure, Panel Data, Heterogeneity.

JEL Classification Codes : G21, G32, C23.

Öz

Bu çalışmanın amacı, 2003-2018 döneminde Türk bankacılık sektöründe kredi riskini etkileyen içsel ve dışsal faktörleri araştırmaktır. Diğer çalışmalardan farklı olarak, mevcut çalışma makroekonomik faktörlerin kredi riski üzerindeki etkisini dinamik bir çerçeve içinde ölçmek için heterojenlik ve kesit bağımlılığını dikkate alan Genişletilmiş Ortalama Grup tahmincisi kullanmaktadır. Bulgular hem içsel hem de dışsal faktörlerin kredi riskini etkilediğini ve bu faktörlerin etkisinin sahiplik yapısına göre önemli ölçüde değiştiğini göstermektedir. Bu sonuçlar, Türk bankacılık sektöründe sahiplik yapısı göz önüne alınmadan yapılan düzenlemelerin tüm sektör için uygun olmayacağını ve dolayısıyla kredi riski yönetiminin gözden geçirilmesi gerektiğini göstermektedir.

Anahtar Sözcükler : Kredi Riski, Türk Bankacılık Sektörü, Sahiplik Yapısı, Panel Veri, Heterojenlik.

1. Introduction

Banks, like other commercial institutions operating in a particular market, are subject to several risks. However, three distinctive features distinguish banks from others. First, banks are leveraged institutions, so a market problem has more devastating effects on banks. In other words, equity capital is a tool that prevents adverse shocks from ending in bankruptcy. Given the lowest capital ratio, even small shocks can cause banks to fail (Gavin & Hausmann, 1996: 31). Although banks are not at the centre of the Coronavirus Pandemic, for instance, the banking sector has been the most affected sector by the pandemic, and share prices fell sharply with the expectation of a significant increase in credit risk compared to the broad market. Second, a problem in the banking sector might rapidly spread throughout the economy due to the spillover effects. The global financial crisis, for example, has provided clear evidence of the spillover effect at the national or international level. Last but not least, bank managers tend to hold more risky portfolios in the interest of shareholders because shareholders benefit more from positive outcomes. At the same time, the cost of negative consequences is shared with the depositors and borrowers. Therefore, regulatory authorities are expected to emphasise banks' risk excessively.

Banks are exposed to several risks in the course of their operations. Banks' main risks are categorised under three groups: credit risk, market risk, and operational risk (Yuksel, 2017: 406). Credit risk addresses the losses from the borrowers' failure to fulfil their obligation to the bank. Market risk explains the risk arising from macroeconomic fluctuations. Finally, operational risk indicates the losses resulting from the banks' operational failures. These risks are not independent of each other. For instance, market risk may affect credit risk since a change in market conditions also impacts borrowers' solvency. Similarly, an operational problem may lead to a mis-selection allowing ineligible borrowers to qualify for loans, increasing credit risk. Therefore, among these risk categories, credit risk seems to be the primary driver of bank risk (Jiménez et al., 2013: 188). Reinhart and Rogoff (2011: 1680) address significant increases in nonperforming loans as a reliable indicator of the banking crisis. González-Hermosillo (1999: 12) also finds that higher nonperforming loans and lower capital equity are associated with a higher probability of bank failure.

Despite well-documented literature on developed countries, the number of studies looking into the determinants of credit risk in developing economies is relatively limited. Theoretically, developed economies differ from developing ones in several aspects. For instance, developed economies have high legal regulations and institutions that reduce moral hazard and adverse selection problems. Besides, developed economies have more stable economic conditions, so households and businesses have consistent incomes and are less likely to default. Given these differences, understanding the dynamics of credit risk in a developing economy context would be informative for management and policy-making decisions. Departing from this motivation, the current study explores the internal (bank-specific) and external (macroeconomic) determinants of credit risk in the Turkish banking sector. Investigating what drives credit risk in Turkish banking is significant for three reasons. First, the Turkish financial system is a bank-based financial system. As of 2018, the

share of bank assets in the Turkish financial system is 83% (The Banks Association of Turkey, 2019). Given this high share, banking distress may result in a crisis through the spillover effect. Second, developing economies are more prone to crises compared to developed economies. For instance, Turkey has suffered several crises (the currency crisis in 1994 and the banking crisis in 2000 and 2001) over the past decades. Third, and more importantly, the credit volume increased rapidly in the Turkish banking sector from 2003-2018, when nonperforming loans also followed an upward trend (see, Figure 1).

Figure: 1
Total Loans and Nonperforming Loans in Turkey
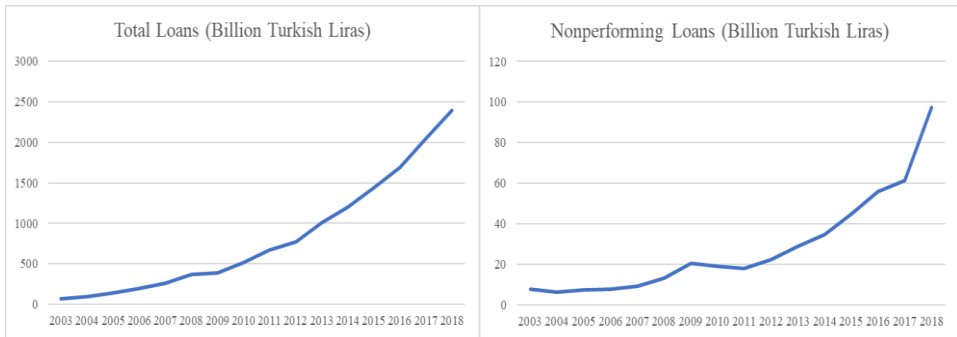
Source: Turkish Banking Regulation and Supervision Agency (2021).

This study contributes to the existing literature on two fronts. First, even though several studies analysed the determinants of credit risk in the context of the Turkish banking sector (Ersoy, 2021; Yuksel, 2017, Us, 2017; Demirel, 2016; Isik & Bolat, 2016; Kasman & Kasman, 2015; Vatansever & Hepsen, 2013; among others), these studies did not consider ownership structure, except Us (2017). However, bank-owners impact various bank-related decisions (objectives, lending behaviours, business models, and productivity, among others). State-owned banks, for example, have broader objectives than private banks. Therefore, state-owned banks tend to finance projects that support economic growth, even if they do not generate a high return, while private banks are unwilling to finance such projects. The lending behaviour of state banks is countercyclical, while private banks adopt procyclical lending policies (Colak & Senol, 2021; Hamid, 2020; Bertay et al., 2015; Brei & Schlarek, 2013;). It is also widely accepted that state banks tend to allocate credit in line with political interest (Boateng et al., 2019; Dinc, 2005; La Porta et al., 2002). Similarly, domestic banks tend to finance opaque but profitable customers, while foreign banks are willing to cherry-pick the more transparent and the less risky opportunities (Beck & Martinez Pierra, 2008; Detragiache et al., 2008). In addition to different financing policies, banks also differ from each other in terms of efficiency. Bonin et al. (2005a, 2005b) show that foreign-owned banks in transition economies are better cost-efficient than other banks[1]. Given the divergent

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[1] *In the case of Turkey, a bulk of studies supports the finding that foreign banks surpass their domestic peer in term of efficiency (Isik & Hasan, 2003; Isik & Hasan, 2002). In addition, several studies in the literature have*

characteristics of banks, we analyse whether the dynamics of credit risk differ across banks with various ownership structures. Our study differs from Us (2017) in two ways. First, this study provides fresh evidence on the dynamics of credit risk between 2003 and 2018, whereas Us (2017) focuses on the period 2002-2013. Second, instead of a standard panel regression analysis, we use a time series estimator, i.e., an Augmented Mean Group (AMG) estimator, which is robust to heterogeneity and cross-sectional dependence. Notice that previous literature on this issue imposes slope coefficients to be constant across panel groups and does not consider possible cross-sectional dependence, both of which are likely to produce inconsistent and biased results[2].

The remainder of the study is organised as follows. The next section provides a literature review, Section 3 introduces data and the econometric model, Section 4 presents the econometric methodology and empirical findings, and Section 5 discusses policy implications and concluding remarks.

2. Literature Review

Since credit risk seems to be associated with bank failure, the number of researches that explores the determinants of credit risk has increased rapidly, especially soon after the global financial crisis. One set of studies focuses on external determinants of credit risk, with the view that macroeconomic factors affect the financial solvency of borrowers. Using the Logit model, Ali and Daly (2010) investigate whether factors affecting credit risk are similar for Australia and the USA and report that the same macroeconomic variables have a different impact on default rates for these economies. Nkusu (2011) explores the macroeconomic determinants of NPLs for the 26 advanced economies using panel VAR analysis and finds that adverse macroeconomic conditions increase credit risk. Beck et al. (2013) examine the external determinants of NPLs across 75 economies using dynamic GMM analysis. The results reveal that real growth, lending interest rate and exchange rate stock prices impact credit risk. Castro (2013) investigates the macroeconomic determinants of credit risk for Greece, Ireland, Portugal, Spain and Italy by using dynamic GMM analysis and reports that an increase in GDP growth and real exchange rate leads to lower credit risk, whereas a decrease in the unemployment rate, interest rate, credit growth, stock price index and housing price index reduces credit risk. He also reveals that the global financial crisis causes a notable increase in credit risk.

The second set of studies addresses external and bank-specific variables in explaining credit risk since macroeconomic variables do not fully explain the variation of NPLs among banks in the same market. However, a significant number of these studies have focused on high-income economies. Keeton and Morris (1987), for instance, investigate the causes of loan loss variation for approximately 2500 banks in the US. Regression results show that

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found that state banks are less efficient than private and foreign banks (Burki & Niazi, 2010; Di Patti & Hardy, 2005; Bonin et al., 2005a; Mercan et al., 2003).

[2]   *See the literature section for further review.*

local economic conditions account for a significant variance. The results also reveal that the
risk-taking behaviour of banks affects loan loss. Using a fixed effects estimator and dynamic
GMM, Ghosh (2015) examines the determinants of credit risk for the US and incorporates
the regional macroeconomic and bank-specific variables. The empirical findings show that
higher capitalisations, liquidity risk, lower credit quality and cost inefficiency increase credit
risk in US banks, whereas credit risk decreases with profitability. In the case of the regional
variables, inflation, unemployment and public debt trigger credit risk, while real GDP,
personal income growth and changing housing prices decrease NPLs. Louzis et al. (2012)
examine the determinants of loan loss in the Greek banking sector for various loan
categories. The dynamic GMM results demonstrate that all loan categories' macroeconomic
conditions and management quality influence NPLs. Salas and Saurina (2002) analyse the
determinants of credit risk in the Spanish context using dynamic GMM analysis and find
that macroeconomic and bank-specific variables impact credit risk. Using panel OLS
regressions, Ahmad and Ariff (2008) investigate the bank-specific determinants of credit
risk for developed and developing economies. The results reveal that regulatory capital is
essential for banks providing several services, while management quality is critical for loan-
dominant banks in developing economies. Klein (2013) investigates the impact of
macroeconomic and bank-specific factors on credit risk in sixteen European countries using
fixed effects and GMM estimators. The results show that macroeconomic and bank-specific
variables affect credit risk, with a dominant role of the former variables. Chaibi and Ftiti
(2015) examine whether the drivers of credit risk vary between bank-based (Germany) and
market-based (France) financial systems. The dynamic GMM results show that
macroeconomic variables affect NPLs in both financial systems, except for the inflation rate.
The results also indicate that bank-specific variables have a more dominant impact on French
commercial banks than on German banks.

Several studies analyse the dynamics of non-performing loans in Turkey; some only
address macroeconomic factors, while others consider bank-specific and macroeconomic
variables. Yurdakul (2014), for instance, investigates the impact of macroeconomic factors
on the credit risk of Turkish banks adopting the General-to-Specific Modelling, Engle-
Granger (1987) and Gregory-Hansen (1996) methods and finds that economic growth rate
and market index decrease nonperforming loans ratio while money supply, foreign exchange
rate, unemployment rate, inflation rate, and interest rate increase credit risk. Demirel (2016)
also investigates drivers of loan loss, focusing on macroeconomic factors such as growth
rate, volatility, 2-year bond yields in the U.S, industrial production, credit growth, current
account deficit, and exchange rate and finds that shocks originating from the stock market
have the most power to explain the changes in NPLs, followed by volatility and 2-year bond
yields in the US. Ersoy (2021) considers bank-specific and macroeconomic factors in
analysing determinants of credit risk. Using pooled OLS, the fixed effects and the system
GMM, he reports that capital adequacy ratio and economic growth decrease the
nonperforming ratio, whereas operating efficiency, income diversification, lagged
nonperforming loans, and inflation increase loan loss. Yuksel (2017) analyses the
determinants of credit risk for the Turkish banking sector using the Probit model and reports

that a decrease in the industrial production index is the most significant determinant of NPLs. Isik and Bolat (2016) provide that among bank-specific variables, capital and loan loss provisions increase credit risk, whereas profitability and revenue diversification decreases loan loss, and economic growth is the only macroeconomic variable that has a negative impact on credit risk. Vatansever and Hepsen (2013) also find that industrial production, market index, and inefficiency ratio adversely affect nonperforming loans, while the unemployment rate, return on equity and capital adequacy ratio positively affect the NPL ratio.

Only a few studies consider the ownership structure in analysing the dynamics of credit risk. Gulati et al. (2019) investigate whether credit risk determinants vary by ownership structure in the Indian banking context using the system-GMM approach. The findings show that lower profitability, higher business diversification, larger size and higher bank concentration increase NPLs. Regarding the ownership type, bank-specific factors have a more dominant impact on NPLs for state-owned banks, while macroeconomic and industry-specific factors have a significant effect on credit risk for private and foreign banks. In the case of Turkey, Us (2017) analyses the impact of the global financial crisis on the determinants of credit risk from 2002Q4 to 2013Q3, considering ownership breakdown and revealing that crisis affects loan loss dynamics asymmetrically across banks. In particular, the bank-specific determinants (such as loan size, inefficiency, bank size, and bank dispersion) have a more significant impact on nonperforming loans in the pre-crisis period compared to the post-crisis period, and the effect of these determinants differ across ownership strata while macroeconomic and policy-related factors have an almost similar impact on banks.

Overall, there is well-documented literature on the determinants of credit risk. However, we still need to learn more about whether ownership structure matters in explaining the dynamics of credit risk. In addition, previous literature employs homogeneous panel estimation techniques in which cross-sectional dependence is not considered.

3. Model and Data

The paper aims to determine credit risk drivers in the Turkish banking sector. Risk, in classical terms, reflects the variation in the distribution of expected results and is measured by the variance of the probability distribution of possible outcomes associated with a given alternative. Accordingly, the risky option is where the deviation in the possible results is significant. The managerial perspective, however, emphasises negative outcomes more than the distribution of possible outcomes (March & Shapira, 1987: 1407). From the classical perspective, the risky alternative has a wide variety of potential consequences, while according to the latter view, a risky option is the one with a higher probability of bad results.

The empirical model is formulated as a dynamic panel model of credit risk. To determine what drives credit risk for Turkish commercial banks, we address two groups of

variables: bank-specific and macroeconomic variables. The first group of variables represents internal determinants of credit risk.

Adopting a managerial perspective, the study utilises loan loss, namely the nonperforming loans, to the total gross loans ratio, as a measure of credit risk. In line with the current literature, we address four bank-specific variables to explore the internal determinants of credit risk. Profitability is the first bank-specific variable. The franchise value paradigm asserts that banks with high profitability avoid excessive risk-taking because banks have too much to lose if a risky project they undertake ends up in bankruptcy (Demsetz et al., 1996: 4). Based on the franchise value view, a negative relationship is expected between profitability and NPLs. On the other hand, the model proposed by Rajan (1994: 401) implies a positive relationship between profitability and loan loss. According to the model, bank management aims to enrich the market reputation of the bank by adopting a liberal credit policy. However, liberal credit policy causes credit quality problems in the long run, even though it increases current profits. Therefore, there is no clear expectation regarding the nexus between profitability and NPLs. *Profitability (roa)* is represented by net profit on assets.

Cost (in)efficiency is the second variable considered an internal determinant of credit risk. As with profitability, the nexus between cost-efficiency and NPLs is multifaceted. On the one side, Bad luck and bad management hypotheses formulated by Berger and DeYoung (1997) argue that cost-efficiency is negatively related to loan loss. According to the bad luck view, growing credit problems force banks to devote more resources to monitoring borrowers, and additional resources allocated to monitoring activities reduce cost efficiency. Under the bad management view, cost-efficiency is an indicator that reflects management skills, so low cost-efficiency seems to be a signal for poor management, thereby, higher credit risk. In sum, the bad management hypothesis argues that low cost-efficiency causes higher credit problems, whereas the bad luck hypothesis supposes that higher NPLs cause low cost-efficiency. On the other hand, the skimping hypothesis formulated by Berger and DeYoung (1997) supposes that cost-efficiency is positively associated with credit risk. This view argues that the number of resources devoted to monitoring activities affects both cost efficiency and credit risk, implying that banks should balance short-term operating costs and future credit problems. Banks can increase cost-efficiency in the short run by reducing resources allocated to monitoring activities; however, cutting resources may result in problems in the long run. *Cost efficiency (ic)* is measured by total income as a share of total costs.

Credit size is another potential determinant of NPLs. One of the goals of banks is to increase their market share. Banks generally reduce interest rates and ease credit terms to achieve this goal. However, easing credit terms lead to higher credit problems (Gulati et al., 2019: 51). Besides, it will be difficult for a bank with a large-scale loan portfolio to monitor borrowers. Therefore, a more extensive loan portfolio is expected to result in a higher probability of loan default (Ahmad & Ariff, 2008: 139). On the other hand, a larger credit

size enables banks to diversify their loan portfolio and, thus, makes them less exposed to credit risk. *Credit size (ld)* is measured by total loans to total deposits.

Bank size is the last bank-specific determinant of credit risk. The empirical literature provides conflicting views regarding bank size and credit risk nexus. According to Louzis et al. (2012: 1015)'s diversification hypothesis, bigger banks have more diversification opportunities and are less exposed to credit risk. Besides, they can better control NPLs by adopting a better risk management system (Gulati et al., 2019: 51; Zribi & Boujelbène, 2011: 72). Too big to fail paradigm, on the other hand, asserts a positive association regarding the relationship above. This paradigm propounds that governments protect bank creditors, especially the large bank creditors; therefore, creditors who expect government protection impose less discipline on banks (Stern and Feldman, 2004: 12-13). Consequently, bigger banks that face less market discipline will tend to take more risks and increase lending to lower-quality borrowers, thereby having more trouble loans (Chaibi & Ftiti, 2015: 5). *Bank size (lnta)* is the natural logarithms of total assets.

Equation (1) describes c*redit risk (npl)* as a function of profitability (roa), cost-efficiency (ic), credit size (ld), and bank size (lnta):

$$npl_{it} = \beta_{1i}npl_{it-1} + \beta_{2i}roa_{it} + \beta_{3i}ic_{it} + \beta_{4i}ld_{it} + \beta_{5i}lnta_{it} + d\_crisis_t + v_i + \varepsilon_{it} \qquad (1)$$

where i indicates the banks (i = 1,….,N); t shows the period (t =1,…..,T); v_i represents the bank-specific effects, and ε_{it} is the residuals. Note that a crisis dummy (d_crisis) is also included to explore the impact of the 2008 global financial crisis on credit risk. Note that empirical results reported under Model-A correspond to the slope coefficients described in equation (1).

The second group of variables represents external determinants of credit risk because macroeconomic conditions affect borrowers' debt repayment capacity. Even though previous studies employ a different set of variables, key macroeconomic performance indicators such as economic growth, unemployment, and inflation are the standard variables used in these studies (Gulati et al., 2019; Yuksel, 2017; Chaibi & Ftiti, 2015; Castro, 2013; Nkusu, 2011; among others). In line with the literature, we employ three commonly used macroeconomic variables. Economic growth is the first macroeconomic variable that may impact credit risk. The negative association between economic growth and loan loss is common among existing studies (Ghosh, 2015; Klein, 2013; Nkusu, 2011; Espinoza & Prasad, 2010). Similarly, we expect a negative relationship between economic growth and NPLs. *Economic growth (eg)* is proxied by the annual change of real GDP per capita.

Unemployment is the second external determinant of credit risk. Higher unemployment causes a deterioration in the borrowers' future income and negatively affects their repayment capacity (Rinaldi & Sanchis-Arellano, 2006: 24). Therefore, we expect a positive relationship between unemployment and loan loss. *Unemployment (unemp)* is measured by the unemployed population as a share of the total labour force.

The last macroeconomic variable used in the study is inflation. Unlike the previous macroeconomic variables, the relationship between inflation and NPLs is ambiguous. Inflation deteriorates the real value of outstanding loans and, therefore, enhances the debt repayment capacity of borrowers. Based on this view, we expect an increase in the inflation rate results in lower NPLs. On the other hand, when the wages are sticky, higher inflation increases credit risk since it reduces the real income of borrowers. Besides, higher inflation may increase nominal interest rates, causing an increase in the cost of borrowing. *Inflation (inf)* is represented by the annual percentage change in consumer prices. Data were retrieved from the Banks Association of Turkey except for the macroeconomic indicators obtained from the World Development Indicators database (World Bank, 2021). Note that empirical results reported under Model-B, -C and -D corresponds to the slope coefficients described in equation (2), (3) and (4), respectively.

$$npl_{it} = \varphi_{1i}npl_{it-1} + \varphi_{2i}roa_{it} + \varphi_{3i}ic_{it} + \varphi_{4i}ld_{it} + \varphi_{5i}lnta_{it} + \varphi_{6i}eg_t + \varphi_{7i}d\_crisis_t + \nu_i + \varepsilon_{it} \qquad (2)$$

$$npl_{it} = \theta_{1i}npl_{it-1} + \theta_{2i}roa_{it} + \theta_{3i}ic_{it} + \theta_{4i}ld_{it} + \theta_{5i}lnta_{it} + \theta_{6i}unemp_t + \theta_{7i}d\_crisis_t + \nu_i + \varepsilon_{it} \qquad (3)$$

$$npl_{it} = \gamma_{1i}npl_{it-1} + \gamma_{2i}roa_{it} + \gamma_{3i}ic_{it} + \gamma_{4i}ld_{it} + \gamma_{5i}lnta_{it} + \gamma_{6i}inf_t + \gamma_{7i}d\_crisis_t + \nu_i + \varepsilon_{it} \qquad (4)$$

where ν_i represents the bank-specific effects and ε_{it} is the residuals. Notice that macroeconomic factors incorporated to the baseline model are individual-invariant.

Annual data on credit risk, profitability, cost-efficiency, bank size, and macroeconomic indicators were obtained for the period 2003-2018 for 22 deposit banks operating in Turkey[3]. The list of banks in our analysis includes the following: Akbank, Alternatif Bank, Anadolubank, Arab Turkish (A&T) Bank, Burgan Bank, Citibank, Denizbank, Fibabanka, Garanti BBVA, Halkbank, HSBC Bank, ICBC Turkey, ING Bank, İş Bank, QNB Finansbank, Şekerbank, Turkishbank, Turkish Economy Bank (TEB), Turklandbank (T-Bank), Vakıfbank, Yapı Kredi Bank and Ziraat Bank[4,5].

Panel A of Table 1 presents the descriptive statistics. Notice that the profitability variable has the lowest mean values, indicating the challenges for bank profitability operating in Turkey. Notice also that the variable with the highest standard deviation is credit size, followed by cost efficiency. Conversely, Panel B of Table 1 shows the correlation matrix among the variables. Notice that correlation between bank-related variables and credit risk is invariably negative. The credit risk variable shows the highest correlation with the credit size variable and the lowest correlation with the cost-efficiency variable. Notice

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[3] *Because of the reshaping structure of the Turkish banking system after the banking crisis experienced in 2001, the analysis period started in 2003.*

[4] *Due to changing ownership structure over the sample period, the list of banks is not provided by ownership.*

[5] *Cross-section dimension of the panel data is applied to comprise as many observations as possible.*

also that the highest correlation among the variables is between profitability and cost-efficiency, which is fairly high compared to other correlation coefficients.

Table: 1
Panel A. Descriptive Statistics

	npl	roa	ic	ld	lnta
Mean	4.62	1.29	135.56	91.97	9.64
Max.	48.59	5.27	304.55	332.16	13.19
Min.	0.01	-17.61	34.64	4.85	4.63
Std. Dev.	5.18	1.66	23.20	33.26	1.86
Obs.	352	352	352	352	352

Panel B. Correlation Matrix

	npl	roa	ic	ld	lnta
npl	1.000				
roa	-0.073	1.000			
ic	-0.012	0.596	1.000		
ld	-0.245	0.001	-0.030	1.000	
lnta	-0.044	0.291	0.387	0.148	1.000

Given the unit-invariant structure, macroeconomic variables are not reported.

4. Methodology and Findings

Sarafidis and Wansbeek (2012) emphasise that one crucial issue in panel data analysis is the assumption that the cross-sections are interdependent. Parameter estimations with cross-sectional dependence might provide biased and inconsistent results. We initially employed the cross-sectional dependence (CD) test proposed by Pesaran (2004) to examine this possibility. The results reported in Table 2 strongly support cross-sectional dependence in each series.

Table: 2
Cross-Sectional Dependence Test

Variable	CD-test
npl	24.25[a]
roa	18.99[a]
ic	13.48[a]
ld	39.87[a]
lnta	62.07[a]

Significance at 1% level "a".

A wide range of studies assumes that slope coefficients are homogeneous. However, ignoring slope heterogeneity will likely lead to biased results (Pesaran & Smith, 1995). Various estimation techniques can be utilised to test whether slope coefficients are homogeneous or heterogeneous. Table 3 reports the results of the slope homogeneity test proposed by Pesaran and Yamagata (2008). The null hypothesis of homogeneity is rejected for each model, indicating that slope coefficients are not identical across cross-sections.

Table: 3
Homogeneity Test

Model	Adj. Delta
Model-A	2.802[a]
Model-B	3.347[a]
Model-C	1.695[c]
Model-D	2.438[b]

Significance levels at the 1% level "a", 5% level "b", and 10% level "c".

Having found the existence of cross-section dependence, unit root tests that do not consider possible cross-section dependence, i.e., first-generation tests, are likely to produce biased results. Therefore, we employ Pesaran's (2007) CIPS test, which considers cross-sectional dependence in the residuals[6]. Considering the possible breaks, we further use the KT test, allowing for a structural break developed by Karavias and Tzavalis (2014). Table 4 reports the findings of the unit root test. Empirical results from both tests reveal that variables do not contain unit root except for *ld* and *lnta*.

Table: 4
Unit Root Test

Variable	CIPS	ΔCIPS	KT	ΔKT	IPS
npl	-4.420[a]		-13.439[a]		
roa	-2.906[a]		-19.977[a]		
ic	-2.322[b]		-8.601[a]		
ld	0.667	-10.927[a]	-0.151	-7.305[a]	
lnta	-1.237	-8.888[a]	0.182	-5.113[a]	
eg					-4.510[a]
unemp					-3.617[b]
inf					-5.077[a]

Δ signifies the first difference.
CIPS test is estimated with one lag.
Cross-section results are reported in the IPS test.
Maximum lag length is determined considering the SIC in the IPS procedure.
Significance levels at the 1% level "a" and 5% level "b".

Given the presence of cross-sectional dependence and heterogeneity, slope coefficients should be estimated using a technique robust to cross-section dependence and heterogeneity. We, therefore, employ the Augmented Mean Group (AMG) estimator.

Table 5 presents the results of the AMG estimator. Model-A is the baseline model, which does not include a macroeconomic indicator, whereas Models B-D incorporates macroeconomic indicators. For each model, the lagged credit risk variable is positive and statistically significant at the 1% level, proving that credit risk in the current year is permanently affected by credit risk in the previous year. This result is similar to Ersoy's (2021) and Chaibi and Ftiti (2015) results. Parallel to Ghosh (2015) and Vatansever and Hepsen (2013), we find that profitability has a negative and statistically significant impact on credit risk across all models except Model-D. A 1% increase in profitability decreases credit risk by around 0,429-0,588%. Consistent with Ersoy (2021), the cost-efficiency variable is positive and statistically significant across all models in which the magnitude

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[6] *Unlike bank-specific variables, we follow IPS procedure for individual-invariant variables, including inflation, unemployment, and economic growth.*

varies between 0,030 and 0,055%. Except for Model-D, we also find a negative and statistically significant impact of credit size on credit risk. A 1% increase in credit size decreases credit risk by around 0,015-0,021%. In the case of bank size, we estimate a negative and statistically significant impact of bank size on credit risk, confirming the findings of Salas and Saurina (2002) but contradicting Gulati et al. (2019). A 1% increase in bank size decreases credit risk by around 0,030-0,047. Despite the positive estimated coefficients across all models, we find that the impact of the global financial crisis on credit risk is statistically significant in Model-B and Model-C. Given the effects of macroeconomic indicators on credit risk, the only significant impact comes from Model-C. Unemployment is positive and statistically significant at the 1% level. A 1% increase in unemployment increases credit risk by 0,312%, whereas inflation and growth do not have a statistically significant impact. This result supports the findings of Yurdakul and Vatansever, and Hepsen (2013).

Table 5
Parameter Estimations

Variable	Model-A	Model-B	Model-C	Model-D
npl(-1)	0.419[a]	0.438[a]	0.439[a]	0.449[a]
roa	-0.583[b]	-0.429[b]	-0.588[a]	-0.232
ic	0.055[a]	0.042[b]	0.047[a]	0.030[b]
ld	-0.021[b]	-0.019[a]	-0.015[c]	-0.003
lnta	-4.738[a]	-4.113[a]	-4.198[a]	-3.043[a]
eg		0.028		
unemp			0.312[a]	
inf				-0.064
d_crisis	0.189	0.485[c]	0.306[b]	0.012
constant	0.617	-1.617	-6.084[a]	2.291

Parameter estimates are calculated as sample averages.
Significance levels at the 1% level "a", 5% level "b", and 10% level "c".
For simplicity purposes, standard deviations are not reported throughout the study. They are available upon request.

Table 6 provides the results of the AMG estimator concerning state-owned banks[7]. Unlike the results of the pooled panel, the lagged credit risk variable is not statistically significant for most of the specifications, which is also the case for the profitability variable. Although credit risk decreases with profitability in state-owned banks, only a significant relationship comes from Model-B. Evidence that the impact of cost-efficiency on credit risk is positive and statistically significant is confirmed given the results obtained from Model-A and Model-D. Likewise, the results obtained from Model-A and Model-C verify credit size's negative and statistically significant impact on credit risk in state-owned banks. The only macroeconomic indicator that affects credit risk is economic growth. A 1% increase in economic growth leads to a decrease in credit risk by 0,151%. Despite the positive estimated coefficients in all specifications, the impact of the global financial crisis on credit risk is statistically significant in Model-C and Model-D.

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[7] *This group includes the following banks: Halkbank, Vakıfbank and Ziraat Bank.*

Table: 6
Parameter Estimations for State-Owned Banks

Variable	Model-A	Model-B	Model-C	Model-D
npl(-1)	0.378	0.594[a]	0.419	0.633
roa	-0.009	-0.190[b]	-0.193	-1.228
ic	0.047[b]	0.013	0.060	0.060[a]
ld	-0.060[b]	-0.039	-0.059[c]	0.043
lnta	-6.303	-9.653	-7.773[a]	-9.534
eg		-0.151[a]		
unemp			0.256	
inf				0.216
d_crisis	0.170	0.182	1.822[b]	1.076[c]
constant	-1.624	-4.487	-6.393	1.931[a]

Notes: Parameter estimates are calculated as sample averages.
Significance levels at the 1% level "a", 5% level "b", and 10% level "c".

Table 7 shows the estimation results for domestic banks. We find that cost-efficiency no longer significantly impacts credit risk compared to previous results. Apart from bank-specific variables, economic growth and unemployment statistically affect credit risk in domestic banks. A 1% increase in economic growth leads to a decrease in credit risk by 0,151%, whereas a 1% increase in unemployment increases credit risk by 0,447%. We also find that the impact of the global financial crises is not robust to empirical specification.

Table: 7
Parameter Estimations for Domestic Banks

Variable	Model-A	Model-B	Model-C	Model-D
npl(-1)	0.336[a]	0.397[a]	0.277[b]	0.299[b]
roa	-0.862[c]	-0.723[b]	-0.534	-0.754[b]
ic	0.040	0.031	0.011	0.045
ld	-0.044[a]	-0.038[a]	-0.048[a]	-0.026[a]
lnta	-4.848[a]	-5.388[a]	-4.819[a]	-4.689[a]
eg		-0.103[c]		
unemp			0.447[a]	
inf				0.026
d_crisis	-1.703[a]	0.120	0.403[b]	0.134
constant	4.745	0.613	-2.486	-1.559

Parameter estimates are calculated as sample averages.
Significance levels at the 1% level "a", 5% level "b", and 10% level "c".

The results for foreign banks are reported in Table 8. Unlike previous estimations, credit size does not significantly impact credit risk in foreign banks. Although statistically insignificant, the impact of the global financial crisis on credit risk is positive across all specifications. The only group that all external determinants that affect credit risk are foreign banks. A 1% increase in economic growth leads to a decrease in credit risk by 0,228%; a 1% increase in unemployment increases credit risk by 0,227%, and a 1% increase in inflation decreases credit risk by 0,192%. In addition, the impact of the global financial crisis is not statistically significant.

Table: 8
Parameter Estimations for Foreign Banks

Variable	Model-A	Model-B	Model-C	Model-D
npl(-1)	0.415[a]	0.524[a]	0.419[a]	0.491[a]
roa	-0.839[a]	-1.269[a]	-1.235[a]	-0.394
ic	0.064[c]	0.088[b]	0.073[b]	0.046[a]
ld	-0.017	-0.019	-0.008	-0.007
lnta	5.826[a]	-5.638[a]	-5.237[a]	-2.991
eg		-0.288[a]		
unemp			0.227[b]	
inf				-0.192[a]
d_crisis	0.255	0.667	0.076	0.213
constant	-3.486	-5.547	-7.032	-0.682

Parameter estimates are calculated as sample averages.
Significance levels at the 1% level "a", 5% level "b", and 10% level "c".

5. Policy Discussions and Implications

Empirical results reveal that internal and external factors affect credit risk, and these factors impact varies by ownership. Profitability is the most significant determinant of credit risk among internal determinants, followed by lagged NPLs. The negative association between profitability and credit risk suggests that banks with high profitability tend to be risk-averse in the credit market, considering Turkey's crisis-prone structure. If profitability is taken as an indicator of management quality, well-managed banks are less exposed to credit risk. However, the magnitudes of profitability and lagged NPLs vary by ownership. For instance, profitability is not such a decisive determinant of credit risk for state-owned banks than local and foreign ones, indicating a higher risk appetite of private banks. Given the public guarantee state-owned banks have, they can cover the loss from outstanding credits to offer loans at much easier terms. Besides, state-owned banks have broader missions, such as social welfare functions through which they are expected to take more risks, albeit at the cost of losing current profits. Therefore, supervisory authorities should take necessary actions, including implementing an audit committee and adopting independent board members to ensure deposit banks take adequate measures to minimise credit risk. Notice also that the number of significant covariates in the case of the state-owned banks is relatively smaller than the other two. On the other side, the previous year's credit risk affects the current year's NPLs in domestic and foreign banks more than in state-owned banks. This finding indicates that credit risk is an ongoing phenomenon for privately-owned banks, whereas state-owned banks can absorb the realised credit losses through government funding schemes. Thus, private banks should adjust their credit risk levels considering their previous credit losses. In addition, banks with high levels of NPLs should be closely monitored by supervisory authorities, depositors, and investors.

The evidence that credit size and bank size negatively affect credit risk confirms that larger size allows better diversification and results in less credit risk. Although bigger banks lead to a less competitive environment, larger size also allows for risk diversification. Therefore, regulatory authorities should consider this dilemma when evaluating bank mergers and acquisitions.

Because credit risk rises as cost-efficiency increases, the skimping hypothesis is valid for the Turkish banking sector, indicating that bank managers attempt to maximise short-term profits despite long-term credit problems. This evidence is probably due to emerging markets' fragile business and political environment.

As an external determinant, unemployment also exerts a significant positive impact on credit risk. This impact likely stems from the loss of revenue, which, in turn, affects borrowers' solvency. Notice that the effect of unemployment on credit risk in domestic banks is nearly two times higher than that in foreign banks, indicating the importance of borrowers' selection policy. Domestic banks tend to finance opaque firms, whereas foreign banks are willing to offer loans only to the largest and the most transparent firms whose employment decisions are less affected by cyclical fluctuations.

Unlike other banking groups, this study addresses foreign banks as the most responsive group to external factors since each macroeconomic element has a statistically significant impact on credit risk. Because foreign banks have operations in various markets, they are more likely to be affected by macroeconomic conditions. Consequently, foreign banks should adopt more prudent credit policies. Notice also that the statistically insignificant impact of the 2008 global financial crisis obtained from most specifications addresses the importance of financial system regulations adopted following the 2001 banking crisis.

Overall, the evidence that one regulation does not fit all suggests that regulatory authorities should consider the ownership structure of the banks while developing appropriate policies. Given the simultaneous impact of internal and external factors on credit risk, regulatory authorities should cooperate with bank managers to overhaul their approach to credit risk assessment.

6. Conclusion

Identifying the determinants of credit risk, the leading indicator of the banking crisis, is quite significant for emerging countries. Determining the factors triggering credit risk is essential for detecting early signs of the crises and for a successful loan management process, particularly for Turkey, where the costs associated with the banking sector have been very high. Given the increasing credit volume in the Turkish banking sector over the last two decades, this study attempts to determine the internal and external determinants of credit risk from 2003-2018. Empirical results reveal that both internal and external factors affect credit risk in the Turkish banking sector. Among internal factors, profitability has the highest impact on credit risk, whereas credit size has the lowest.

On the other hand, unemployment is the only external factor affecting credit risk in the pooled panel. Moreover, we find that empirical results vary considerably by ownership. For instance, cost-efficiency is not a significant risk determinant in domestic banks, while credit size does not affect credit risk in foreign banks. Regarding external factors, economic

growth is the only factor affecting state-owned banks' credit risk, whereas credit risk in privately-owned banks is more responsive to macroeconomic determinants. We also find that the 2008 financial crisis leads to an increase in credit risk, except for foreign banks.

This study focuses on a post-crisis era when the banking system was heavily regulated. Regulation is likely to lead to a change in the determinants of credit risk; future researchers can use high-dimensional time series to observe whether the results are robust to the analysis period. In addition, a change in the determinants does not necessarily have a linear impact on credit risk, especially for developing countries where financial stability still needs to be fully achieved. Therefore, a nonlinear framework can be adopted in the following studies.

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The Bank Performance Ranking in the Emerging Markets: A Case of Turkey[1]

Nuri AVŞARLIGİL (https://orcid.org/0000-0002-4401-2236), Akdeniz University, Türkiye; nuriavsarligil@akdeniz.edu.tr

Ercüment DOĞRU (https://orcid.org/0000-0003-2650-9326), Burdur Mehmet Akif Ersoy University, Türkiye; ercumentdogru@mehmetakif.edu.tr

Ayşegül CİĞER[2] (https://orcid.org/0000-0001-9128-4974), Akdeniz University, Türkiye; aysegulc@akdeniz.edu.tr

Gelişmekte Olan Piyasalarda Banka Performans Sıralaması: Türkiye Örneği[3]

Abstract

In this study, the pre-pandemic (2019) and pandemic period (2020) financial performances of 13 commercial banks with the highest transaction volume in Turkey were compared using multi-criteria decision (Entropy, ARAS, MOORA, and MOOSRA) techniques. The financial performance ranking results obtained by the ARAS method are similar to the BrandFinance brand valuation ranking. In addition, before the pandemic Ziraat Bank, which was a public bank; during the pandemic period, along with Ziraat Bank, Halkbank, which is the other public bank, were found to be among the top 5 banks showing high performance.

Öz

Bu çalışmada, Türkiye'de işlem hacmi en yüksek 13 ticari bankanın pandemi öncesi (2019) ve dönemi (2020) finansal performansları çok kriterli karar (Entropi, ARAS, MOORA ve MOOSRA) teknikleriyle belirlenerek BrandFinance marka değerlemesi sıralaması ile karşılaştırılmıştır. ARAS yöntemi ile ulaşılan finansal performans sıralama sonuçları BrandFinance marka değerleme sıralaması ile benzeri çıkmıştır. Ayrıca kamu bankası olan Ziraat Bankası'nın pandemi öncesi; pandemi döneminde de Ziraat Bankası ile diğer kamu bankası olan Halkbank'ın da yüksek performans göstererek ilk 5 banka içinde yer aldığı tespit edilmiştir. Çalışmanın orijinalliği, finansal performans sıralaması sonuçları ile BrandFinace marka değerleme sıralama sonuçlarının karşılaştırıldığı ilk çalışmadır.

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[2] *Corresponding Author.*

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1. Introduction

Commercial banks stand out as the financial institutions serving the highest number of participants in the financial system. There are academic studies on the measurement and ranking of the performances of commercial banks. Multi-criteria decision-making techniques are generally used in financial performance reviews. There are very few previous studies on the commercial banking ranking of Turkey, which has significant potential and population among emerging markets. Thus, it is essential to examine Turkish commercial banks in this respect. In addition, a study in which multi-criteria decision-making techniques ARAS, MOORA, and MOOSRA methods are examined together will contribute to the literature. For an original review, performance rankings of thirteen commercial banks serving in Turkey will be made using ARAS, MOORA, and MOOSRA methods. The entropy method will be used to determine the criterion weights as well. Comparing these results with the BrandFinance brand value ranking will reveal whether there is a consistency between financial performance and brand value. While ranking, ten financial items and derived rates used in measuring financial performance are determined. The weights of the financial items used in the calculations are determined using the entropy method.

2. Literature Review

Many studies have used ARAS, MOORA, and MOOSRA and entropy methods. For example, Zavadskas and Turksis (2010) and Zavadskas et al. (2010) studied selecting the place of establishment using the ARAS method. On the other hand, Bakshi and Sarkar (2011) made a project selection using the ARAS method. While Stanujkic and Jovanovic (2012) conducted a study on the measurement of website quality, Reza and Majid (2013) used the ARAS method to select the best bank. Sliogeriene et al. (2013) used the ARAS method in their studies on analysing and selecting energy generation technologies. Jagadish and Ray (2014) used the MOOSRA method to choose the fluid used in cutting processes. In the same year, Kutut et al. (2014) used the ARAS method to choose alternatives that can be used to protect historic buildings. Brauers and Zavadskas (2006) introduced the MOORA method, a new method, to the literature by explaining it with an example of privatisation in transition economies. Brauers et al. (2008) used the MOORA method to optimise alternatives for road design and determine the most suitable option in their study. Brauers and Ginevicius (2009) propose a new model for regional development in their work. While it is stated in the study that the regional income calculation is sufficient to measure the welfare of the population of the region, it is emphasised that it does not represent the welfare economy in general. Brauers et al. (2010) propose a model to reduce pollution related to promoting local employment in the tourism sector and solve problems associated with the development of renewable energy and tourism MOORA method. Chakraborty (2011) used the MOORA method in his study, stating that managers in the production environment should make critical decisions by evaluating many criteria. Brauers and Ginevicius (2013) suggest that investors consider many risks and benefits when investing in businesses. In such cases, the MOORA method was used based on the Bel20 list in Belgium to determine how the investors would follow. Sarkar et al. (2015) used the MOOSRA method for machine selection, while Yildirim (2015)

used the ARAS method for housing selection in his study. In 2016, Ecer used the ARAS method to choose and select ERP software in their research, while Adali and Isik (2016) used the ARAS method for their studies' best air conditioner selection. Omurbek et al. (2017) examined the sustainability performance of large-scale banks according to their asset sizes in the context of financial, operational, and environmental sustainability. In addition to the studies in which the ARAS and MOOSRA methods were used, studies using the entropy method are included in the literature. Firstly, Bilien and Tassinopoulos (2001) used the entropy method in their research while estimating employment. Chen et al. (2015) used the entropy method to analyse the effects of fighting poverty. In 2011, Shemshadi et al. (2011) used the entropy method in their studies where they selected suppliers. Chen et al. (2015) used the entropy method to analyse groundwater sustainability in their studies. Yavuz (2016) used the entropy method in the case of geographic market selection in his research. All in all, it has been determined that the entropy method was used in some studies on performance evaluation. In their research in 2016, Karaatli et al. (2016), performance evaluation in the defence industry, Karaatli (2016) in the evaluation of tourism performance in Turkey, Omurbek and Aksoy (2016), oil company performance measurement and Omurbek et al. (2016b), on the other hand, used the entropy method for the performance evaluation of automotive companies. Finally, Tunca et al. (2016) used the entropy method in the performance ranking of OPEC countries. In addition to all these studies, studies have also been conducted to reveal the effects of the COVID-19 pandemic that emerged worldwide in 2020 on the financial system. Examples of these are the following studies. Guo et al. (2021) found that when COVID-19 spreads worldwide, the markets' links seem closer than other risks. Shapoval et al. (2021) stated that the effects of the pandemic on travel negatively affect the tourism and hotel industry. Gunay, in the study (2021), shows that the volatility in the first months of COVID-19 is not as severe as in the global financial crisis in 2008 due to the independent risk analysis. He also states that the Brazilian real and the Turkish lira are the currencies that experienced the highest volatility during the COVID-19 outbreak. In the study conducted by Zaremba et al. (2021), it was determined that workplace and school closures impair liquidity in emerging markets. According to Danisman et al. (2021), countries with higher (Loan/Deposit) ratios and unrequited loans for the banking sector are more vulnerable.

3. Methodology

Entropy, ARAS, MOORA and MOOSRA methods, which are multi-criteria decision-making methods, were used to determine the performance ranking of banks. While the entropy method was used to determine the criterion weights, ARAS, MOORA and MOOSRA methods were used for performance rankings.

3.1. Entropy Method

The concept of entropy was defined for the first time in the literature by Rudolph Clausius (1865) as a measure of the disorder and uncertainty in a system (Zhang, 2011: 444). The entropy method measures the amount of helpful information provided by existing data

(Wu, 2011: 5163). The entropy method consists of four steps (Karami & Johansson, 2014: 523-524; Wang & Lee, 2009: 8982):

Firstly, various methods can standardise indices to eliminate the effects of different index sizes on incommensurability in the decision matrix. Criteria are normalised according to benefit and cost indexes with the help of the equations below.

$$r_{ij} = X_{ij}/Max_{ij} \tag{1}$$

$$r_{ij} = Min_{ij}/X_{ij} \tag{2}$$

It is, secondly, calculated by normalisation to eliminate discrepancies in different units of measure.

$$P_{ij} = (a_{ij}/\sum_{i=1}^{m} a_{ij}) \tag{3}$$

P_{ij} = Normalized values

a_{ij} = Benefit values

Third, the entropy of Ej is calculated from the below equation.

$$E_j = -k \sum_{i=1}^{m} [P_{ij}.lnP_{ij}]; \forall_j \tag{4}$$

$k = [ln(n)]^{-1}$(Entropy coefficient)

In step 4, d_j uncertainty is calculated from the equation.

$$d_j = 1 - E_j; \forall j \tag{5}$$

Finally, with the help of the below equation, the weights of the wj criterion are calculated as the importance level.

$$w_j = (d_j/\sum_{j=1}^{n} d_j) \tag{6}$$

3.2. ARAS Method

ARAS (Additive Ratio Assessment) method was developed by Zavadskas and Turksis (Zavadskas & Turksis, 2010: 159-172). Unlike other MCDM methods, the utility function values of the alternatives are compared with the utility function value of the optimal choice added to the decision problem by the researcher (Sliogeriene et al., 2013: 13). The ARAS method reveals the proportional similarity of each alternative to the ideal choice (Dadelo et al., 2012: 68).

The ARAS method consists of 4 steps (Zavadskas & Turskis, 2010: 163-165).

Firstly, there is a row of optimal values for each criterion in the initial decision matrix in the ARAS method.

$$X = \begin{bmatrix} X_{01} & X_{0j} & X_{0n} \\ X_{i1} & X_{ij} & X_{in} \\ X_{m1} & X_{mj} & X_{mn} \end{bmatrix}; \; i = 0,1,\ldots,m \; j = 0,1,\ldots,n \tag{7}$$

X_{ij} = value representing the performance value of the *i*. alternative in terms of the *j*. criterion

X_{0j} = optimal value of *j*. criterion

If the optimal value of the criterion is not known in the decision problem, the optimal value is calculated from the below equations, depending on whether the criterion shows the maximum or minimum property.

$$X_{0j} = Max_i/X_{ij} \tag{8}$$

$$X_{0j} = Min_i/X_{ij} \tag{9}$$

The second step consists of normalized decision matrix values. Values are calculated in two ways, depending on whether the criterion has the benefit or cost feature. If the criterion performance values are considered better to be maximum, normalized values are calculated from the below equation.

$$\overline{X}_{ij} = (X_{ij}/\sum_{i=0}^{m} X_{ij}) \tag{10}$$

If the benchmark performance values are considered better to be minimum, the normalization process is carried out in two steps. First, it is transformed into a utility state by using performance values, then its normalized values are calculated from the below equations.

$$X_{ij}^* = 1/X_{ij} \tag{11}$$

$$X_{ij} = (X_{ij}^*/\sum_{i=0}^{m} X_{ij}^*) \tag{12}$$

In the third step, after obtaining the normalized decision matrix, a weighted normalized decision matrix was created using the wj determined weights. The weight values of the criteria satisfy the condition $0 < wj < 1$, and the sum of the weights must be equal to 1, as shown below equation.

$$\sum_{j=1}^{n} w_j = 1 \tag{13}$$

Normalized values using the below equation, weighted normalized values of $\overline{x}ij$ are obtained.

$$\hat{x}_{ij} = \overline{x}_{ij}.w_{ij} \tag{14}$$

$\hat{x}_{ij}$ weighted normalized decision matrix is obtained by constructing the calculated $\hat{X}$ weighted normalized values in the form of the matrix shown in the below equation.

$$\hat{X} = \begin{bmatrix} \hat{x}_{01} & \hat{x}_{0j} & \hat{x}_{0n} \\ \hat{x}_{i1} & \hat{x}_{ij} & \hat{x}_{in} \\ \hat{x}_{m1} & \hat{x}_{mj} & \hat{x}_{mn} \end{bmatrix}; \text{ i} = 0,1,\ldots,\text{m j} = 0,1,\ldots,\text{n} \tag{15}$$

Lastly, optimal values for each alternative are calculated, and values belonging to the other options are obtained from the below equation. Si., including the optimal function value of the option;

$$S_i = \sum_{j=1}^{n} \hat{x}_{ij} \quad ; \qquad \text{i} = 0,1,\ldots,\text{m} \tag{16}$$

The S_i values of the other options are proportioned to the S_0 optimal value, and the utility degrees are calculated from the equation.

$$K_i = S_i/S_0 \quad ; \qquad \text{i} = 0,1,\ldots,\text{m} \tag{17}$$

The utility function values of the alternatives can be calculated using the value area ratios in the range of [0,1]. Then, these values obtained are ranked in descending order, and the alternatives are evaluated.

3.3. MOORA Method

The MOORA method (MOORA-The Multi-Objective Optimization by Ratio Analysis Method), a Multi-Purpose Optimization Method Based on Ratio Analysis, was introduced by Brauers and Zavadskas (2006) and brought to the literature. MOORA method is basically a method based on different grouping predictions (Brauers & Zavadskas, 2006: 445-469).

The application of the MOORA method starts with a decision matrix that includes all alternatives and criteria. The matrix is shown as "xij" (Brauners & Ginevicius, 2009: 123).

MOORA, a multi-purpose optimisation method, is a new method in the literature. Still, it has different versions, such as MOORA-Ratio Method, MOORA-Reference Point Approach, MOORA-Significance Coefficient, MOORA-Full Product Form and MULTI-MOORA methods (Ersoz & Atav, 2011: 79). Since this study will be examined using the MOORA-Ratio method, only that will be introduced.

The three steps of the MOORA method are given below (Brauers & Zavadskas, 2006: 445-469);

Step 1: Determining the Objectives and Performance Values of Alternatives

It starts with bringing together the goals, alternatives, and performance values according to the goals into a matrix. It is expressed by a matrix formed in the following figure. In the matrix, m indicates the number of alternatives, and n indicates the number of criteria.

$$X_{ij} = \begin{bmatrix} X_{11} & X_{12} & X_{13} \\ X_{21} & X_{22} & X_{23} \\ X_{m1} & X_{m2} & X_{mn} \end{bmatrix};$$
(18)

Step 2: Normalizing the Matrix

The matrix is normalized by dividing the sum of the performance values squared by the square root of the performance value of each alternative according to each criterion using the following equation.

$$X_{ij}^* = (x_{ij} / \sqrt{\sum_{i=1}^{n} x_{ij}^2})$$
(19)

X_{ij}^* is i alternatives j performance value normalized by criterion shows. This value may be in the range of 0.1 or some cases, in the range of -1.1.

Step 3: Sorting Step

This step subtracted the Sum of Minimization Performance Values from the Total of Normalized Maximization Performance Values. This process is handled with the help of the following equation.

$$Y_i = \left(\sum_{j=1}^{g} x_{ij}^* \right) - \left(\sum_{j=g+1}^{n} x_{ij}^* \right)$$
(20)

g is the number of goals to be maximised, (n-g) the number of goals to be minimised, and yi is i. shows the normalised value of the alternative for all purposes. The values are ordered in descending order. The choice in the first rank, according to the order of yi is considered the most suitable option.

3.4. MOOSRA Method

Das, Sarkar and Ray first developed the MOOSRA method (Multi-Objective Optimization on Simple Ratio Analysis) (Das et al., 2012: 142-162). MOOSRA methodology, in general, begins by placing four significant parameters in the decision matrix: alternatives, criteria or attributes, individual weight or importance coefficients of each criterion, and the performance measure of options according to the criteria. MOOSRA is a multi-purpose and optimisation method (Jagadish & Ray; 2014: 560).

The application steps of the MOOSRA method are first started by creating the decision matrix of the problem, and the second step is the normalisation of the decision matrix. While calculating all performance values of each alternative in the MOOSRA method, the sum of the practical and non-useful values normalised performance values are obtained by the simple ratio method (Balezentiene et al., 2013: 85).

The four steps of the MOOSRA method are given below (Jagadish & Ray, 2014: 560-561):

Firstly, this methodology starts with defining the decision matrix in which criteria and alternatives are listed. The performance of each option is established in the following equation.

$$X_{ij} = \begin{bmatrix} X_{11} & X_{12} & X_{13} \\ X_{21} & X_{22} & X_{23} \\ X_{m1} & X_{m2} & X_{mn} \end{bmatrix}; \tag{21}$$

The process of converting the attribute value to 0-1 interval is called normalisation. In multi-criteria decision-making, the values in the decision matrix must be converted from different units to a single unit. The equation below is used for the normalisation process.

$$X_{ij}^* = \left(x_{ij} / \sqrt{\sum_{i=1}^{n} x_{ij}^2} \right) \tag{22}$$

Thirdly, all alternatives' performance values (Yi) are calculated using the simple ratio of the weighted sum of valuable and non-useful criteria. In this calculation, the following equation has been used.

$$Y_i = \left(\sum_{j=1}^{g} w_j \cdot x_{ij}^* \right) / \left(\sum_{j=g+1}^{n} w_j \cdot x_{ij}^* \right) \tag{23}$$

(g) is the maximised value, and (n-g) is the minimised value.

In the last step, the process of sorting the alternatives is carried out. When the alternatives are ordered in descending order, the best choice is the option with the highest value and is calculated by the below equation.

$$Y_i = \left(\sum_{j=1}^{g} \cdot x_{ij}^* \right) / \left(\sum_{j=g+1}^{n} \cdot x_{ij}^* \right) \tag{24}$$

3.5. Data

In this study, the financial performances of thirteen commercial banks operating in Turkey were examined. Banks were selected according to their total asset size. The data set used in the analysis consisted of variables obtained or derived from banks' financial statements in 2019 and 2020. Banks used in the study were numbered B1-B13 in Table 1.

Table: 1
Bank Names and Codes

Bank Name	Capital Structure	Bank Code
Akbank	Private	B1
Denizbank	Private	B2
HSBC Bank	Private	B3
ING Bank	Private	B4
QNB Finansbank	Private	B5
Şekerbank	Private	B6
Türk Ekonomi Bankası	Private	B7
Türkiye Cumhuriyeti Ziraat Bankası	Public	B8
Türkiye Garanti Bankası	Private	B9
Türkiye Halk Bankası	Public	B10
Türkiye İş Bankası	Private	B11
Türkiye Vakıflar Bankası	Public	B12
Yapı ve Kredi Bankası	Private	B13

The variables and derived rates used in the analysis are as follows; (Capital Adequacy Ratio, Return on Equity, Total Assets, Deposits, Operating Profit, Net Profit, Interest Income Expenses Per Employee, Non-Performing Loans and Interest Expenses). All data used in this study were obtained from the data in Turkey Banks Union's official website (TBB İstatistiki Raporlar, n.d.).

4. Results

As a result of the analysis using the entropy method, weights in Table 1 were obtained.

Table: 2
Weights

Criteria	Weights (2019)	Weights (2020)
CAR	0,0048	0,0029
ROE	0,0153	0,1069
TOA	0,134	0,1168
DEP	0,1361	0,1161
OPP	0,2149	0,1807
NEP	0,1961	0,1701
INI	0,1152	0,1049
EPE	0,0121	0,0065
NPL	0,0868	0,082
INE	0,1153	0,1131

When we look at the calculated weights of 10 criteria used in the study in 2019, it is seen that the criterion with the highest weight is approximately 21.5% operating profit. When we look at the calculated weights of 10 criteria used in the study in 2019, it is seen that the criterion with the highest weight is approximately 21.5% operating profit. While the second criterion with the highest weighting was Net profit, the criterion with the lowest weighting was the capital adequacy ratio of 0.48%.

When we look at the calculated weights of the criteria in 2020, which is the year of the pandemic, it is seen that the criterion with the highest weight is approximately 19% operating profit. The second criterion with the highest weight is Net profit, with 17%, while the criterion with the lowest weight is the capital adequacy ratio, with 0.29%.

The first five bank rankings calculated using the ARAS method are in Table 2.

Table: 3
Sorting by ARAS

Sorting 2019	Bank Code	K_i Value	Sorting 2020	Bank Code	K_i Value
1	B8	0,7885	1	B8	0,7760
2	B11	0,5987	2	B9	0,5983
3	B9	0,5925	3	B1	0,5782
4	B1	0,5590	4	B11	0,5640
5	B13	0,4225	5	B10	0,4693

In the performance ranking according to the ARAS method in 2019, the bank ranked first in B8. The second bank is B11, followed by B9. B13 ranks 5th in the ranking in 2019. In the performance ranking made according to the ARAS method 2020, which is the year of the pandemic, B8 is again in first place. In 2020, the second bank was B9, followed by B1. B10, on the other hand, ranks 5th in the 2020 ranking. B13 needed help finding a place in the top five in 2020.

The first five bank rankings calculated using the MOORA method are in Table 3.

Table: 4
Sorting by MOORA

Sorting 2019	Bank Code	Y_i^* Value	Sorting 2020	Bank Code	Y_i^* Value
1	B8	0,3408	1	B8	0,3213
2	B9-B11	0,2399	2	B9	0,2409
3	B9-B11	0,2399	3	B1	0,2318
4	B1	0,2230	4	B11	0,2174
5	B10	0,1407	5	B10	0,1638

In the performance ranking according to the MOORA method in 2019, the bank ranked first in B8. B9 and B11 share the rankings of the second and third banks. The values of Yi* were equal in 2019. B1 ranks 4th and B10 5th in the ranking in 2019. In the performance ranking made according to the MOORA method in 2020, which is the year of the pandemic, B8 is again in first place. In 2020, the second bank was B9, followed by B1. B11 is the fourth bank, while B10 was the fifth in 2020.

The first five bank rankings calculated using the MOOSRA method are in Table 4.

Table: 5
Sorting by MOOSRA

Sorting 2019	Bank Code	Y_i Value	Sorting 2020	Bank Code	Y_i Value
1	B8	5,3944	1	B8	5,1305
2	B9	4,4099	2	B1	4,8973
3	B1	4,3866	3	B9	4,8571
4	B11	4,1980	4	B3	4,5874
5	B10	3,0163	5	B4	4,5061

The performance ranking was according to the MOOSRA method in 2019; the bank ranked first in B8. The second bank is B9, followed by B1. B10 ranks 5th in the ranking in 2019. The performance ranking was made according to the MOOSRA method in 2020, the

year of the pandemic, and B8 is again in the first place. In 2020, the second bank was B1, followed by B9. B4, on the other hand, ranks 5th in the 2020 ranking. B10 could not find a place in the top five in 2020.

The Brand value rank for 2019 and 2020 announced by BrandFinance is shown in Table 5.

Table: 6
Sorting by BrandFinance

Sorting 2019	Bank Code	Brand Value (Million USD)	Sorting 2020	Bank Code	Brand Value (Million USD)
1	B8	1,637	1	B8	1.616
2	B9	1,344	2	B9	1.538
3	B11	1,135	3	B1	998
4	B1	934	4	B11	951
5	B13	647	5	B10	408

Banks were classified among themselves in the list of the most valuable brands in Turkey, announced by BrandFinance in 2019. Accordingly, the banks with the highest brand value are B8, B9, B11, B1, and B13.

In 2020, the year of the pandemic, B8 and B9 were again in the first two places in the BrandFinance ranking. While B1 was the third bank in 2020, B10 ranked fifth. B13 could not find a place in the top five in 2020 again.

5. Discussion

The study's primary purpose is to conduct a comparative analysis of how commercial banks operating in Turkey have changed financially with the pandemic process. Comparisons were made in the context of this purpose, including method comparison and between periods. Rankings were made using different financial performance ranking methods. ARAS method, MOORA method and MOOSRA method gave different results. It is thought that using three different sorting methods in the same review contributes to this study's originality. To our knowledge, no study compares the results of these three other methods in the literature. The only study on the ranking of commercial banks operating in Turkey is Omurbek et al.'s (2017) study, which examines the sustainability performance of large-scale commercial banks concerning financial, operational, and environmental sustainability according to their asset sizes. This study primarily lists the one-year performances of banks realised under the concept of sustainability. When the results are examined, it is seen that there is a very high consistency between the outputs of the ARAS, MOORA and MOOSRA methods. In the study in which the first seven commercial banks were listed, only the fifth and seventh firms were evaluated in different ARAS methods. Apart from that, the rankings in all three methods were the same. If expressed using the codes in the study, B2 was identified as the first bank in the ranking.

In this study, besides the performance ranking in 2019 and 2020, the changes that have emerged in the ranking have also been emphasised. A comparison is made between the

results of multi-criteria decision-making methods, and determinations are made about the performance changes of banks. In addition, we tried to establish a link between financial performance ranking and brand value in the study. The banks, among the 100 most valuable companies in Turkey, announced in 2019 and 2020 by BrandFinance, a reputable brand valuation firm serving internationally, are listed among themselves. The brand value rankings obtained were compared with the outputs of the ARAS, MOORA and MOOSRA methods used in the study. Unexpectedly, with the brand value ranking announced by BrandFinance for the pandemic period 2020, it was seen that the rankings of both the ARAS method and the MOORA method in 2020 were the same at the level of the top five banks. In the MOOSRA method, the ranking is different from the BrandFinance ranking. However, it is seen that B8 is the first bank in all methods and BrandFinance rankings for both years. This result is consistent with Omurbek's (2017) study. Omurbek et al. (2017) coded the bank as B2, and B8 in the study refers to the same bank. However, in our research, it can be said that the rankings of other banks changed with the pandemic process. In the study, in which it was determined that the COVID-19 pandemic affected the dynamics of the Turkish banking sector, it can be concluded that ARAS, MOORA and MOOSRA methods yield different results in performance measurement. At the same time, as a result of the investigations conducted during the pandemic, it can be said that the BrandFinance brand value ranking method is compatible with the ARAS and MOORA methods. It can be noted that the implicit relationship, which is thought to be between financial performance and brand value, is proved by this study.

In future studies, the fuzzy logic approach can be included in the analysis instead of making precise judgments and sequences. Researchers are recommended to perform new investigations using fuzzy ARAS, MOORA and MOOSRA methods. In addition, it is thought that the interest rate volatility that emerged with the pandemic process will directly affect the financial performance of banks. Thus, with a duration analysis to be conducted on the said banks, their sensitivity towards changes in interest rates should be measured.

6. Conclusion

B8 stands out as the bank with the best performance and highest brand value in pre-pandemic 2019 and 2020, the pandemic year. B11, which came second in the ARAS method in 2019, fell to fourth place in 2020. The B9, which ranked 3rd in 2019, rose to the 2nd in 2020. B1, which ranked 4th in 2019 in the ARAS method, climbed one step in 2020 and ranked third. Finally, the B13, which ranked 5th in 2019, could not find a place in the top five in the pandemic year.

The B 8, which ranked first in the performance ranking according to the MOORA method in 2019, was also first place in 2020. In 2020, B9 maintained second place, while B11 dropped to fourth. B1, on the other hand, climbed up one step and ranked third. B10, on the other hand, ranked 5th in 2020, as in 2019.

The B8, which ranked in the first performance ranking according to the MOOSRA method in 2019, was also first in 2020. The B9, which came in second in 2019, dropped one place in 2020 and ranked third. B1, 3rd in 2019, rose to second place in 2020. In the MOOSRA method, B11 and B10, ranked 4th 2019 and 5th in 2019, could not find a place in the top five banks in 2020. B3, whose performances increased in 2020, rose to fourth place, while B4 took fifth place.

Looking at what changed from 2019 to 2020 according to both ARAS, MOORA and MOOSRA methods, it was seen in both years that B8 ranked first concerning performance. It can be concluded that the financial performance rankings of commercial banks changed significantly during the COVID-19 outbreak. Although the Ki value of B8 was calculated according to the ARAS method, the Yi value calculated according to the MOORA method and the Yi value calculated according to the MOOSRA method decreased in 2020. It was observed that it did not lose its first place.

Looking at the BrandFinance 2019 brand value ranking, it is seen that the B8 is the most valuable brand, followed by the B9. B1 has been declared the third most valuable bank. B1, the 4th most valuable bank, and B13, the 5th most valuable bank, lost their places in the top five in the pandemic year in the pre-pandemic period. In other words, B1 and B13 stand out as the banks most affected concerning brand value. Looking at the top three banks in BrandFinance's brand value ranking in 2020, it is seen that it is in line with 2019. While B8 is again the most valuable bank, B9 is the second and B1 is the third.

Looking at the top three banks in BrandFinance's brand value ranking in 2020, it is seen that it is in line with 2019. While B8 is again the most valuable bank, B9 is the second and B1 is the third. On the other hand, B11 and B10 increased their brand values in 2020, the year of the pandemic, and ranked fourth and fifth.

As a result, the COVID-19 outbreak has affected the performances of Turkish commercial banks and their brand values in Turkey. It can be said that the most adversely affected banks are B11 and B13. In addition, it is exciting that the public bank B8 ranks first in the financial performance ranking according to all methods. Otherwise, B10, another public bank, was not among the top 5 banks in the pre-pandemic period but increased its performance by rising to 5th in both ARAS and BrandFinance rankings. This may mean that public banks are not adversely affected by the pandemic process.

In brief, the financial performance ranking results obtained by the ARAS method from the ARAS, MOORA and MOOSRA methods used in the study were similar to the BrandFinance brand valuation ranking. This shows that the ARAS method provides more reliable results than other methods. On the other hand, when the bank performances are evaluated according to the pandemic period, it has been revealed that Ziraat Bank (B8) is the bank with the first financial performance according to all methods. The striking point of the result is that Ziraat Bank is the only public bank in the financial performance ranking made for the pre-pandemic period. In addition, it has been determined that Halkbank (B10),

another public bank during the pandemic period, increased its financial performance and became one of the top 5 banks in the BrandFinance ranking. It is in line with the ranking and BrandFinance ranking obtained due to the ARAS method during the pandemic period when Ziraat Bank ranked first, and Halkbank ranked fifth.

Banks positively affected by the pandemic process can be listed as B1, B3 and B4. A significant result that can come out of the study is that the ARAS method used in the financial performance ranking gives very consistent results with the BrandFinance technique, which is the brand value calculation technique. In summary, it can be said that the pandemic process has affected the financial performance of banks in Turkey and reduced their brand values, except for B9 and B1.

The originality of the study; no study has been found to measure the financial performance of commercial banks in Turkey using ARAS, MOORA and MOOSRA multi-criteria decision-making techniques. In addition, it is the first study to compare financial performance ranking results with BrandFinace brand valuation ranking results.

This study contributes to the fact that the ARAS method gives accurate results in the measurement of financial performance. On the other hand, while the results benefit the banking sector, they also provide ideas for new academic studies.

It is recommended to review these situations in further studies. Even comparisons using fuzzy ARAS, fuzzy MOORA and fuzzy MOOSRA methods are recommended. In addition, it is thought that the change in the financial performance of banks depends on their sensitivity to interest rates. To determine this situation, duration analysis is recommended to researchers.

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User Acceptance of Metaverse: An Analysis for e-Commerce in the Framework of Technology Acceptance Model (TAM)

Yavuz TORAMAN *(https://orcid.org/0000-0002-5196-1499), İstanbul Nişantaşı University, Türkiye; yavuz.toraman@nisantasi.edu.tr*

Barış Batuhan GEÇİT *(https://orcid.org/0000-0002-1354-1231), Ostim Technical University, Türkiye; batuhang@ostimteknik.edu.tr*

Metaverse Kullanıcı Kabulü: Teknoloji Kabul Modeli (TKM) Çerçevesinde e-Ticaret Üzerine Bir Analiz

Abstract

The increase in technology has directed society to penetrate more towards electronic channels. Usage of the internet and e-commerce has been growing dramatically year by year. Thus, households' daily life has become more digitalised, leading innovative entrepreneurs to find new technologies. Firstly, the World has seen the emergence of blockchain technologies in recent years. In the more recent period, terms like Metaverse and NFT became popular. This study aims to analyse Metaverse and NFT terms with Technology Acceptance Model, and accordingly, a structural equation analysis has been conducted via Smart PLS 3. According to the analysis results, Perceived compatibility, enjoyment, and trust have a significant and positive effect on perceived usefulness, the mediation effect has been accepted, and other hypotheses have been rejected. Afterwards, all these results were interpreted accordingly to the analysis.

Keywords	:	Metaverse, Non-Fungible Token (NFT), Technology Acceptance Model, Consumer Behaviour, e-Commerce, Last Mile Delivery, Blockchain.
JEL Classification Codes	:	M1, L81, L84, D1.

Öz

Teknolojinin gelişimi insanların elektronik kanallara yoğunlaşmasına neden olmuştur. İnternet kullanımı ve e-ticaret yıllar içinde gelişimini sürdürmektedir. Böylece günlük yaşam daha fazla dijitalleşmiş olup yenilikçi girişimcileri de yeni teknolojiler bulmaya yönlendirmektedir. İlk olarak dünya blokzincir teknolojileri ile tanışmıştır. Yakın bir zamanda ise Metaverse ve NFT gibi terimler popüler hale gelmiştir. Mevcut çalışma Metaverse ve NFT terimlerini TKM ile açıklamaya çalışmaktadır. Bu bağlamda Smart PLS 3 programı kullanılmıştır. Analiz sonuçlarına göre, algılanan uyumluluk, eğlence ve güvenin algılanan fayda üzerinde anlamlı ve pozitif bir etkiye sahip olup aynı zamanda aracılık etkisi kabul edilmiş diğer hipotezler ise reddedilmiştir. Sonrasında tüm sonuçlar analize uygun olarak yorumlanmıştır.

Anahtar Sözcükler	:	Metaverse, Nitelikli Fikri Tapu (NFT), Teknoloji Kabul Modeli, Tüketici Davranışı, e-Ticaret, Son Adım Teslimat, Blokzincir.

1. Introduction

The World is undergoing rapid change. This change is accelerated by the development of Internet technologies and the exponential growth of data (Pärssinen et al., 2018: 54884). The internet has revolutionised the World (Swan, 2015) and changed how society lives. The usage of smartphones and personal computers has increased dramatically throughout the years. The increasing use of technological devices and digital penetration brought new technology-related platforms to people's lives.

Firstly, at the end of the 20th century, e-commerce emerged. E-commerce is a subject that researches how to use electronic and information technology (Qin & Qin, 2009). E-commerce has grown dramatically throughout the years (Hazarika & Mousavi, 2022). The number of digital e-commerce buyers from all over the World increased from 1,320 billion people in 2014 to 2,140 billion people in 2021 (Coppola, 2021). Especially with the Covid-19 pandemic, e-commerce has grown even more since people were restricted from outside their homes at certain times. This increased their tendency to use electronic channels to fulfil their daily needs and complete their transactions. This tendency has hindered people's negative bias toward e-commerce, and digital channels have been a habit.

Another voguish term has emerged after the massive growth of technology and digital devices. It has been blockchain technologies. Blockchain technologies promoted the traditional business process to change profoundly. Blockchain Technologies have also made a massive impact on society, especially with cryptocurrencies and the investment tendencies of people. Afterwards, terms called Metaverse and NFT have been popular recently, which brings people more advanced versions of the technological and digital World with the Virtual World.

As technology has grown steadily in recent years, technology-related academic research and scales have also gained popularity. Technology Acceptance Model (TAM) is among these models (Alambaigi & Ahangari, 2015: 235). Technology Acceptance Model is the adaptation of users toward a system (Letho & Lee, 2013: 194). The Technology Acceptance Model is widely used in many disciplines to analyse people's tendency to adopt systems and new technologies.

This study initially gives a literature review regarding digitalisation, blockchain, e-commerce, NFT, and Metaverse. Afterwards, the methodology and analysis of the research have been mentioned. Finally, a discussion and conclusion have been given.

2. Digitalisation

Digitalisation has shown its effects worldwide since the start of the 21st century. The usage rate of smartphones, computers, and tablets has increased every year. With these technological devices' increasing and widespread usage, internet usage and dependence have also increased.

Usage of the internet has shown a dramatic increase year by year worldwide. According to Statista (2021), there were approximately one billion internet users worldwide in 2005. The Worldwide internet user population passed two billion in 2011 and three billion in 2015. In 2018 this population passed four billion, and by the end of 2021, the internet user population will be almost five billion. Comparing worldwide internet user numbers from 2005 (one billion and 23 thousand people) to 2021 (four billion and 901 thousand), the internet user population has increased by %479 within 17 years.

These numbers indicate how much the internet and digitalisation have taken over the World. Such a spread of internet usage has changed the way society live their lives. People tend to use digital tools more in their daily lives. With the increasing and widespread usage of these technological devices, the lives of households have been affected dramatically. Digitalisation has been identified as one of the major trends changing society and business (Parviainen et al., 2017: 63).

Digitalisation is a fundamentally disruptive force triggered by the Fourth Industrial Revolution and the Internet of Things, which has changed how we approach and think about business processes and activities. In this increasingly digital age, relationships between organisations (i.e., companies, governmental agencies, and others) and customers are being reshaped, and new business models are being invented (Parida, 2018).

Accordingly, companies, entrepreneurs, and investors started aiming to create new digital tools to attract consumers, create new paths with limitless technology opportunities, and become much more profitable. In the digital age, people have seen born of e-commerce, the growth of e-commerce, and today e-commerce has grown dramatically. Especially with the leverage of the Covid-19 pandemic, e-commerce has already been rising with the high amount of technological penetration of households. The world's total population of e-commerce buyers increased from 1,320 billion in 2014 to 2,140 billion in 2021 (Coppola, 2021). %18 of all retail sales worldwide are from e-commerce and expected to pass %21 by 2024. Before 2017 this ratio was lower than %10. In 2020 global e-retail sales have grown by %27,6 (Madasoğlu, 2021).

According to Interbrand (2021), Amazon is the most valuable e-commerce platform in the World and the second most valuable brand among all the brands in the World (Interbrand, 2021). Amazon has an estimated 2,5 billion monthly visitor traffic (Madasoğlu, 2021). These numbers clearly show how much e-commerce has been growing and will grow; checking the stats of digitalisation and e-commerce, the growth of e-commerce and digitalisation has a tremendous positive correlation.

Today in the marketing literature, Marketing 5.0 is a popular topic that mainly presents ideas regarding the world's digital transformation, including such issues as; agile marketing, artificial intelligence for marketing automation, the internet of things, and blockchain for marketing (Kotler et al., 2021).

As contemporary marketing approaches are mainly concerned with digitalisation and trade is transforming from brick-and-mortar to more e-commerce, consumer demands and business supplies turned more towards a digital breakthrough.

According to Westerman et al. (2012), positive impacts of digitalisation are already seen in various industries, where digital leaders outperform their peers (Kotarba, 2017: 123).

El-Darwicheet et al. (2012) claim that consolidation of digitalisation benefits is also clearly visible on the macroeconomic level, resulting in job creation, innovation, and economic growth and according to Deloitte Access Economics (2015), as well as increasing the efficiency of public service and administration (Kotarba, 2017: 123).

3. Blockchain

The internet has seen massive growth during the 21st century. In the sequel, internet-related platforms have been founded and used widely. These include electronic marketplaces, business processes, and customised services (Acar & Kucukaltan, 2019: 178). One of the advanced technologies of recent years has been blockchain. Blockchain is the technology of the new era, or rather, the software architectural structure. The field of application is expanding day by day. The ultimate effect is that it can bring purchases face-to-face, even if not physically. It will either eliminate the intermediaries or cause their structure to change (Güven & Şahinöz, 2021: 43).

Blockchain is information technology. But blockchain technology is also many other things. The blockchain as a decentralised computing paradigm is a game-changing new computing paradigm. The blockchain is the economic layer that the Web lacks. The blockchain is the trustless participation mechanism, line-item attribution, credit, evidence, and compensation incentives tracking schema for any intelligent agent in any cooperation. (Swan, 2015: 92).

Thanks to blockchain technology, these nonmonetary social currencies may now be more trackable, transmissible, transactive, and monetisable. Social networks can potentially transform into social and economic networks (Swan, 2015, 75).

Through tokenisation, blockchain technology has provided access to assets that could not previously be exchanged rapidly or easily. Tokenisation is a critical component of Decentralized Finance (DeFi) and a built-in feature of several blockchain topologies. Aside from its primary job of serving as network fuel, the attributes and features of a token open up a wide range of economic possibilities (Popescu, 2021: 26).

Blockchain is a database, and data is sequentially recorded in blocks. Each record has a timestamp. When a block is complete, the next block is produced. The blocks are connected to each other in the form of a chain. Just as there are databases everywhere, the same is true for blockchain. Each blockchain is created in the registry (Güven & Şahinöz, 2021: 44).

4. Electronic Commerce

As technology has advanced dramatically throughout recent years, electronic commerce has grown swiftly. With the increased digital penetration worldwide, e-commerce has also increased with the same acceleration. With e-commerce already overgrowing, the Covid-19 pandemic has been another milestone for the escalation of e-commerce. With the Covid-19 pandemic, people were restricted from leaving their houses and had no other option than buying their daily needs from online platforms, which is included in the scope of e-commerce. Afterwards, e-commerce became a habit rather than an obligation for consumers, both for their hedonic needs, like clothes and for their daily needs, like food. Chen and Dubinsky (2003) argued that with the rich and accessible content of online shopping, consumers could easily compare prices, and thus it is convenient and time-saving.

E-commerce gives many opportunities to its users, such as being practical, reaching many products in seconds, more campaigns and discounts, contactless payment opportunities, availability of many product varieties and especially avoiding leaving the house.

According to Oberlo (2021), the e-commerce share/retail share ratio was %10,4 in 2017. This ratio has increased to %12,2 in 2018, %14,1 in 2019, %16,1 in 2020, %18,1 in 2021 and %20 in 2022. This ratio is expected to increase to %22 in 2023. It can be easily interpreted that e-commerce's proportion to total retail shares is increasing % by two every year, and e-commerce is taking over the commercial world.

In recent years terms like Metaverse and NFT have also become voguish, and these terms are showing signs of making a leverage effect on the increase of e-commerce. What made e-commerce that powerful in recent years was people's tendency to use digital channels even more. Metaverse and NFT terms create a new world, which increases people's tendency to get involved in the digital world even more.

5. Metaverse

Since 2020, the word "metaverse" has gained momentum in the tech sector. In 2021, the phrase metaverse, which referred to a three-dimensional virtual environment populated by avatars of actual people and was popularised by Neal Stephenson in his novel Snow Crash (1992), became one of the most popular tech terms (Kim, 2021).

Metaverse term is the combination of the prefix "meta" (implying transcending) with the word "universe", which describes a hypothetical synthetic environment linked to the physical World (Lee et al., 2021: 1). The term "metaverse" originates from the science fiction novel Snow Crash, written by Neal Stephenson (Duan et al., 2021: 1).

According to Smart et al. (2007), the Acceleration Studies Foundation (ASF) divided the Metaverse into four categories: a virtual world in which a flawless virtual story is experienced, a mirror world in which the current real World is reflected, augmented reality

in which increased information is shown in the real world, and lifelogging, which captures and stores everyday information about people and things (Jeon, 2021: 1).

Metaverse is meant to be a completely immersive virtual reality environment. Virtual avatars will navigate this digital environment more interactively. It will enable users to socialise in ways other than exchanging photographs and papers. The Metaverse allows users to pre-screen real estate properties in virtual reality to purchase residences using tokens. Metaverse tokens are becoming more popular due to their applications, and they are transactional entities that may be used to trade in virtual markets (NDTV, 2021).

6. Non-Fungible Token (NFT)

After the emergence of blockchain systems, especially cryptocurrencies, NFT has been another global trending topic.

A Non-Fungible Token (NFT) represents a one-of-a-kind digital asset that cannot be exchanged for another NFT of the same sort. A Non-Fungible Token is simply a non-replicable digital proof of authenticity. NFTs signify ownership of unique goods and are recorded on a blockchain or distributed ledger. The record of ownership is always available and unchangeable and assures that there can only be one owner at any moment, thanks to the security properties of blockchain technology (Popescu, 2021: 26).

NFTs, or Non-Fungible Tokens, are more than simply a way to trade and acquire digital art. As fashion labels and corporations begin to market themselves by distributing their NFTs, they have a wide range of real-world applications. NFTs are a means to exchange everything from social media postings to celebrity assets while keeping the original authorship of the product. NFTs have breathed new life into gaming platforms as users have begun to "play to earn". Today, games can assist players in obtaining NFTs, which can then be exchanged for more outstanding prices on markets. In terms of use cases, NFTs and Metaverse are similar. In the Metaverse, gaming assets are traded as NFTs using Metaverse currencies (NDTV, 2021).

7. Methodology

The survey method has been applied for this research. The questionnaire has been adapted from the original Technology Acceptance Model. Sources of other variables have been given in the Technology Acceptance Model section.

Accordingly, the survey has been sent to approximately 500 participants, and 74 surveys have been collected, which has been the most significant limitation of this study. However, many studies related to blockchain technologies have relatively smaller sample sizes due to an inadequate number of proficient blockchain Technology users (Agustina, 2019: 280; Gil-Cordero et al., 2020: 5). These questionnaires have been sent to blockchain users since Metaverse, NFT, and cryptocurrencies use the same system, and users of blockchain technologies: are more adapted to the system. These questionnaires were

collected from November 2021 to January 2022 using online distribution via Google Forms. Since adaptation towards Metaverse, NFT, and e-commerce still needs to be outstanding, the participant number could be much higher. According to the literature regarding TAM, numerous studies have been published using a low number of participants among the studies using PLS-SEM.

The convenience method has been selected as the most appropriate tool to utilise among the random sampling methods.

Figure: 1
Proposed Model
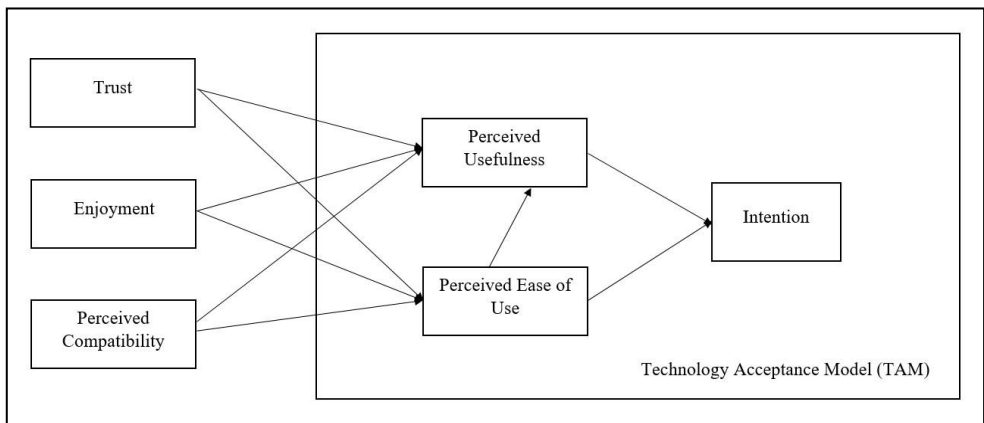
8. Technology Acceptance Model (TAM)

The interpretation of human behaviour by experts has been a frequently studied subject. In this sense, TAM has become an often-used model for understanding user behaviour in adopting new technologies. On the other hand, TAM bases its theoretical infrastructure on the Reasoned Action Theory (GET), which assumes that human behaviour is due to specific causes (Davis et al., 1989: 990; Kong et al., 2021: 366; Rafique et al., 2020: 4).

TAM aims to explain the determinants of acceptance in information technologies while trying to understand people's behaviour in information technologies. The Technology Acceptance Model provides the basis for examining and understanding the impact of technology acceptance, external factors, internal beliefs, attitudes, and the intention (Davis et al., 1989: 989; Venkatesh & Davis, 1996: 455; Manis & Choi, 2019: 505).

TAM includes active use, intention, attitude towards innovation, perceived usefulness, and perceived ease of use of new technological devices or applications (Davis et al., 1989: 990; Venkatesh & Morris, 2000: 118; Venkatesh & Bala, 2008: 276).

Intention consists of positive or negative thoughts of people towards active use. Since social psychologists see intention as the antecedent of behaviour, it is seen as the most critical variable affecting active service. The choice to use the variable used in the research is the most important factor explaining the usage behaviour of people in this context (Venkatesh & Davis, 1996: 460; Davis et al., 1989: 993; Assaker, 2020: 437). According to the literature, the following hypotheses have been formed.

H1: *Perceived usefulness (PU) affects the intention to use Metaverse.*

H2: *Perceived Ease of Use (PEOU) affects the intention to use Metaverse.*

The perceived usefulness of people determines the degree to which they believe their job performance will increase when they use new technology. The usefulness perceived by users of the system is affected by external factors. With the differentiation of processes in TAM, different variables that may affect the perceived usefulness can be added to the model. (Sukendro et al., 2020: 8). According to the literature, the following hypothesis was formed. One of the crucial factors for the widespread use of new technology is the perceived ease of use factor. The ease of use of the system when users use the systems plays a vital role in determining the intention (Davis, 1989: 326; Davis, 1993: 478). Technologies with ease of use have a positive effect on purpose in the adoption process. According to the literature, the following hypothesis was formed.

H3: *Perceived Ease of Use (PEOU) has an impact on Perceived usefulness.*

Trust has been a crucial external factor in the adoption of technological innovation. The phenomenon of trust perceived by people will directly affect the use of the system. The reason is that the interaction will be limited as new technologies bring uncertainty. For this reason, the trust variable has been a frequently used factor when examining the acceptance processes of innovations (Gefen, 2000: 728; Pavlou, 2003: 118; Pavlou & Gefen, 2004: 44; Schierz et al., 2010: 212). Since the technological innovation examined in the research is digital money, measuring users' trust in innovation is imperative. According to the literature, the following hypotheses have been formed (Jarvenpaa et al., 1999).

H4: *Perceived Trust (T) affects Perceived Usefulness.*

H5: *Perceived Trust (T) affects Perceived Ease of Use.*

Perceived enjoyment is directly related to people's intrinsic motivations. If people use the system in a fun way, if the general use of the system is not actively used, it will positively affect their intention to use it. Since the Metaverse system is a 3-dimensional system, the Enjoyment variable was added to the model, considering that the entertainment perceived by the people is important. According to the literature, the following hypotheses have been formed (Linares et al., 2021: 5).

H6: *Perceived Enjoyment (E) affects Perceived Usefulness.*

H7: *Perceived Enjoyment (E) affects Perceived Ease of Use.*

Perceived compatibility is people believing that their habits and adoption of new technology will match. The compatibility of innovations with people's past habits is considered an important external factor in the adoption of technology (Karahanna et al., 1999: 191; Plouffe et al., 2001: 214; Ramadhiana et al., 2021: 4). According to the literature, the following hypotheses have been formed.

H8: *Perceived Compatibility (PC) affects Perceived Usefulness.*

H9: *Perceived Compatibility (PC) affects Perceived Ease of Use.*

As seen in Table 1, it is seen that the research conducted for adopting new technologies within the framework of TAM is specific to applications and devices developed with the development of technological devices. While continuing its technological development, it is observed that most transactions previously performed in the physical environment are transferred to online environments.

In studies by Salloum et al. (2019), Sukendro et al. (2020) and Rafique et al. (2020), it is seen that education and learning are related to the transfer of teaching and learning to the digital environment with the spread of technology devices. In the studies of Min et al. (2019), Ramadhiana et al. (2021) and Kong et al. (2021), there are studies on the acceptance of mobile applications. Learning the factors that affect people's use of mobile applications will provide a healthier service with the improvements to be made. Toraman (2022b) measured people's perceptions, attitudes and intentions towards metaverse technology. It has been concluded that Metaverse can be a self-sufficient ecosystem in the future. Manis et al. (2019); Linares et al. (2001); Sagnier et al. (2021); Fussell and Truong's studies, on the other hand, try the upper levels according to the time of technological developments. The studies examine the acceptance of technologies that enable people to be in different places without leaving their environment. Considering the studies in general, hypotheses that give successful results in some studies do not provide the same results in others. The reason for this can be seen as the sample difference and the fact that people have different behaviours.

Table: 1
Literature Review of Technology Acceptance Model (TAM)

Year	Author (s)	Sector	Hypothesis	Relation	Model
2010	Chandra et al.	New Technology Acceptance: Mobile Payment System	TR→PU	Not Supported	
			TR→PEOU	Supported	
			PEOU→I	Not Supported	
			PU→I	Supported	
			PEOU→PU	Supported	
2019	Salloum et al.	New Technology Acceptance: E-Learning	PEOU→PU	Supported	
			PU→I	Supported	
			PEOU→I	Supported	
			AT→I	Supported	
			I→AU	Supported	
2019	Min et al.	New Technology Acceptance: Uber Mobile Application	C→PU	Supported	
			C→PEOU	Supported	
			PU→AT	Supported	
			PEOU→AT	Supported	
			AT→I	Supported	
2019	Manis et al.	New Technology Acceptance: The Virtual Reality Hardware (VR)	AT→I	Supported	
			PU→I	Supported	
			PU→AT	Supported	
			PEOU→PU	Supported	
2020	Sagnier et al.	New Technology Acceptance: Virtual Reality	PU→I	Supported	
			PEOU→I	Not Supported	
			PEOU→PU	Not Supported	
2020	Sukendro et al.	New Technology Acceptance: E-Learning	PEOU→PU	Supported	Technology Acceptance Model (TAM) and Diffusion of Innovation Theory (DIT)
			PU→AT	Not Supported	
			PEOU→AT	Supported	
			AT→I	Supported	
			PU→I	Supported	
2020	Rafique et al.	New Technology Acceptance: Mobil Library	PEOU→PU	Supported	
			PU→I	Supported	
			PEOU→I	Supported	
2021	Kong et al.	New Technology Acceptance: Mobile Social Media	PEOU→PU	Supported	
			PU→AT	Supported	
			PEOU→AT	Supported	
			AT→I	Supported	
			PU→I	Not Supported	
			PEOU→I	Supported	
2021	Ramadhiana et al.	New Technology Acceptance: Virtual Hotel Operator Applications	PC→PU	Supported	
			PC→PEOU	Supported	
			PU→I	Supported	
			PEOU→I	Supported	
2022	Fussell, S.G. & Truong, D.	New Technology Acceptance: Virtual reality	PEOU→PU	Supported	
			PU→AT	Supported	
			PEOU→AT	Supported	
			PBC→I	Supported	
2021	Linares et al.	New Technology Acceptance: Online Games	PE→FE	Supported	
			PE→CI	Supported	
			PEOU→PE	Supported	
2022	Toraman Y.	Metaverse E-Commerce	PU→I	Supported	
			PEOU→PU	Supported	
			AT→I	Supported	

PU: Perceived Usefulness, PE: Perceived Enjoyment C: Compatibility, PEOU: Perceived Ease of Use, AT: Attitude, I: Intention, AU: Actual Use,
PBC: Perceived Behavioural Control, TR: Trust, E: Enjoyment, FE: Flow Experience, CI: Continuance Intention.

9. Analysis

Firstly, reliability analysis has been conducted for the research. The most commonly used methods for the reliability analysis are 'Factor Loading', 'Cronbach's Alpha', 'Composite Reliability', and 'Average Variance Extracted'.

According to Geçit and Taskin (2020), Cronbach's Alpha values are the most widely used reliability tests. Reliability is that a scale does not contain random errors (Yükselen,

2017: 117). Cronbach's Alpha is the most classically accepted measure of reliability. In contrast, build reliability tends to overestimate internal consistency reliability, thus leading to relatively higher reliability estimates. Accordingly, it is reasonable to consider both criteria and interpret their results (Hair et al., 2016: 137). AVE is defined as the sizeable average value of the square loads of the structure-related indicators. In other words, it is the sum of the square loads divided by the number of indicators (Hair et al., 2016: 138). In analysis, Cronbach's Alpha, Structural Reliability, and AVE values should be higher than 0.700 (Hair et al., 2016: 136).

The scale used for this article includes variables of enjoyment, perceived compatibility, trust, perceived ease of use, perceived usefulness and intention. This scale has been adopted by Venkatesh (2000); Holsapple and Wu (2007). Factor analysis of the questions related to these items is given in Table 2:

Table: 2
Factor Analysis

Items	Questions	Factor Loading
E1	It would be fun to use a virtual reality device.	0.890
E2	I will not be bored while using a virtual reality device.	0.939
E3	Virtual reality devices will make my leisure time more fun.	-
PC1	Using metaverse fits well with my lifestyle.	0.927
PC2	Using metaverse fits well with how I purchase products and services.	0.918
PC3	I would appreciate using metaverse instead of alternative models of payment.	0.899
T1	I trust metaverse systems to be reliable.	0.907
T2	I trust metaverse systems to be secure.	-
T3	I believe metaverse systems are trustworthy.	--
T4	I trust metaverse systems.	0.917
T5	Even if the metaverse systems are not monitored, I will trust them to do the job correctly.	0.894
PU1	Using metaverse systems would enable me to accomplish financial tasks and payments quickly.	0.950
PU2	Using metaverse systems would improve my performance in making payments.	0.952
PU3	Using metaverse systems would enhance my effectiveness in making payments.	-
PU4	Using metaverse systems would make it easier for me to manage and make payments.	0.932
PEOU1	Learning to use metaverse systems would be easy for me.	0.922
PEOU2	Getting the metaverse system to do what I want it to do would be easy.	0.950
PEOU3	My interaction with the metaverse system would be clear and understandable.	-
PEOU4	It would be easy for me to become skilful at using the metaverse system.	0.908
I1	I am likely to use metaverse in the near future.	0.963
I2	I am willing to use metaverse in the near future.	-
I3	I intend to use metaverse when the opportunity arises.	0.960

I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

All items have strong factor loading values, as seen from the factor analysis. After conducting a factor analysis for the scale, a reliability analysis was conducted to find out the reliability of the scale. The reliability analysis table is given in Table 3.

Table: 3
Reliability Analysis

Items	Factor Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
E1	0.890	0.808	0.911	0.836
E2	0.939			
PC1	0.927	0.903	0.906	0837
PC2	0.918			
PC3	0.899			
T1	0.907	0.891	0.900	0.821
T4	0.917			
T5	0.894			
PU1	0.950	0.940	0.943	0.893
PU2	0.952			
PU4	0.932			
PEOU1	0.922	0.918	0.922	0.860
PEOU2	0.950			
PEOU4	0.908			
I1	0.963	0.918	0.919	0.924
I2	0.960			

I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

It is expected for all values to be higher than 0,700, and according to the Table, all values from the items are higher than 0,800. Most of them are even higher than 0,900. This proves that the model has strong reliability.

When the Multicollinearity and Variance Inflation Factors (VIF) values of the research are examined, the VIF value of the perceived usefulness (PU2) variable is 4.860. Since VIF values between 1 and 5 are accepted in the literature, the value of PU2 is acceptable. When the sub-dimensions of the model are examined, the values are between 1.849 and 4.384. T1, T2, E3, PU3, PEOU3, and I3 sub-dimensions were excluded from the model due to the multi-connection problem (Daoud, 2017: 3).

Figure: 2
Path Analysis of Research
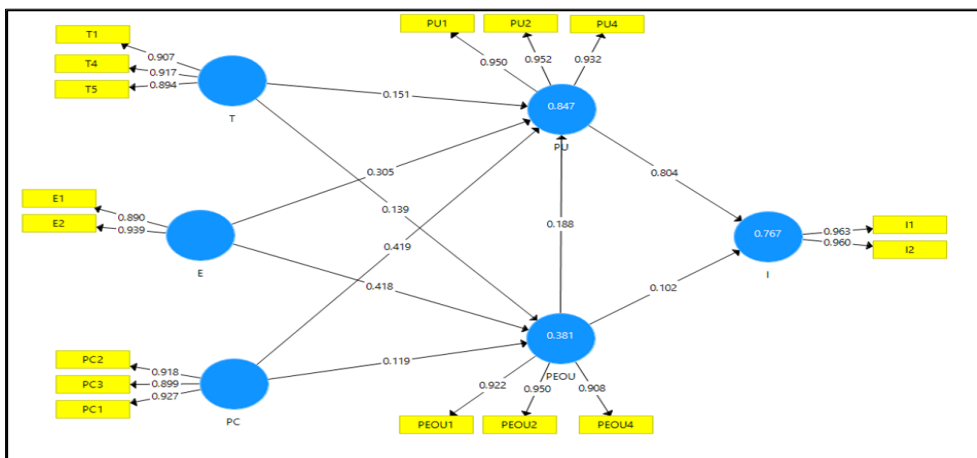
I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

Figure 2 shows the model of the research. All the research applications have been conducted accordingly to the above-shown figure. The arrows near the variables indicate factor loadings, and as seen from the figure, all factors related to the variables have a high factor loading ranging from 0,894 to 0,963.

The arrows between variables show path coefficients between variables. As seen in Figure 1, all the variables have a positive path coefficient, which means accepted variables have a positive effect.

Table: 4
Outputs of Structural Model

Hypothesis	Relation	Path Coefficient	t value	p-value	<0,05 Hypothesis supported?
H1	E→PU	0.305	4.257	0.000	Supported
H2	E→PEOU	0.418	3.132	0.002	Supported
H3	PC→PU	0.419	4.272	0.000	Supported
H4	PC→PEOU	0.119	0.570	0.569	Not Supported
H5	T→PU	0.151	2.117	0.034	Supported
H6	T→PEOU	0.139	0.858	0.391	Not Supported
H7	PEOU→PU	0.188	2.550	0.011	Not Supported
H8	PEOU→I	0.102	1.222	0.222	Supported
H9	PU→I	0.804	11.778	0.000	Supported

Significant in the p<0.05 value range. I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

Table 4 shows the results of the hypothesis from H1 to H9. Accordingly, the H1, H2, H3, H5, H7 and H9 hypotheses have been accepted since the p values of these hypotheses are lower than the desired value of 0,05. H4, H6, and H8 hypotheses are rejected since these hypotheses have a p-value higher than 0,05. Even though these three hypotheses have been denied, they will still be analysed on indirect and total effects since this study includes the mediator effect.

Table: 5
Indirect Effects

Relation	t value	p-value
PEOU→PU→I	2.463	0.014

Significant in the p<0.05 value range. I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use.

Table 5 indicates the indirect effect, as the study has a mediation effect. Thus, the PEOU variable has been the independent variable, PU has been the mediator variable, and then I variable has been the dependent variable. The p-value is lower than the value of 0,05, and the PEUO → I effect has been rejected. As PEOU → I has been rejected and PEOU → PU → I effect has been accepted, it can be said that the mediation effect has been accepted.

Table: 6
Total Effects

Relation	t value	p-value
E→I	4.930	0.000
PC→I	4.202	0.000
T→I	2.255	0.024

I: Intention, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

In the research analysis, hypotheses seen on the total effects table were not included. The effect of the independent variables of the research model on the intention is shown in the table above.

Table: 7
R^2 Values of Variables

Items	R^2	$Radj^2$
PU	0.847	0.838
PEOU	0.381	0.354
I	0.767	0.760

I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use.

In academic studies related to consumer behaviour, R^2 values higher than 0,200 are acceptable (Hair et al., 2011: 147). According to the analysis, all R^2 values are significantly higher than the value of 0,200, ranging from 0,354 to 0,847.

10. Discussion

The development of technology causes both devices and internet connections to be better, to increase the transaction performance of people and indirectly to increase the time spent in the digital environment.

Blockchain-based crypto money systems, NFT, and Metaverse are increasing the number of users daily and are becoming areas where people are more interested. On Metaverse systems, H&M, Samsung, Adidas, GUCCI, J.P. Morgan, etc., it is seen that brands participate in new marketplace creation activities (J.P. Morgan, 2022).

The research analyses the perception, attitude, and usage intention of potential users towards the system while carrying out company operations to transfer electronic commerce activities to Metaverse systems.

Technology Acceptance Model (TAM), frequently used in the literature, was used in research on the acceptance of new technologies. Determining the perceptions of potential users towards the Metaverse system will support the construction of a more stable Metaverse system with the necessary regulations in the future.

When the hypotheses tests of the research were examined, the H4, H6 and H8 hypotheses were rejected, and other hypotheses were accepted. Hypotheses H4 and H6 were obtained from the analysis results, which were not related to the ease of use of the Metaverse system of perceived compatibility and trust. Still, they were related to the benefit that people obtained from the system. The H8 hypothesis, on the other hand, did not have a direct effect, as perceived ease of use had an indirect relationship with intention. The participants' opinions about the ease of use affect the benefit they will get from the system and indirectly affect their choices.

The fact that the users perceive the Metaverse system as a game makes the enjoyment variable important. For people to spend more time in a 3-dimensional world, the system must provide people to have a good time. It is seen that the fun of metaverse systems directly affects people's perceived usefulness and intentions to use them. In this context, the acceptance of the H1 and H2 hypotheses is among the important results of the research. The fact that shopping processes have become a 3-dimensional travel entertainment shows that the past e-commerce habits of the buildings have partially evolved (Alalwan et al., 2018: 105).

The compatibility that users perceive from metaverse systems is also very important. The use of systems people see as compatible with them is positively affected. In particular, results have been parallel to the literature obtained in the research. The positive effect of perceived compatibility on the perceived usefulness of the individual is among the essential results of the study. On the other hand, when the total outcomes are examined, the perceived compatibility also affects the intention emphasising the necessity of showing parallelism to the past habits of the people of the metaverse systems in the future. (Ramadhiana et al., 2021: 2-5). As a result, since people are already carrying out their e-commerce activities in digital environments, it is concluded that they can shop from the retailer of the same brand in the metaverse system.

People prefer to interact in systems they trust. For this reason, with the development of technology, the change of e-commerce marketplaces and the acceptance of use are closely related to the system's reliability. As can be seen in the H5 hypotheses, users' finding the system safe has a direct effect on their perceived usefulness. On the other hand, as seen in the total effects table, it also affects intention. Having a safe environment where people can shop while spending time is crucial (Alalwan et al., 2018: 105; Al-Sharafi et al., 2016).

As emphasised above, it is seen that the independent variables in the research model, Perceived Compatibility, enjoyment, and trust metaverse systems, are important factors for people to buy their products and services from brands and businesses.

The fact that R^2 and R_{adj}^2 values are higher than 0.70 in the research shows that it has a substantial explanation percentage (Agustina, 2019: 280-284). Therefore, it is possible to say that the independent variables included in the research model are sufficient. However, expanding the research with different variables will positively contribute to the literature.

11. Conclusion

Technological developments have made it necessary to move traditional market areas to digital environments. While the products were sold through the websites, the product sales, the follow-up of the product delivery processes, and post-delivery customer support services were carried out in digital environments. In this context, e-commerce, which first entered human life with websites, was carried out through new channels such as social media platforms and mobile applications. Today, there is a shift towards metaverse systems using

blockchain technology in their infrastructure. Primarily due to the COVID-19 pandemic, even people's daily shopping is carried out through e-commerce platforms as more and more people are switching from classical commerce towards e-commerce with the increase of digitalisation and the tendency changes that occurred with the Covid-19 pandemic.

Many brands have started e-commerce activities in metaverse systems, indicating that the system is deemed suitable for investment. For example, with an agreement with the clothing giant Gucci Superplastic, the partnership in Super Gucci NFT works has been taken. Three special NFT series will be created and sold under the Super Gucci brand (Supergucci, 2022). NFTs to be issued by Adidas will be another example of this issue (J.P. Morgan, 2022). From this point of view, many companies in the future will increase their activities in the digital environment and want to increase their market share. With new technologies introduced and adapted by the households, different innovation adaptation models similar to the TAM may be used.

Due to the use of blockchain technology in the Metaverse infrastructure, cryptocurrencies have a relationship with cold and hot wallets. Specific to Turkey, the Central Bank of the Republic of Turkey (CBRT) announced that Digital Turkish Lira (DTL) will be tested in 2023, which will contribute positively to the active use of Metaverse technology in the future. In this context, with the introduction of DTL in the future, the Turkish Lira can be used in the Metaverse system. This situation will enable the spread out of Metaverse (Toraman, 2022a, 373).

12. Limitations

The most significant limitation of this study has been the number of respondents. As mentioned in the 'Methodology' section, people need to be more highly adapted to Metaverse and NFT as of early 2022. This adaptation would probably increase in the future, but as one of the earlier studies related to these terms, the sample size has been negligible.

Another sampling method, such as snowball sampling, could have been used. However, knowledge of system users and the total number of system users are relatively low; a sampling method like snowball would not be practical for now. This method can be significantly used with the increasing number of adaptations towards these systems in the future.

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Inflation and Cold Progression: An Analysis of Turkish Income Tax between 2006-2021

Gamze Yıldız ŞEREN *(https://orcid.org/0000-0002-5063-1172), Tekirdağ Namık Kemal University, Türkiye; gyseren@nku.edu.tr*

Özgür SARAÇ *(https://orcid.org/0000-0001-8029-6646), Dokuz Eylül University, Türkiye; ozgur.sarac@deu.edu.tr*

Enflasyon ve Soğuk Artan Oranlılık: 2006-2021 Dönemi İçin Türk Gelir Vergisi Üzerine Bir İnceleme

Abstract

Inflation causes high taxation -although real income does not increase- because the income tax base targets nominal income. This situation results in taxation as if the ability to pay has increased, although it has not. Compensation for this deflecting effect of inflation in the income tax tariff requires growing the income segments included in the tariff at the rate of inflation regularly experienced yearly. However, the current need for public revenue can cause governments to make regulations in favour of the administration and against taxpayers -almost by creating an undervaluation- while providing this requirement. It is called "cold progression" in the literature. In this study, which draws attention to the distortions caused by inflation in the tax system, the evidence obtained shows the existence of cold progression.

Keywords : Inflation, Personal Income Tax, Cold Progression, Inflation Tax.

JEL Classification Codes : H2, H24, E31.

Öz

Enflasyon, gelir vergisi matrahının nominal geliri hedef almasından dolayı -reel gelir artmasa da- yüksek orandan vergilemeye sebep olur ve bu, aslında ödeme gücü artmadığı halde artmış gibi vergilendirilmesi sonucunu doğurur. Enflasyonun gelir vergisi tarifesinde meydana getirdiği bu saptırıcı etkinin telafisi, tarifede yer alan gelir dilimlerinin her yıl düzenli olarak yaşanan enflasyon oranında arttırılmasını gerektirir. Lakin var olan kamusal gelir ihtiyacı, hükümetlerin bu gerekliliği sağlarken -adeta eksik değerleme yaparak- idare lehine ve mükellefler aleyhine olacak şekilde düzenleme yapmalarına sebep olabilir ki, literatürde buna "soğuk artan oranlılık" adı verilir. Enflasyonun vergi sisteminde yol açtığı bozulmalara dikkat çeken bu çalışmada elde edilen kanıtlar soğuk artan oranlılığın varlığını göstermektedir.

Anahtar Sözcükler : Enflasyon, Kişisel Gelir Vergisi, Soğuk Artan Oranlılık, Enflasyon Vergisi.

1. Introduction

The effects of inflation are divided into payment and declaration effects. The payment effect shows which categories bear the burden of the revenues provided to the government due to inflation, and the declaration effect indicates what kind of changes taxpayers will make in their preferences, considering that inflation will continue (Bulutoğlu, 1962: 247). Accordingly, household members filling the gas tank of their vehicles, storing food in their refrigerators, stocking canned food and pasta in their cellars, and buying one or two-sizes larger shoes and clothes for their young children are examples of the declaration effect of inflation. The main reason behind such behaviour, which means forwarding of consumption, is the expectation that the purchasing power, which has decreased with inflation, will also decrease further in the future. The resource that makes this behaviour, which gives protection against inflation for a while, possible, is their budget. The protection afforded by those with large budgets, namely those with higher incomes, is more significant in volume and prolonged in duration. The ones with low and fixed incomes have limited opportunities, like their budgets, to protect themselves from inflation by engaging in such behaviours.

The income effect of inflation occurs when inflation decreases the real income of those whose incomes increase slower and less than prices, while there is an increase for those whose incomes rise faster and more. Accordingly, with the assumption that the per capita income is constant during the period, inflation provides an implicit income transfer from the first group to the second one. This transfer of real income also applies to those whose assets increase less than current prices and those whose assets increase more (Bulutoğlu, 1962: 248). The income effect of inflation is also valid for debt relationships and taxation, which is the forced version of this relationship. Thus, inflation is satisfactory for the borrower party in debt contracts settled in national currency. Because of the burden of real interest, which will be paid due to inflation, it lightened. This effect is also valid for reducing the tax burden on taxpayers. On the opposite side, inflation reduces the real value of the state's tax revenue, called the Olivera-Tanzi Effect in the literature. However, since inflation affects all kinds of monetary values in the tax system, it also has consequences for taxpayers. One of these outcomes is cold progression, which is likely to be realised because of the progressive tax tariffs. To give an idea at the start, cold progression can be expressed as "*the government update the income brackets in the progressive tariff in an inflationary environment by making an undervaluation for the next period and thus exposing the increased nominal income to the upper bracket tax rates*".

This study, which focuses on determining the scope of cold progression and investigating its existence for the Turkish Income Tax, consists of five chapters apart from the introduction and conclusion. The literature is given in the first chapter. In the second chapter, the challenges caused by inflation in terms of taxation are revealed, and these are elaborated on the destructions in tax systems and deviations from ideal taxation. In the third chapter, progressive taxation is briefly analysed in terms of taxation techniques, and its advantages for fair taxation are emphasised. In the fourth chapter, cold progression, the subject of our study, is defined and demonstrated through solid examples. Its relationship

with the automatic stabilisation feature of the progressive tariff is established. In the fifth chapter, the cold progression that has been caused is revealed. The implicit real income transfer that it causes - in other words, the deviations from tax justice - is presented concretely by making a recent period analysis of the Turkish Income Tax tariff for fifteen years in two different categories: between 2006-18 and between 2019-21. The study ends with the conclusion part, in which possible solutions are discussed to compensate for the deviations derived from the cold progression.

2. Literature

Studies on cold progression are very limited in the literature. The studies within this context that are conducted for the USA, Austria and Germany are as follows: Heer and Süssmuth (2003), who examined the effects of cold progression on income distribution in the US economy, primarily focused on the impact of income tax brackets and found the development of high inflation on income distribution to be smaller with the model they have developed. However, they found that the long duration of adjustments in income tax tariffs significantly reduces production, employment and savings. Kucsera and Lorenz (2016) examined the effects of cold progression in Austria between 2016-21. They found an additional tax burden of 1,356 Euros occurred for five years due to the hidden tax increase. To avoid the effects of cold proportionality, they suggested changing the tax bracket thresholds and automatically determining tax rates in line with annual inflation in case inflation reaches a certain percentage. Gottfried and Witczak (2008) estimated the total income from income tax for 2010-12 with the microsimulation model in their study on cold progression in Germany. According to that, because of the annual growth of 1.97% and the cold progression, approximately 9 billion Euros of tax revenue will be gained from 2010-12. The taxpayers who are affected by cold progression are particularly low-income taxpayers. Despite that, taxpayers with high/very high taxable income are not affected by the course of cold progression. Tax rates are the reason for this unequal situation in question.

Although there is no specific study directly under the name of cold progression in Turkey, studies discuss the relationship between inflation and income tax in various dimensions. For example, Akbulut (2021) examined the effects of interest, inflation and income tax on income distribution in Turkey. Accordingly, it has been concluded that inflation and interest negatively affect fair income distribution. Şanver and Saygı (2019) analysed the income tax tariff regarding fiscal drag between 2009-19 in Turkey. According to the study, the income tax tariff steps should be adjusted yearly to avoid the fiscal drag effect. Öztürk et al. (2019) examined the impact of economic variables on tax revenues and handed the period between 1980-2017 in their study. According to that, inflation affects tax revenues negatively in Turkey. Şahan (2005) examined the effects of inflation on the income tax tariff between 1980-2004 in Turkey. Three main findings were achieved in the study. Accordingly, inflation destroys the income tax, increases the taxpayer's income tax assessment and causes deviations in the objectives of the tax system.

Looking at the literature, it can be stated that the calculation of cold progression in Turkey is neglected. The cold progression between 2006-21 is calculated in this study. This study will try to show that inflation will prevent or even annihilate an effective tax system through cold progression. The primary motivation of the study is to show that if the necessary tariff updates are not made, the income tax will not have effective results in the face of cyclical phenomena such as inflation. The study is expected to contribute to the literature in the context of re-discussing problematic tax practices in terms of tax justice.

3. Challenges of Inflation on Taxation

Inflation, one of the most familiar concepts in an economy, is a phenomenon that confronts economies with long periods of instability. Although inflation is generally defined as the rate of continuous increase in prices in a certain period, it can also be considered a large scale that occurs in fees or living costs. No matter in which context it is being discussed, inflation represents how expensive the relevant goods and services have become for a certain period (Oner, 2010: 44). Inflation means the increase in the general level of prices in a certain period affects all kinds of *quantity variables* determined in national currency in terms of devaluation. For example, it is highly wrong to announce GDP increases as the *"growth rate"* without removing the effect of inflation since growth shall be real. The same is also valid for wages. Accordingly, transferring the wage amount to the next period by increasing the wage in the amount of the inflation rate raises it but does not increase the purchasing power. Again, inflation devalues quantity variables. Since taxation is a technical field, it is essential to have many quantity variables in tax systems. Exception limits, deduction amounts, exemption limits, minimum living levels, administrative penalty amounts, and tax tariffs can be examples of quantitative variables in the tax system. Inflation requires constant updates of such quantity variables in the system. Otherwise, the tax system will be out of date.

3.1. Deviations from Ideal Taxation Due to Inflation

Taxes, which governments use as the primary means of financing increased public expenditure, should have a set of principles. These are fairness, efficiency, impartiality, certainty, simplicity and flexibility (OECD, 2014: 30-31). In addition, equality before the law, utility, generality, general response, non-retroactivity, economy, and consistency, prohibition of comparison, interference, proportionality, simplicity, allocation and conformity are among such principles (Saraç & Eroğlu, 2021: 7). Inflation has deviating effects on ideal taxation. These effects appear in the form of destruction in terms of taxation principles. It is possible to summarise them as follows:

Fairness: It is one of the principles that inflation primarily harms. To achieve tax justice, techniques such as exemption, exclusion, minimum living allowance, progressiveness, and rate differentiation are used. The goal is to reveal the taxpayers' ability to pay. Inflation intensifies progressivity and increases the real tax burden (Öncel, 1995: 493). Adoption of the progressive tariff in taxation ensures that the

taxpayer with higher paying ability pays more tax proportionally than the taxpayer with less ability to pay (Sağbaş & Saruç, 2020: 97). However, as a result of tax bracket drag that occurs in the presence of inflation causes the taxpayer's purchasing power does not increase, but the taxpayer enters a higher income bracket, and the increasing proportionality, which is desired to serve justice, has the opposite results.

Certainty: This principle, which emphasises the inevitability of taxes, reveals the necessity of the absence of arbitrariness in taxation. Since inflation creates monetary and real value differences, it creates uncertainty in taxation. It makes it difficult for taxpayers to predict their tax payments (Öncel et al., 1992: 47). The dominance of uncertainty in taxation paves the way for injustice or, even if there is none, creates an acceleration in this direction. The thought that there is no justice and trust disturb taxpayers and increases their reaction to taxes. Thus, the management of the system becomes difficult (Sarac & Eroğlu, 2021: 25).

Flexibility: The principle of flexibility, which emphasises the ability of taxes to follow changes in the ability to pay, suffers in an inflationist environment. Since inflation causes increases in monetary income, it grinds all kinds of quantity variables in the tax system. For example, monetary income increases may cause the exception limit to be exceeded. This causes taxpayers to be treated as if their ability to pay has increased, even though it has not. Inflation can give opposite results to the flexibility principle by taxing taxpayers who do not have an increased ability to pay due to the high-income elasticity of the progressive tariff.

Economy: The principle of economy, which is about collecting taxes with the least possible expense, suffers from inflation. Because in an inflationary environment, it becomes difficult for taxpayers and the administration to adapt to the tax system. Inflation makes the operation of the tax system costly. The system has to be constantly revised due to inflation. The inflationary environment increases the costs incurred by both the administration and taxpayers.

Consistency: The principle of consistency, which emphasises the importance of not changing tax regulations too often, has to be suspended in an inflationary environment. Because all amount variables in the tax system, which are worn out due to inflation, need to be updated. In countries with chronic inflation, the frequency of such adjustments may occur several times a year. Governments that take inflation for granted may make fewer adjustments with the concept called revaluation rate. However, it should be monitored whether this ratio is applied as much as it should be in this case. Inflation, which deviates from the principle of consistency in taxation in this aspect, makes the system's operation expensive and makes it difficult for taxpayers to comply with the tax.

Simplicity: The principle of simplicity, which means clarity in taxation, is perhaps the most easily accepted by inflation. Because the tax authority should eliminate the erosion caused by inflation in quantity variables, this can be done with continuous adjustments. Still, it deviates from the principle of stability, as stated. Techniques such as inflation accounting demanded by taxpayers in countries experiencing

chronic inflation, although necessary for tax justice, further increase the violations of simplicity experienced due to inflation and increase the audit costs of the system.

Impartiality: The principle of impartiality, which means that taxes do not have a diversion effect on taxpayer behaviour, naturally wears out as inflation is a kind of deviation. The damage to the tax bases due to inflation may disrupt the savings and investment decisions of taxpayers who have to pay high taxes (Poterba & Rotemberg, 1990: 1). The system's loss of impartiality results in increased taxpayer reactions and tax non-compliance. After all, the impartiality of the tax system is one of the most important values that the liberal rhetoric adopts, making it their motto.

Efficiency: The value of the revenue obtained decreases due to delays in the taxation process due to inflation (Saraç & Eroğlu, 2021: 37). Inflation destroys the fiscal purpose of taxes and pushes the government to seek new sources of income constantly.

The damage caused by inflation to taxation principles and the deviations from the ideal taxation it creates reveals the necessity of fighting against inflation since the principles cannot be shaped and stretched according to the conjuncture. Taxes are already a tool in the fight against inflation. Successful tax policies followed by governments can provide solutions to inflation. On the other hand, the government's attitude towards accepting inflation and short-term solutions for the bypass may cause an escalation of problems. Since inflation destroys many taxation principles, it is impossible to establish *an ideal tax system* despite inflation. However, the research question of this study is to discuss the tax damages caused by inflation in the context of cold progression. For this reason, discussions on eliminating the damage caused by inflation with tools such as inflation accounting have not been discussed within this scope.

3.2. The Destruction Inflation Creates in the Tax System

A continuous and high inflation rate causes severe adverse effects on the economy. When viewed from the interaction processes' perspective, these destructive effects transition from micro decision level to macro imbalances. The interest of analysis and research is mainly on the relationship between inflation and macro balances. After all, inflation is a macro-level phenomenon by definition and nature (Berksoy, 1996: 1). taxes are the indicator of inflation, which impacts many macroeconomic indicators, and that is the focus of this study. Calculating tax as a fraction of nominal variables causes inflation to increase effective tax rates. The relationship between the nominally defined tax system and inflation ultimately disrupts the vertical justice of the tax burden and causes unfair distribution (Immervoll, 2000: 2-5). In many countries, tax systems still need to be fully integrated into inflation. However, the possible effects of inflation on the tax system must be considered for healthy public finance. The best way is to keep inflation under control; since this will not always be possible, adjusting tax systems according to inflation is indispensable (Thuronyi, 1996: 434).

Inflation can affect taxpayers through three different channels. These are listed as (i) effects on the calculating of taxable income, (ii) changes in real factor incomes, and (iii)

changes in the real value of all deductions, exemptions, and legally nominal tax provisions (Aaron, 1976: 193). These effects vary depending on whether the tax laws are designed for inflation. While tax laws are concerned with calculating received income, they may ignore income-generating factors (Aaron, 1976: 193). Inflation affects real tax burdens through channels such as tax liabilities and tax base (Immervoll, 2000: 2-3).

Since tax liabilities are nominal amounts, they are only one of the most apparent distortions in the tax burden. Especially from the perspective of income taxpayers, this situation arises from collection delays. Failure to fix this may lead to unequal tax practices. Another negative aspect arises regarding tax bases. Thus, an income tax base defined as nominal does not consider the changes in consumption potential due to the difference in the purchasing power of money that will occur due to inflation. Ignoring the effects of changes in the value of money on income will result in an unfair distribution of the tax burden. Failure to adjust the tax base to changes in value due to currency depreciation often leads to significant deviations in tax. Another critical issue is moving to higher tax brackets in progressive tariffs due to inflation. This situation, which varies according to the severity of inflation, needs to be fully understood by the public as it needs to be approved by the political process. So, the issue in question means an automatic tax increase. This situation is attractive for politicians as it is a suitable financing way for increased public expenditures (Immervoll, 2000: 3-4). Inflation may affect the amounts of exceptions and exemptions in the tax system and cause low incomes that should be excluded from taxation to be included in the tax scope. This development is against low-income groups and causes the tax burden to become heavier for this group because incomes exempt from tax before inflation may not benefit from the exemption as nominal income increases because of inflation (Pamak, 1978: 121).

Inflation also affects the relative returns of taxes, depending on the tax type. This effect varies according to the different elasticity of tax types to price increases. The flexibility in question is higher in income taxes than in consumption taxes. In this case, inflation tends to increase income tax. If the taxes are based on nominal values, the longer the time factor determines the tax base, the more effective the inflation will be. The long periods while calculating the tax base cause the effects of inflation to be more evident. Inflation, which lowers the real value of nominally fixed cuts and exemptions, narrows the real margin of tranche rates. Income increases only nominally, but this increase also increases real tax burdens (Nowotny, 1980: 1025-1029). The effects of inflation also differ in countries with longer delays in tax collection. Especially when inflation is high, the said effects become quite evident. Because in such a case, tax revenue is subject to erosion due to inflation. (Tanzi, 1977: 154).

4. Short Analysis of Progressivity in Taxes and Their Relationship with Inflation

As the tax base grows, the tax rate and burden do not remain constant but increase; this is called *progressivity*. In progressive taxes, everyone subject to these taxes pays the same rate corresponding to their income share. Progressive taxation is based on the idea of

proportional taxation, which is also called vertical justice. Accordingly, as income increases, the paid tax increases proportionally. Progressive taxation can also be defined broadly as a more equal distribution of post-tax income than pre-tax income (Pamak, 1978: 138; Piketty & Saez, 2007: 4-5). This means that someone who earns more pays taxes with a higher average than someone who makes less (IONOS, 2020). Progressivity, one of the means of providing social justice through tax justice, adopts the idea that the ability to pay taxes increases at a higher rate than income. Progressivity is being applied, especially in income and wealth taxes today. The reason for the application of progressivity in income tax is the fact that the importance that is being given to each additional income unit decreases as the income of the taxpayer increases (as the income increases, the marginal utility of income decreases) and thus the solvency increases at a higher rate as income increases. The reason for applying progressivity to the wealth taxes is that the wealth of the enormous wealth owners increases faster than the total capital stock with economic development. Progressivity also prevents wealth distribution inequalities from becoming excessive (Pamak, 1978: 138).

The progressive income tax allows more equitable income distribution, faster growth and less economic and financial volatility. By addressing these issues, Weller (2007) establishes a link between progressive taxes, high income, and fair income distribution[1]. Accordingly, since the tax base is more significant in countries with progressive taxes, it is possible to implement more comprehensive fiscal policies. Ensuring income equality leads to fair demand growth, on the other hand, provides an indirect relationship between progressive taxation and economic stability (Weller, 2007: 371). The progressive taxes that countries put into practice to ensure income equality may only sometimes provide income equality. Considering African countries, although higher progressive income taxes are applied for high-income groups, income inequalities in these countries are quite high. South Africa, the country with the highest (vertical) progressive income tax in the continent, has unequal income distribution. This is important as it shows that progressive taxation alone is insufficient to reduce income inequalities (Shahir & Figari, 2021: 1). After all, taxes regulate income redistribution, not its primary distribution.

Fair income distribution should be supported by primary means of distribution, such as employment opportunities and wage justice. Undoubtedly, the informal economy, tax evasion, and increasing inflation cause income inequalities in African countries. For example, despite an average inflation rate of 8.5% in Sub-Saharan Africa in 2018, the country still needs to implement a consistent indexation procedure for tax systems. The absence of inflation adjustments creates a high real tax burden or fiscal drag as a result of the increase in nominal incomes in the presence of a progressive tax tariff (Shahir & Figari, 2021: 1). In this context, non-indexing of the tax system leads to a hidden increase in tax

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[1] *A progressive tax system is not always successful in preventing inequalities in income distribution. Piketty and Saez (2007), in their study investigating the evolution of progressive taxation in the USA from 1960 to the present, find that the effect of progressive taxation on income distribution is gradually decreasing.*

rates, allowing governments to generate revenue without asking anyone explicitly (Musgrave, 1979: 702).

Fiscal drag occurs in the face of the structure of progressivity that can prevent income distribution inequalities due to inflation is an undesirable result of progressivity in the sense of equality. This can also be described as a progressive income tax, in which tax rates are calculated according to nominal income, pushing the taxpayer to higher tax brackets even though there is no increase in the taxpayer's real income due to inflation. In the absence of compensating legislation, taxpayers make more real payments. The narrowness of the income brackets further increases this negativity (Muresianu & Harrison, 2021; Nowotny, 1980: 1026-1027). Because the income bracket structure of a progressive income tax and the real value of tax cuts, if any, are affected by inflation. The real value of many deductions in the income tax system decreases due to inflation (Nowotny, 1980: 1026-1027). Therefore, although a progressive income tax, which is superior in providing tax justice, is not updated according to inflation, the opposite results may occur. At this point, the *automatic stabilisation* ability of progressive income tax gains the feature of being a preferable alternative to tax justice by governments.

For governments seeking stability in aggregate demand, there are two paths. These are (i) discretionary fiscal policies and (ii) automatic stabilisers. In discretionary fiscal policies, governments can increase or decrease public expenditures and/or taxes. The intricate and cumbersome nature of the political decision-making process, its inelasticity, and the difficulties in predicting economic forecasts are the shortcomings of this method. These shortcomings are out of the question for the second option, automatic stabilisers. According to the conjuncture, automatic stabilisers provide desired changes in public expenditures and revenues without needing government action. The advantage of automatic stabilisers over discretionary fiscal policies is that they allow quick and timely action (Şen & Kaya, 2013: 303-304). Automatic stabilisers are rules embedded in the financial system that automatically make the necessary changes in public revenues and expenditures (McKay & Reis, 2016: 6). There are many tools with this feature, such as autonomous public expenditures, household and corporate savings, self-generated budget deficits, unemployment insurance (Musgrave & Miller, 1948: 122) in the system and progressive taxes are, in our opinion one of the most important ones, among these automatic stabilisers that help balance cyclical fluctuations (Weller, 2007: 370).

Automatic stabilisers are the subject of a more income tax-focused discussion. The reason for this lies in the great importance of income tax in terms of tax revenue and the higher tax rates applied as income increases, which means it is progressive (Şen & Kaya, 2013: 305). The progressive nature of the income tax allows it to be an automatic stabiliser without any additional decision or regulation in the existing system. Thus, taxation of the nominal income, which increases in the inflationary period, from the upper bracket in the progressive tariff increases the personal tax and decreases the disposable income. What this means in terms of fighting inflation is the decreasing aggregate demand. Let's explain with the help of a simple example:

Year t Income Tax Tariff		
1.000 liras		10%
2.000 liras	(100 liras) for 1.000 liras, for the exceed	20%
4.000 liras	(300 liras) for 2.000 liras, for the exceed	30%
4.000 liras and more	(900 liras) for 4.000 liras, for the exceed	40%
Tax of 5.000 liras	: 1.300 lira	
Disposable Income	: 3.700 lira	

Accordingly, let's assume that the general price level in year t is 100 and that the disposable income obtained over this level is 1,850 units of purchasing power (according to disposable income after tax) in exchange for 2 liras of good A. Then, let's assume that there is 100% inflation in the transition to year t+1, and let's calculate the income tax of 10,000 liras on the same tariff:

Year t+1 Income Tax Tariff		
1.000 liras		10%
2.000 liras	(100 liras) for 1.000 liras, for the exceed	20%
4.000 liras	(300 liras) for 2.000 liras, for the exceed	30%
4.000 liras and more	(900 liras) for 4.000 liras, for the exceed	40%
Tax of 10.000	: 3.300 liras	
Disposable Income	: 6.700 liras	

Since the inflation rate is 100%, this should be reflected in our example as doubling the tax paid and disposable income. But this has not happened. Let's go step by step. (i) The equivalent of TL 5,000 for year t is TL 10,000 for year t+1. So, (ii) the tax equivalent of 1,300 liras paid in year t in year t+1 should be doubled and become 2,600 liras. However, the tax paid is not 2,600, but 3,300 liras, that is, 700 liras more. (iii) This 700 liras loss can be found by tracking disposable income. Accordingly, the disposable income of the year t, which was 3,700 TL, should have doubled to 7,400 TL in the t+1 year, but this did not happen, and 700 TL decreased. (iv) The explanation for this decrease in terms of good A that the taxpayer can buy in t+1 is as follows: Since inflation is 100%, the price of good A doubled in t+1 and increased to 4 liras. Accordingly, the amount of good A that a disposable income of 6,700 lira can purchase is 1,675 units. As can be seen, the taxpayer can now purchase 1.675 good A instead of 1,850, which reveals the progressive tariff's automatic stabilisation feature when interpreted in terms of total demand. On the other hand, 175 A goods, which the taxpayer could not buy, since additional tax revenues with the ability of the progressive tariff. But the question to be asked here is the cost of this automatic stability provided. The answer is taxpayers lost in terms of disposable income, that is, purchasing power, and there is a deviation from justice in taxation. This is an important finding as it shows that automatic stabilisation takes place at the expense of deviating from justice.

5. Theoretical Frame of Cold Progression

Inflation erodes quantity variables in all tax laws. Since the tranches in the progressive tariff are quantity variables, inflation will also erode them. In such a case, they are expanding the brackets as much as the inflation rate should be done, which means updating them. Today, these updates are being made by a revaluation rate. Although the process is simple, it also has some problems. First, inflation must be determined correctly. Otherwise, deviations are inevitable. In addition, the taxation period and the period in which

inflation is determined must be the same. Undoubtedly, such updates increase taxpayer compliance costs and the explicit costs that the administration bears. Updating the tax brackets at an incomplete rate, which is contrary to what it should be, for example, revaluation of 80% while the inflation is 100%, as in the example in the third section, causes taxation of some, while not all, of the increased nominal income from the upper brackets. The deviation caused by this difference is called cold progression[2]. Cold progression is also referred to as income bracket drag and tax hook. The deviation caused by this difference is called cold progression.

Cold progression[3], also expressed as *cold* progressivity *or cold progress*[4], is the situation in which the base increases due to inflation in a country where a progressive income tax tariff is applied, and inflation occurs at high rates. This case causes the tax bases to be taxed from higher brackets (Sağbaş & Saruç, 2020: 103; IONOS, 2020). Cold progression can also be defined as *"the burden imposed on taxpayers by inflation as a result of the progressive nature of tax rates"* (Hänni, 2021: 257). Cold progression describes increases in tax burdens that do not consider inflation and are based on increases in nominal incomes (Manz, 2021).

Figure: 1
Stages and Emergence of Cold Ascending Progression
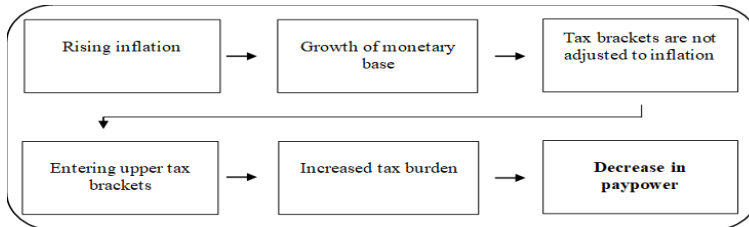
Cold progression is the fact that the monetary tax bases that have grown due to inflation are not expanded at the rate of inflation or are incompletely expanded due to the progressive tax tariffs, which bring extra taxation to taxpayers even though their ability to pay does not increase (IONOS, 2020). Therefore, we can define cold progression as an additional income tax burden based on progressive taxation. The most critical factor in the emergence of the said burden is that tax brackets are not adjusted according to the course of inflation, that is, undervaluation (CA18, 2021). Taxpayers being subject to an additional

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[2]   *In their report for Austria, Kucsera and Lorenz (2016) evaluate cold progression as an expression in the German language (Kalte Progression) and define it as follows: "Income bracket drag, a phenomenon known as "cold progression" in German. The Economist (2014) also makes a similar statement in some news it published on German taxes: "Tax bracket drag or what the Germans call "cold progression" is that salary increases only compensate for inflation, resulting in taxpayers being pushed into a higher tax base".*

[3]   *In the study, "cold progression" was preferred in order to achieve unity in the terminology.*

[4]   *The word "progress" here is defined in the OECD (2022) Dictionary of Tax Terms as the payment of an income tax at an increasing rate as income increases. Therefore, the opposite situation occurs in cold progression.*

burden without legal regulation strengthens executive power in using taxation authority. Also, governments receive additional taxes from taxpayers without making them feel this way because of financial anaesthesia.

Cold progression occurs when real incomes fall, but the government do not reduce its tax burden. Accordingly, monetary income increases, but real income decreases. That is, the nominal income increase is smaller than inflation. In case the tax brackets are not expanded or incompletely expanded according to inflation, the monetary income of the taxpayer falls into the upper tax brackets, and the personal tax burdens increase. Since the effect of this increase in disposable income is decreasing, the result is a decrease in the ability to pay. Cold progression is a kind of *hidden tax increase*. The reason for this is not the increase in prices but the increase in the monetary income of the taxpayer and the increase in the tax burden without being noticed as a result of the income increase (IONOS, 2020).

Tanzi, who contributed to the field of taxation with his original ideas, begins the preface of his book Inflation and Personal Income Tax, which he published in 1980, with the following sentence, quoting Andre Maurois: *"Inflation is the devil's work because it destroys facts, not appearances"*. According to Tanzi, *"inflation distorts tax systems and affects the relationship between the level of taxation and its incidence among taxpayers. But these distortions are often not obvious, and sometimes so subtle that unsophisticated observers and even highly sophisticated ones may be deceived into concluding that nothing has changed in reality"* (Tanzi, 1980). Cold progression creates the perception that nothing has changed, just like the determination here. Although it is not easy to detect at first glance, it is possible to reveal the increase in the tax burden on taxpayers with some calculations. Thus, the method to be followed becomes concrete through the following determination:

[Cold Progression = Inflation Rate > Rate of Increase in Tariff Brackets]

This given determination is the necessary condition for governments to establish cold progression. The difference between the current inflation rate and the increase rates applied to the tariff brackets is focused on in the analyses to be made, and the cold progression, if there is any, is tried to be revealed through a cumulative example.

6. Analysis of Turkish Income Tax Tariff

The study's hypothesis is: *There is a cold* progression *in Turkish Income Tax applications*. Cold progression needs to be addressed regarding periods, which have been chosen as (i) 2006-2018 and (ii) 2019-2021. In the first of these periods, the Income Tax tariff was applied at a rate of 15, 20, 27 and 35%, respectively. In the second period, the existing range was increased from 20% to 25% by applying the tariff at 15, 20, 27, 35 and

40%[5]. Annual changes in progressive taxation should be monitored to indicate the change in tax and disposable income against inflation and, if any, cold progression.

6.1. Methodology

In the study, a method in the form of a "*comparison of the annual inflation rates with the increase rates applied to the tariff brackets*" will be used. Since the income tax payment schedule is annual, the annual inflation published by TURKSTAT is used in the study. Accordingly, starting from 2006, a sample base amount (100,000 lira), which covers all tariff brackets, was selected. This amount was expanded by the inflation rate for each year and taxed according to the tariff that should be. Thus, cold progression is revealed if the applied tariff's tax amount is more than the actual tariff to be used.

The mathematical formulation of this method that is being used is as follows:

$$R_G^c = \sum_{t=1}^{n}(1 + \pi_t)\alpha_{1t}Y_{1t} + (1 + \pi_t)\alpha_{2t}Y_{2t} + (1 + \pi_t)\alpha_{3t}Y_{3t} + (1 + \pi_t)\alpha_{4t}Y_{4t} + (1 + \pi_t)\alpha_{5t}Y_{5t}$$

$$R_G^o = \sum_{t=1}^{n}(1 + \pi_t^o)\alpha_{1t}Y_{1t} + (1 + \pi_t^o)\alpha_{2t}Y_{2t} + (1 + \pi_t^o)\alpha_{3t}Y_{3t} + (1 + \pi_t^o)\alpha_{4t}Y_{4t} + (1 + \pi_t^o)\alpha_{5t}Y_{5t}$$

$$Y_5 = Y - (Y_1 + Y_2 + Y_3 + Y_4)$$

$$L = \sum_{t=1}^{n} R_{G_t}^o - R_{G_t}^c$$

The explicit names of the variables and parameters in the formula are as follows:

Y : Taxable Income

α : Tax Rates in Brackets

R : Provided Tax Revenues

R_G^c : Tax Revenues Calculated on Current Inflation

R_G^o : Tax Revenues Calculated on the Valuation Rate Used by the Government

π_t : Current Inflation Rate

π_t^o : Valuation Rate Used by the Government

L : Total Loss of Revenue from Cold Progression

6.2. Application

The Income Tax schedule for 2006, which we consider the base year, is as follows:

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[5]   *This change in the tariff structure has caused a four-bracket evaluation in the 2006-2018 period and a five-bracket evaluation in the 2019-2021 period in the mathematical equation given below. The given equation represents the five-bracket tariff, and it is sufficient to remove the fifth income bracket from the formula in order to reduce it to the four-bracket tariff.*

Income Tax Tariff (2006)		
7.000 liras		15%
18.000 liras	(1.050 liras) for 7.000 liras and for the exceed	20%
40.0000 liras	(3.250 liras) for 18.000 liras and for the exceed	27%
More than 40.000 liras	(9.190 liras) for 40.000 liras and for the exceed	35%
Tax of 100.000 liras	*: 30.190 liras*	
Disposable Income	*: 69.810 liras*	

The amount of Income Tax calculated based on 100,000 TL, which we have chosen as the study example, and the disposable income remaining after this tax is taken as given above. *The official CPI rate in 2006 was 0.0965*. The 100,000 liras base used in the example has been expanded with this ratio, and its real value has been preserved. The tariffs applied and to be involved in 2007 and the Income Tax and disposable income calculated over these tariffs are as follows:

The equivalent of 100,000 liras in 2006 was 109,650 liras in 2007.

Income Tax Tariff (2007) (Applied)		
7.500 liras		15%
19.000 liras	(1.125 liras) for 7.500 liras and for the exceed	20%
43.000 liras	(3.425 liras) 19.000 liras and for the exceed	27%
More than 43.000 liras	(9.005 liras) for 43.000 liras and for the exceed	35%
Tax of 109.650 liras	*: 33.232,5 liras*	
Disposable Income	*: 76.417,5 liras*	

While the CPI rate in 2006 was 0.0965, the official reassessment rate announced by the Government is 0.0780. Even keeping the reassessment rate lower than the inflation rate alone is evidence of cold progression. Besides, the valuation rates of the income brackets in the tariff are 0.0714 in the first bracket, 0.0555 in the second bracket, and 0.0750 in the third and fourth brackets, respectively. However, the tariff to be applied using the inflation rate and the Income Tax calculated according to this tariff, and the disposable income amounts are as follows:

Income Tax Tariff (2007) (Updated with CPI)		
7.675,5 liras		15%
19.737 liras	(1.151 liras) 7.675,5 liras and for the exceed	20%
43.860 liras	(3.563 liras) 19.737 liras and for the exceed	27%
More than 43.860 liras	(10.076 liras) 43.860 liras and for the exceed	35%
Tax of 109.650 liras	*: 33.102,5 liras*	
Disposable Income	*: 76.547,5 liras*	

The outcomes for 109,650 liras according to the tariffs applied and should be applied can be followed from the operations made on the bottom line of the tariffs. Accordingly, the conclusion that whether cold progression exists or not can be seen by the following calculation:

Indirectly Received Excess Tax: (33.232,5 - 33.102,5) = 130 liras
Loss of Disposable Income: (76.417,5 - 76.547,5) = - 130 liras
Outcome: Cold Progression Exists!

6.3. Consolidation of the Application

As can be seen, the hypothesis of "*There is a cold progression in Turkish Income Tax applications*", which constitutes the core of the study, has been confirmed through the comparison of tariffs applied to 2006 income, and tariffs should be applied[6]. The results obtained by using the developed method for the entire period are as follows:

Table: 1
The Course of Cold Progression in the Turkish Income Tax Tariff, 2006-2021

	CPI (%) (Annual Change)	Base (*)	Tax Calculated According to the Tariff in the Application	Tax Calculated to the Updated Tariff according to CPI	Loss of Disposable Income *(Cold Progression)*
2006	9,65	100.000	30.190,0	-	-
2007	8,39	109.650	33.232,5	33.102,5	130,0
2008	10,06	118.850	36.245,5	35.881,5	364,0
2009	6,53	130.806	39.807,0	39.491,0	316,0
2010	6,40	139.348	42.792,0	40.167,0	2.625,0
2011	10,45	148.266	45.573,0	44.762,0	811,0
2012	6,16	163.760	50.426,0	49.440,0	986,0
2013	7,40	173.848	53.692,0	52.486,0	1.206,0
2014	8,17	186.713	58.110,0	56.369,0	1.741,0
2015	8,81	201.968	62.779,0	60.974,0	1.805,0
2016	8,53	219.761	68.666,0	66.746,0	1.920,0
2017	11,92	238.507	75.127,0	72.114,0	3.013,0
2018	20,30	266.937	83.908,0	80.709,0	3.199,0
2019	11,84	321.125	100.854,0	97.096,0	3.758,0
2020	14,60	359.146	111.571,0	108.593,0	2.978,0
2021	36,08	411.581	128.743,0	124.447,0	4.296,0

(*) The base is updated cumulatively according to the CPI rate of the previous year.

The information obtained with the help of the table can be summarised as follows: (i) There is cold progression throughout the period under consideration. (ii) The degree of cold progression increased dramatically in 2010, eight times the previous year. (iii) The degree of cold progression experienced in 2006-2021 has generally increased, which means the trend has a positive slope. While the cold progression ratio to be taken as a base in 2006 was 0.130% from (130/100,000) to 0.130%, this ratio increased to (4,296/359,146) 1,196% in 2021 and increased 9,2 times in total. This result shows that in Turkey, more taxes are taken from personal income without being felt, and inflation is used as a tool by the Government to generate tax revenues. Another evaluation that the result gives an opportunity is that the progressivity that should serve fairness in taxation has been weakened in this direction.

7. Outcome

Turkey was also dragged into the chronic inflation process, as many developing countries were in the 1970s, and this has been the main problem in Turkey for about thirty years. Because of the stabilisation measures taken after the 2001 Crisis and the political stability achieved in the country, inflation was reduced to single digits for the first time in many years. After this severe disinflation period, inflation remained around 8% until 2017

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[6] For the Income Tax Tariffs applied in Turkey in the period of 2006-2021 and the Income Tax Tariffs updated according to the CPI, see, Appendix 1 and Appendix 2, respectively.

(except 10.08% in 2008 and 10.45% in 2011), but after this year, it increased to double figures. Inflation, which was 20.30% in 2018, decreased to 11.84% in 2019 but started to rise afterwards and reached an extraordinary level of 36.08% in 2021 with the effect of the pandemic.

In the theoretical discussions on the social state and tax justice, it is clear that the progressive rate is superior to the fixed rate[7]. However, the progressive rate can be disabled or weakened in presenting the expected effects of inflationary processes. It's the responsibility of governments that make it ineffective, not a progressive rate. The reason why governments take decisions in this direction is mostly due to increased income needs. Governments can easily disguise this to fight against inflation. At this point, it has been revealed from 2006 to 2021 regarding Turkish Income Tax, that the cold progression, which is the subject of this study, has eroded the advantages of the progressive tariff and created undesirable effects in terms of the income distribution.

Progressive income tax may abandon its expected justice function as inflation rises. Namely, an increase in inflation may increase the nominal income and expose the taxpayer to a progressively higher tax payment. High tax rates mean a high tax burden. The cold progression, which we have discussed by sticking to the use of German within the study, creates a kind of hidden tax on taxpayers whose purchasing power decrease but pays more taxes. As a result of cold progression, governments can increase their tax revenues while taxpayers' incomes increase in nominal terms, reducing their purchasing power. Cold progression has two basic dimensions in this context. One is political, and the other is social. Cold progression is a tool to fight against inflation in the political dimension. Accordingly, since it is difficult to notice what has been done about the decisions taken, it is unlikely that the cold progression will cause the governments to lose votes. In the social dimension, cold progression further distorts the income distribution and puts disadvantaged taxpayers in a much more disadvantageous position. This is worrisome as it results in even more inequitable distribution.

Income Tax generates approximately one-fifth of tax revenue in Turkey. The cold progression caused by the government imposes a more significant tax burden on the taxpayers of this tax as a whole. In addition, the relatively narrow Turkish income tax brackets cause taxpayers to be taxed from the upper-income brackets in the tariff. This mainly affects wage earners in an unfair position to a greater extent. For these reasons, finding solutions to the cold progression problem is essential because inflation will likely follow at much higher rates soon.

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[7]   *There will probably be objections to this determination by those who defend fixed tax. However, this study is not suitable for responding to objections due to the known page limits. The author/s will discuss with this aspect of the subject in a separate study.*

The suggestions that come to mind in the first determination of the solution to the cold progression problem are as follows:

- ***Abandoning the Use of Progressive Tariffs:*** In our opinion, this recommendation is *not to bandage the bleeding finger but to cut it*. Because as stated earlier, progressive tariffs are superior in making the redistribution of income more equitable. In terms of taxation technique, it is a practical solution to defend fixed income tax instead of a progressive tax. After all, since there are no upper-income brackets in the fixed rate tariff, there is no opportunity for governments to tax more effectively without being noticed. However, the fixed rate in question contradicts the social state principle. In our opinion, the problem should be solved within the progressive tariff itself.

- ***Linking Tariff Brackets to Price Increases (Indexing):*** The brackets in the tariff should be expanded and updated as much as the inflation rate experienced in each period; that is, they should be indexed. Indexing can prevent the adverse effects of cold progression. Still, since the period in which inflation is measured and the period in which tax is paid are different, it is appropriate to keep the delays as short as possible. In our opinion, this period should be monthly, and the income tax schedule should be expanded monthly in order not to cause injustice in wages.

- ***Inflation Accounting Application:*** It is the accounting process of all kinds of nominal values that will affect taxation, that is, the amounts to be taken into account in inflation adjustment, by multiplying the adjustment coefficient determined every month. Inflation accounting is much more effective as it solves the costs that high inflation will impose on the tax system based on the taxpayer. However, inflation accounting is costly as it imposes additional burdens on public accountants who are intermediaries in the system. Also, since this method accepts inflation as data, it is prestige-losing for the political authority, namely the government.

- ***Determining the Tariff Increase Rate Same with the Inflation Rate:*** The emergence of cold progression is possible by increasing the income tax brackets at a lower rate than the inflation rate, which means making a kind of undervaluation in a sense. Accordingly, increasing the income brackets at the rate of inflation and offsetting the wage earners taxed on the net income at the end of the year can resolve the obvious negativity. However, the point to be considered here is the methods used in calculating inflation - Laspeyres and Paasche indexes are referred to here-. This recommendation is of no value if inflation is calculated under the real value.

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Appendix: 1
Applied Income Tax Tariffs (2006-2021)

	First Bracket		Second Bracket		Third Bracket		Fourth Bracket		Fifth Bracket
2006	Up to 7.000 TL	15%	(1.050) for 7.000 TL for the exceed	20%	(3.250) for 18.000 TL for the exceed	27%	(9.190) for 40.000 TL for the exceed	35%	
2007	Up to 7.500 TL	15%	(1.125) for 7.500 TL for the exceed	20%	(3.425) for 19.000 TL for the exceed	27%	(9.005) for 43.000 TL for the exceed	35%	
2008	Up to 7.800 TL	15%	(1.170) for 7.800 TL for the exceed	20%	(3.570) for 19.800 TL for the exceed	27%	(10.293) for 44.700 TL for the exceed	35%	
2009	Up to 8.700 TL	15%	(1.320) for 8.800 TL for the exceed	20%	(3.960) for 22.000 TL for the exceed	27%	(11.520) for 50.000 TL for the exceed	35%	
2010	Up to 8.800 TL	15%	(1.320) for 8.800 TL for the exceed	20%	(3.960) for 22.000 TL for the exceed	27%	(11.520) for 50.000 TL for the exceed	35%	
2011	Up to 9.400 TL	15%	(1.410) for 9.400 TL for the exceed	20%	(4.130) for 23.000 TL for the exceed	27%	(12.230) for 53.000 TL for the exceed	35%	
2012	Up to 10.000 TL	15%	(1.500) for 10.000 TL for the exceed	20%	(4.500) for 25.000 TL for the exceed	27%	(13.410) for 58.000 TL for the exceed	35%	
2013	Up to 10.700 TL	15%	(1.605) for 10.700 TL for the exceed	20%	(4.665) for 26.000 TL for the exceed	27%	(13.845) for 60.000 TL for the exceed	35%	

2014	Up to 11.000 TL	15%	(1.650) for 11.000 TL for the exceed	20%	(4.850) for 27.000 TL for the exceed	27%	(13.760) for 60.000 TL for the exceed	35%		
2015	Up to 12.000 TL	15%	(1.800) for 12.000 TL for the exceed	20%	(5.200) for 29.000 TL for the exceed	27%	(15.190) for 66.000 TL for the exceed	35%		
2016	Up to 12.600 TL	15%	(1.890) for 12.600 TL for the exceed	20%	(3.570) for 19.800 TL for the exceed	27%	(15.900) for 69.000 TL for the exceed	35%		
2017	Up to 13.000 TL	15%	(1.950) for 13.000 TL for the exceed	20%	(3.570) for 19.800 TL for the exceed	27%	(16.150) for 70.000 TL for the exceed	35%		
2018	Up to 14.800 TL	15%	(2.220) for 14.800 TL for the exceed	20%	(3.570) for 19.800 TL for the exceed	27%	(18.480) for 80.000 TL for the exceed	35%		
2019	Up to 18.000 TL	15%	(2.700) for 18.000 TL for the exceed	20%	(7.100) for 40.000 TL for the exceed	27%	(22.760) for 98.000 TL for the exceed	35%	(163.460) for 500.000 TL for the exceed	40%
2020	Up to 22.000 TL	15%	(3.300) for 22.000 TL for the exceed	20%	(8.700) for 49.000 TL for the exceed	27%	(27.870) for 120.000 TL for the exceed	35%	(195.870) for 600.000 TL for the exceed	40%
2021	Up to 24.000 TL	15%	(3.600) for 24.000 TL for the exceed	20%	(9.400) for 53.000 TL for the exceed	27%	(30.190) for 130.000 TL for the exceed	35%	(212.190) for 650.000 TL for the exceed	40%

Source: It was created by us using the transcripts prepared by the Revenue Administration of the Ministry of Treasury and Finance.

Appendix: 2
Income Tax Tariffs Updated According to CPI (2006-2021)

	Income Tax Tariff First Bracket		Income Tax Tariff Second Bracket		Income Tax Tariff Third Bracket		Income Tax Tariff Fourth Bracket		Income Tax Tariff Fifth Bracket	
2006	Up to 7.000 TL	15%	(1.050) for 7.000 TL for the exceed	20%	(3.250) for 18.000 TL for the exceed %27	27%	(9.190) for 40.000 TL for the exceed	35%		
2007	Up to 7.675,5 TL	15%	(1.151) for 7.675,5 TL for the exceed	20%	(3.563) for 19.737 TL for the exceed	27%	(10.076) for 43.860 TL for the exceed	35%		
2008	Up to 8.320 TL	15%	(1.248) for 8.320 TL for the exceed	20%	(3.863) for 21.393 TL for the exceed	27%	(10.923) for 47.540 TL for the exceed	35%		
2009	Up to 9.157 TL	15%	(1.374) for 9.157 TL for the exceed	20%	(4.252) for 23.545 TL for the exceed	27%	(12.022) for 52.322 TL for the exceed	35%		
2010	Up to 9.755 TL	15%	(1.463) for 9.755 TL for the exceed	20%	(3.066) for 25.083 TL for the exceed	27%	(19.807) for 55.739 TL for the exceed	35%		
2011	Up to 10.379 TL	15%	(1.557) for 10.379 TL for the exceed	20%	(4.819) for 26.688 TL for the exceed	27%	(13.626) for 59.306 TL for the exceed	35%		
2012	Up to 11.464 TL	15%	(1.720) for 11.464 TL for the exceed	20%	(5.323) for 29.477 TL for the exceed	27%	(15.050) for 65.503 TL for the exceed	35%		
2013	Up to 12.170 TL	15%	(1.826) for 12.170 TL for the exceed	20%	(5.651) for 31.293 TL for the exceed	27%	(15.977) for 69.538 TL for the exceed	35%		
2014	Up to 13.071 TL	15%	(1.961) for 13.071 TL for the exceed	20%	(6.069) for 33.609 TL for the exceed	27%	(17.159) for 74.684 TL for the exceed	35%		
2015	Up to 14.139 TL	15%	(2.121) for 14.139 TL for the exceed	20%	(6.564) for 36.355 TL for the exceed	27%	(18.560) for 80.786 TL for the exceed	35%		
2016	Up to 13.385 TL	15%	(2.308) for 13.385 TL for the exceed	20%	(7.543) for 39.558 TL for the exceed	27%	(20.596) for 87.903 TL for the exceed	35%		
2017	Up to 14.527 TL	15%	(2.179) for 14.527 TL for the exceed	20%	(7.860) for 42.932 TL for the exceed	27%	(22.027) for 95.401 TL for the exceed	35%		
2018	Up to 16.259 TL	15%	(2.439) for 16.259 TL for the exceed	20%	(8.797) for 48.049 TL for the exceed	27%	(24.652) for 106.773 TL for the exceed	35%		
2019	Up to 19.560 TL	15%	(2.934) for 19.560 TL for the exceed	20%	(10.576) for 57.769 TL for the exceed	27%	(29.659) for 128.448 TL for the exceed	35%	(159.702) for 500.000 TL for the exceed	40%
2020	Up to 21.876 TL	15%	(3.281) for 21.876 TL for the exceed	20%	(11.828) for 64.609 TL for the exceed	27%	(33.171) for 143.656 TL for the exceed	35%	(178.611) for 559.200 TL for the exceed	40%
2021	Up to 25.070 TL	15%	(3.761) for 25.070 TL for the exceed	20%	(13.555) for 74.042 TL for the exceed	27%	(38.014) for 164.630 TL for the exceed	35%	(204.689) for 640.843 TL for the exceed	40%

Source: It was created by us using the CPI rates prepared by TURKSTAT.

The Asymmetric Impacts of Oil Prices and Selected Macroeconomic Variables on Stock Markets: The Case of Turkey

Anıl AKÇAĞLAYAN (https://orcid.org/0000-0002-4827-3636), Ankara University, Türkiye; gokkus@politics.ankara.edu.tr

Sevgi Eda TUZCU (https://orcid.org/0000-0002-3658-2546), Ankara University, Türkiye; stuzcu@politics.ankara.edu.tr

Petrol Fiyatları ile Seçilmiş Makroekonomik Değişkenlerin Hisse Senedi Piyasasına Asimetrik Etkileri: Türkiye Örneği

Abstract

This paper investigates the asymmetric impacts of crude oil prices and other selected macroeconomic variables on the Turkish stock market for the period between 2005:01-2021:06 through the combination of the NARDL model and the quantile regression approach. The findings support the existence of cointegration between the stock market and oil prices. The variations in oil prices have asymmetric impacts in the long run. A positive shock by 1% decreases stock returns by 0.67%, while oil price declines have no significant impact. Quantile regressions show that the effects of oil price shocks are more visible at the low levels of the stock market.

Keywords : Crude Oil Prices, BIST100, NARDL, Asymmetric Effects, Quantile Regression.

JEL Classification Codes : E44, E52, G10, G12, Q43.

Öz

Bu çalışmada, 2005:01-2021:06 döneminde ham petrol fiyatları ile diğer seçilmiş makroekonomik değişkenlerin Türkiye hisse senedi piyasası üzerindeki asimetrik etkileri, NARDL modeli ve kantil regresyon yaklaşımı çerçevesinde ele alınmıştır. Bulgular, hisse senedi piyasası ile petrol fiyatları arasında eşbütünleşme olduğunu göstermektedir. Petrol fiyatlarındaki değişimin uzun dönemde asimetrik etkisi vardır. Petrol fiyatlarındaki %1'lik bir pozitif şok, hisse senedi fiyatlarını %0,67 düşürürken; fiyat düşüşlerinin anlamlı bir etkisi bulunmamaktadır. Kantil regresyon sonuçları, petrol fiyatı etkilerinin özellikle borsanın düşmekte olduğu dönemlerde gözle görülür hale geldiğini göstermektedir.

Anahtar Sözcükler : Ham Petrol Fiyatları, BIST100, NARDL, Asimetrik Etkiler, Kantil Regresyon.

1. Introduction

In his seminal work, Ross (1976) emphasises that stock prices can respond to many factors, not only the market portfolio but also a set of macroeconomic variables. Fama (1991) argues that stock prices contain expectations about future economic activity and represent company earnings and dividends. Since then, many studies have examined the impacts of different macroeconomic variables on stock returns. Among these variables, monetary policy indicators, inflation, interest rates, and exchange rates have been widely used (Fama, 1981; Chen et al., 1986; Bahmani-Oskooee & Sohrabian, 2006; Tiryaki et al., 2019; Çatık et al., 2020; Civcir & Akkoc, 2021). Yet, examining the effect of oil prices on financial markets is a relatively new topic. For this reason, the main aim of this paper is to investigate the asymmetric effect of oil price changes on returns in the Turkish stock market while considering the impacts of several macroeconomic variables on this relationship. More specifically, the asymmetric relationship between oil prices, industrial production, interest rates, exchange rates, and the BIST100 index of Borsa Istanbul is examined for the period 2005:01-2021:06.

The need for energy sources other than oil has become apparent in recent years. The share of renewable energy production has been steadily growing. The World Energy Outlook (2021) predicts that the new energy economy will rely more heavily on clean energy sources in the future. Although the importance of these alternative energy sources alongside natural gas and coal has increased, the leading share of oil in the world's energy consumption has not changed. The World Energy Outlook (2021) forecasts a peak in global oil demand around 2025. This high dependence on oil for energy demand makes countries vulnerable to oil price fluctuations. The relationship between oil prices and selected macroeconomic variables has long been studied since the oil shocks in the 1970s.

For Turkey, the importance of oil is even more pronounced compared to other emerging countries. 32% of Turkey's energy supply comes from oil, the largest energy source for the country's total final consumption (IEA, 2021)[1]. Turkey's dependence on oil imports is also very high. In 2016, the country ranked 58th in the world in terms of oil production but 22nd in terms of oil consumption[2], which makes Turkey a net oil and refined products importer. Nearly 90% of Turkey's oil consumption is covered by foreign suppliers, which significantly increases the input costs[3], particularly when the depreciation of the Turkish Lira against the foreign currencies since 2015. Turkey specialises in diversifying oil supply sources to manage these costs more efficiently[4]. The dependence on oil as a primary energy source has decreased quite a bit in recent years, but fluctuations in the price of oil

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[1] *International Energy Agency (IEA), Turkey 2021, Energy Policy Review, retrieved from: <https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf>, 05.01.2022.*

[2] *<https://www.worldometers.info/oil/turkey-oil/>, 11.02.2022.*

[3] *IEA, <https://www.iea.org/data-and-statistics>, 11.02.2022.*

[4] *IEA, Turkey 2021, Energy Policy Review, <https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf>, 05.01.2022.*

still protect its vital position in the Turkish economy. Figure 1 demonstrates the evolution
of Turkey's oil consumption from 2005 to 2020, where the y-axis shows barrel/ day
consumption and the x-axis is the years.

Figure: 1
The Changes in the Oil Consumption of Turkey between 2005 and 2020
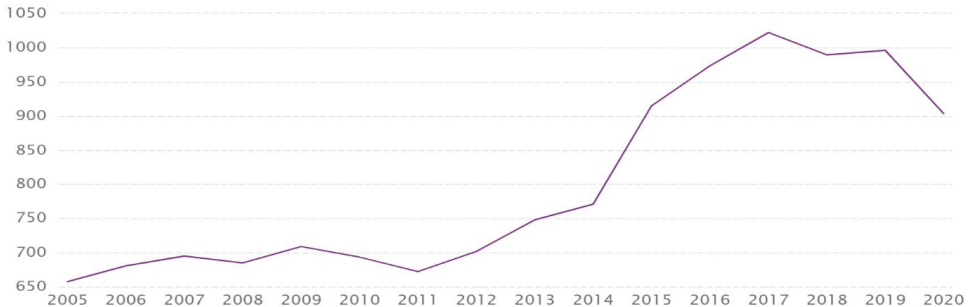
Source: <https://www.ceicdata.com/en/indicator/turkey/oil-consumption>, 25.02.2022.

Changes in oil prices can affect stock market indices through many channels. Oil
price increases raise production costs, negatively affecting corporate profits, leading to lower
cash flows and dividends and, ultimately, lower stock returns (Smyth & Narayan, 2018).
Positive oil price shocks also cause households to consume fewer non-oil-related goods and
services as energy and energy-related goods become more expensive. The steady rise in oil
prices can create inflationary pressures on central banks, forcing them to adjust monetary
policy accordingly (Bernanke & Kuttner, 2005, Degiannakis et al., 2018). Interest rate hikes
harm stock prices. Finally, investors can perceive the rise in oil prices in different ways.
They can react positively to it by associating the price rise with an economic boom or
negatively by interpreting this rise as a signal for increased risk premiums (Smyth &
Narayan, 2018).

Stock markets have the traditional role of providing liquidity, allocating capital,
accelerating economic growth, and producing information for investors. As an emerging
market, Borsa Istanbul, the Turkish Stock Exchange, has an important place in the Turkish
economy. Currently, 539 companies are traded in BIST Istanbul. According to the latest
annual report of Borsa Istanbul (Borsa Istanbul 2020), the market value of the stock
exchange in 2020 was 1.783 billion TL, which is 31st among the stock exchanges in the
world. With a trading volume of TL 31.3 billion, it is one of the most traded exchanges
globally. The total contribution of BIST Istanbul to the total income was 38% in 2020, while
the Turkish stock exchange alone contributed 14% to the total revenue in the same year.
Although stocks of energy companies have a lower portion in the entire stock market index,
oil prices are expected to be influential on the stock exchange due to the input costs and
other transmission channels. Çatık, Huyugüzel Kışla, and Akdeniz (2020) also indicate that
due to the strong influence of foreign investors in the Turkish stock market, global oil market

fluctuations will have a significant effect on asset pricing behaviour in Turkey. Therefore, as an oil-exporting country, it is crucial to understand the relationship between oil price shocks and stock prices in Turkey.

In this study, we examine the impacts of positive and negative oil price shocks on Borsa Istanbul between 2005:01 - 2021:06 with monthly data employing the NARDL model. Besides the oil prices, the potential asymmetric effects of the changes in income and exchange rates are also considered in the model. Previous literature investigates the relationship between oil price changes and stock market returns with various methodologies, including vector autoregressive models, regression models, and the ARDL approach. Smyth and Narayan (2018) indicate clearly that oil price changes have asymmetric impacts on stock returns for different markets. For Turkey, it is also put forth that this relationship is nonlinear and asymmetric (for example, Altıntaş & Yacouba 2018). Yet, very few of these studies apply NARDL as their primary model (for instance, Tiryaki et al., (2019) and Civcir and Akkoc (2021)). Different from the previous studies for Turkey, we select the NARDL approach as our primary methodology to investigate the asymmetric effects. In this sense, our study shows similarities with Tiryaki et al. (2019), in which they consider the asymmetric impacts of oil price changes and selected macroeconomic variables with the same method. However, our choice for monetary policy proxy is different from their study. We employ short-term interest rates as a monetary policy proxy which has been the primary monetary policy tool since the 2000s, not money supply.

Alongside the asymmetry in the oil price-stock market nexus, we further investigate the source of asymmetry in the oil price-stock returns relationship and the role of monetary policy changes in this association. To do so, we benefit from OLS and quantile regressions which include the oil price shocks and their interactions with short-term interest rates as explanatory variables. The quantile regression approach allows us to detect the impact of oil price shocks on the different states of the stock market, namely bearish, regular, and bullish markets. To the extent of our knowledge, our study is the first that combines the NARDL and quantile regression approaches to examine the oil price-stock market nexus for Turkey. This study also contributes to the existing literature by using the most recently available period and showing short-term interest rates' effects on the Turkish stock exchange.

Our findings demonstrate supporting evidence for a long-term asymmetric cointegration relationship among oil prices, exchange rates, income, and stock exchange. We also show the asymmetric effects of oil price variations on the Turkish stock exchange. We find that the Turkish stock exchange is negatively affected by oil price increases but does not react to the oil price decreases. Similarly, our results reveal asymmetric impacts of interest rate and exchange rate changes on the stock market. Our findings also suggest that oil prices as a global factor play a leading role in determining stock returns. These findings will also allow us to offer policies for other energy-dependent emerging economies.

The remainder of this study is organised as follows: First, the literature that investigates the influence of oil price changes is described thoroughly. Second, the NARDL

method, the quantile regression approach, and the data employed are explained. The following section demonstrates and interprets the results of unit root tests and estimations from the NARDL model and the quantile regressions. The final section concludes with policy implications.

2. Literature

Crude oil has been accepted as one of the most strategic commodities in the world. The rise and downs in oil prices drive both macroeconomic trends and corporate profitability, geopolitical situations and consumer sentiment. Therefore, it is possible to expect significant effects of oil price changes on stock market indices and economies. Theoretically, the impacts of oil prices can be negative or positive. One can distinguish the effects of positive oil price shocks on production and consumption in different channels for oil-importing countries: First, the share of household expenses on energy and energy-related goods will be increased, resulting in a lower percentage for other goods and services. That is, the total consumption of households will be affected negatively. Second, production costs will rise for countries where oil production demand cannot be satisfied. Oil is one of the primary inputs for producing goods and services, as well as capital and labour. The rise in production costs is almost inevitable, especially when there is no close substitute for oil as an input. The cash flows to the firms will be lower, and eventually, stock prices will decrease (Smyth & Narayan, 2018).

Oil price - stock market association is also affected by monetary policy changes. Increasing oil prices will create an inflationary pressure on central banks, which leads to higher interest rates. Bernanke and Kuttner (2005) note three monetary policy channels for this relationship due to an increase in short-term interest rates. First, increased interest rates will be used as discount rates for future stock dividends, resulting in lower dividends. Second, these interest rates will also be used to discount the future cash flows from firm investments. Higher interest rates will generate lower net present values, similar to stock dividends. Degiannakis et al. (2018) argue that the negative consequences of higher oil prices on stock returns in oil-importing countries will be more severe if the central bank has low credibility in terms of maintaining general price stability in the market. The third effect is through the evaluation process of bonds and bank deposits. As the interest rates rise, returns from bank deposits and bonds will be higher, so these investment options will be seen as more profitable than stock investments. Investing in the stock market will have a higher opportunity cost. As a result, investors will direct their cash flows to the bond market and bank deposits instead of stock markets.

Oil prices also have the potential to influence stock markets indirectly because oil itself as a commodity is one of the investment alternatives in the financial markets. The increase in oil prices will change the portfolio structure of investors and thus affect stock prices. Similarly, Demirer et al. (2020) argue that fluctuations in oil prices can drive investor sentiment. The favourable price shocks can be viewed as increased risk premia in financial markets. Increased uncertainty and risk premia will harm investment decisions (Degiannakis

et al., 2018). However, it is also possible to interpret rising oil prices as a sign of an economic boom, as they may represent better corporate performance and rising stock prices (Smyth & Narayan, 2018). These indirect and contradictory effects are particularly pronounced in oil-importing emerging markets such as Turkey.

The literature discusses oil prices as a central factor affecting world economies. Many have investigated the relationship between oil price shocks and several macroeconomic indicators, including industrial production and inflation (Hamilton, 1983; James & Kaul, 1996; Aykırı, 2020) and even other energy sources demand, such as electricity (Akarsu, 2017). Yet, studies examining the effects of oil price changes on financial markets are relatively new.

Empirical evidence focusing on the effects of oil prices on stock prices mainly considers developed countries. The findings from these studies vary based on the methodology employed, the forecast period, and whether countries import or export oil. One of the first studies in this field belongs to Jones and Kaul (1996). They show that the increase in oil prices significantly negatively impacts stock returns in Canada, Japan, the UK, and the USA. Park and Ratti (2008) examine oil price shocks and stock return association for 13 European countries and the USA between 1986 and 2005. Their results indicate that the fluctuations in oil prices decrease stock returns in many European countries. Miller and Ratti (2009) and Kilian and Park (2009) also find supporting evidence for the deteriorating effect of increased oil prices on the stock exchange. There is contradictory evidence as well. Narayan and Narayan (2010) and Arouri and Rault (2012) demonstrate that either oil prices do not influence stock market indices, or this effect is positive. Huang et al. (1996) also find that oil price shocks do not affect stock price returns. Aydoğan, Tunç, and Yelkenci (2017) look at the effects of oil price changes on stock market returns for net oil exporters and importers with a VAR methodology and Granger causality test. They find that oil price changes influence oil-importing countries' stock markets more than oil-exporting ones.

The effects of oil price increases on many macroeconomic variables, including production and inflation levels for Turkey, have also been discussed in the literature (i.e., Berument & Taşçı, 2002; Dedeoğlu & Kaya, 2014; Altay et al., 2013; Doğrul & Soytaş, 2010). The literature discussing this effect on the Turkish stock market usually assumes a symmetric association. These studies mainly employ VAR methodology and causality tests, and the findings vary. Some even show that oil prices and stock markets are positively related. For example, with VAR methodology and weekly data, Eryiğit (2012) investigates the relationship between the BIST100 index, interest rates, and oil prices. The data period covers the dates between 01.07.2001 and 31.10.2008, and the findings indicate a positive association. Halaç et al. (2013) investigate monthly data from BIST 100, crude oil prices, and nominal exchange rate by cointegration method while considering structural breaks. Their evidence also supports a positive association between oil prices and stock returns.

Ünlü and Topçu (2012) examine two different periods, 1990-2001 and 2001-2011, for BIST100 and oil prices relationship by employing cointegration and causality analyses.

They cannot show cointegration or causality for the first period for these two variables. For the second period, however, they find that these variables move together in the long run, and there is one-way causality from oil prices to the stock market index. Contrary to expectations, they show that the increase in oil prices positively affected Turkish stock market returns in the second analysis period. Kapusuzoğlu (2011) shows a long-term one-way Granger causality from BIST 100, BIST 50, and BIST 30 indices to oil prices.

Ekşi et al. (2012) examine the sensitivity of 7 sub-sectors of the manufacturing industry as a stock market proxy to oil prices for the period of 01:1997-12:2009. Their error correction model and Granger causality tests indicate a causality from oil prices to chemistry and base metal industries. Such a causality cannot be shown for other sectors in the short or long term. Similarly, Çatık, Huyugüzel Kışla, and Akdeniz (2020) investigate the sensitivity of Turkish main sectoral stock returns to oil price fluctuations. They consider both the structural breaks in their dataset that cover the period of 03:1997-09:2018 and time-varying parameters in the association. Their results indicate that the dependence on oil prices significantly changes across sectors and time.

In the studies mentioned above that examine Turkey, the relationship between oil prices and the Turkish stock market is assumed to be linear and symmetric. Yet, it is possible to observe a nonlinear and asymmetric relationship between these two. Mork (1989) claims that a change in oil prices creates nonlinear effects. The lack of evidence in the literature for the linear development of oil prices on financial markets may be due to the asymmetric nature of this relationship. Smyth and Narayan (2018) note that there is no reason to believe that this association is uniform for price ups and downs. The possible asymmetric effects have been examined more closely with the recent econometric models in the literature.

Altıntaş and Yacouba (2018) employ the NARDL model to investigate the sensitivity of stock markets to money supply and oil prices for the period of 1988:01-2014:12. In this study, the money supply is considered the primary monetary policy tool. The findings of this study indicate that there is a long-term cointegration association among the variables mentioned above. It is also shown that expansionary monetary policy positively impacts the Turkish stock exchange while tightening has adverse effects. Altıntaş and Yacouba (2018) provide supporting evidence for the asymmetric results of oil price changes on the Turkish stock exchange for the long term. They find that favourable oil price shocks negatively affect stock prices, supporting the increased cost of production argument. The oil price decreases, on the other hand, do not affect stock prices.

Civcir and Akkoc (2021) contribute to the literature on the relationship between oil prices and the stock market by examining sector-level data from Turkey. They consider possible asymmetric effects of oil price shocks on sectoral stock prices in the short- and long-run using the NARDL approach. Their dataset includes daily data on crude oil prices, exchange rates, and subsector stock market indices for the period from 02:2009 to 04:2019. This dataset allows them to examine the relationship between oil prices and the stock market in the period following the global financial crisis. They confirm the nonlinearities,

particularly in the short run, but the oil price-stock market association varies by sector. They show that sectors related to financial markets are the most affected by the oil price increase in the long run.

Tiryaki et al. (2019) also look at the impact of the industrial production index, M3 money supply, and real effective exchange rates on stock market returns in Turkey for two different periods, namely 1994:01-2017:05 and 2002:01-2017:05 periods, with the NARDL model. They find that these three variables have long-term asymmetric effects on stock market returns, but these effects are more significant after 2002 than the entire period. The findings also reveal that the positive impact of expansionary monetary policy on stock markets is more critical than the adverse effects of contractionary monetary policy.

Although this paper has a similar aim to Tiryaki et al. (2019) and Civcir and Akkoç (2021), there are significant differences between these studies. First, in this study, short-term interest rates are employed to reflect the central bank's position, not the M3 money supply, as in Tiryaki et al. (2019) and Altıntaş and Yacouba (2018). Before the 2000s, the main monetary policy instrument was the money supply. However, since the early 2000s, this changed, and interest rates became Turkey's primary monetary policy instrument. They are using the money supply as a monetary policy proxy, as in Tiryakioglu et al. (2019) and Altıntaş and Yacouba (2018), depending on the assumption that the money supply is endogenous. However, we believe that using interest rates will provide a better picture of the stance of central banks toward oil price changes.

The second difference between the studies mentioned above lies in the data used in this paper. Tiryaki et al. (2017) analysed monthly data up to 2017 in two subperiods. Civcir and Akkoç (2021) work with daily data for crude oil prices, exchange rates, and sectoral indices of stock markets. However, this study uses monthly and the most recent data available. For the analysis, the period from 2005 to 2021 is covered. Therefore, we hope that this study presents the current relationship between oil prices and the stock market in Turkey in a non-linear form by employing a NARDL approach. This is one of the contributions of this paper to the growing literature in this field.

This study also differs from the previous literature by examining the source of asymmetry in the oil price-stock market returns relationship while emphasising the role of monetary policy changes. The oil price shocks, namely economic activity demand shock, oil inventory demand shock, oil consumption demand shock, and oil supply shock, are considered the possible reasons for asymmetry, and OLS examines their effects. Quantile regression approaches for different states of the stock market. In this sense, this study is the first that combines the NARDL and quantile regression methods to investigate the oil price-stock market association for Turkey.

3. Data and Methodology

3.1. Data

To examine the possible asymmetric relationship between stock market returns and selected macroeconomic variables, monthly data from the 2005:01-2021:06 period is employed. As discussed in the previous section, the theoretical and empirical literature uses other macroeconomic variables in this association. Following the earlier studies, industrial production index (y) (as in Tiryaki et al., 2019; Erdem et al., 2005; Kandır, 2008; Scholtens & Yurtsever, 2012; Park & Ratti, 2008), interest rates (i) (following Scholtens & Yurtsever, 2012; Park & Ratti, 2008), exchange rates (exc) (Tiryaki et al., 2019), and crude oil prices (oil) are used as the main determinants of stock returns.

BIST 100 index from Borsa Istanbul is used as the proxy for stock prices in Turkey. This is the main index for Borsa Istanbul, including the selected shares traded in the Stars Market[5]. Turkey's monthly industrial production index represents industrial production (2015=100). To reflect the Central Bank's monetary stance of the Republic of Turkey, interest rates are employed. The exchange rate in US dollars reflects both the international trade relationships and the effects of economic and political changes. An increase in the exchange rates can be interpreted as the depreciation of the Turkish Lira. The Brent-Europe oil price (per barrel in US dollars) is used for oil prices. The industrial production index, exchange rates, and BIST100 data are obtained from the Electronic Data Delivery System of the Central Bank of Turkey. The US Energy Information Administration (EIA) accepts the oil price series. All the variables except interest rates are used in natural logarithms.

To examine the role of oil price shocks in the oil price-stock market relationship, we also employ publicly available oil price shock data computed based on the paper by Baumeister and Hamilton (2019) and provided by Christiane Baumeister's webpage[6].

3.2. The NARDL Approach

Previous literature tests the oil price-stock market return relationship with various methodologies. These include vector autoregressive models (i.e., Sadorsky, 1999; Eryiğit, 2012), different regression models (i.e., Scholtens & Yurtsever, 2012; Nusair & Al-Khasawneh, 2018; Mokni, 2020), GARCH specifications (i.e., Sadorsky, 1999; Arouri & Nguyen, 2010) and ARDL models (Al-haji et al., 2017; Tursoy & Faisal, 2018). These models assume that the relation between oil price and stock market returns is linear. For Turkey, among others, Altıntaş and Yacouba (2018), Tiryaki et al. (2019), and Civcir and Akkoc (2021) find evidence supporting that the association mentioned above is nonlinear and asymmetric. We employ the nonlinear autoregressive distributed lag model as our primary model to account for the asymmetric cointegration relationship between variables.

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[5] Borsa Istanbul stock indices ground rules determine the definition of BIST 100. <https://www.borsaistanbul.com/files/bist-stock-indices-ground-rules.pdf>, 12.01.2022.

[6] <https://sites.google.com/site/cjsbaumeister/datasets>, 20.05.2022.

Nonlinear ARDL (NARDL) is developed by Shin et al. (2013) as an extended version of linear autoregressive distributed lag with short- and long-term asymmetric effects, which Pesaran and Shin have previously proposed (1999) and Pesaran, Shin, and Smith (2001).

The cointegration relationship can be examined with other methods as well. Engle and Granger's (1987) procedure is proper when there are only two variables, whereas Johansen and Juselius's (1990) method is employed when there are many variables. Both of these methods require that all variables be integrated into order one (I(1)). Unlike Engle and Granger and Johansen and Juselius procedures, Pesaran et al. (2001) developed a bound test approach that can be applied even when the variables have different orders of integration. The general dynamic specification of ARDL can be used when the variables are level or first difference stationary. Another advantage of ARDL is that it can decompose the long-term relationship among variables when they are not stationary second difference. The asymmetric bound test is also efficient for small samples using ARDL because all variables' lags can be added to the model. Despite all these advantages over other cointegration procedures, ARDL does not consider asymmetric effects. Shin et al. (2013) add these asymmetric effects into the model and develop the nonlinear ARDL model. Unless the data is integrated into order two (I(2)), NARDL can be successfully employed (Pesaran et al., 2001).

The ARDL model that investigates the symmetric cointegration relation between stock market returns and other macroeconomic variables can be seen in Eq. (1):

$$\Delta B\dot{I}ST100_t = \theta_0 + \theta_b B\dot{I}ST100_{t-1} + \theta_y y_{t-1} + \theta_{oil} oil_{t-1} + \theta_i i_{t-1} + \theta_{exc} exc_{t-1} + \sum_{i=1}^{p-1} \alpha_i \Delta B\dot{I}ST100_{t-i} + \sum_{i=1}^{p} \rho_i \Delta y_{t-i} + \sum_{i=1}^{r} \beta_i \Delta oil_{t-i} + \sum_{i=1}^{s} \varepsilon_i \Delta i_{t-i} + \sum_{i=1}^{u} \sigma_i \Delta exc_{t-i} + \epsilon_t \tag{1}$$

In Eq. (1), BIST100, y, oil, i and exc are stock market return, industrial production index, oil prices, interest rates, and exchange rates, respectively. The first part on the right-hand side of this equation reflects the cointegration association. θs represent the long-term coefficients. The second part of this equation shows the short-term effects. The following null hypothesis tests the symmetric cointegration relationship among variables: $\theta_b = \theta_y = \theta_{oil} = \theta_i = \theta_{exc} = 0$. Pesaran et al., (2001) provide upper critical values when all variables are I(1) and lower critical values when all variables are I(0). If the calculated F statistic is higher than the upper critical value, the null hypothesis of no cointegration is rejected. That is, evidence supports the existence of a long-term cointegration relationship between dependent and explanatory variables. This result indicates the co-movement of these variables in the long run. When the calculated F test is lower than the lower critical values, one can conclude that there is no cointegration. The area in between is the indecisive area.

Yet, the short- and long-term association between variables can be asymmetric and symmetric. The asymmetric and nonlinear effects of explanatory variables on the dependent variable can be examined through the NARDL method. New time series variables created

by the positive and negative partial sums of explanatory variables are used to test the short-
and long-term asymmetric effects. The new series derived from the oil price variable can be
seen below:

$$oil_t = oil_0 + oil_t^+ + oil_t^- \tag{2}$$

In this equation, oil_0 represents the initial value, oil_t^+ and oil_t^- are the positive and
negative partial sums.

$$oil_t^+ = \sum_{i=1}^{t} \Delta oil_i^+ = \sum_{i=1}^{t} maks(\Delta oil_i, 0)$$
$$oil_t^- = \sum_{i=1}^{t} \Delta oil_i^- = \sum_{i=1}^{t} min(\Delta oil_i, 0) \tag{3}$$

One of the advantages of the NARDL model is that this model can investigate the
asymmetric effects of all variables or some of them. In this study, the possible nonlinearity
in the effects of all variables on stock markets is considered. Therefore, the nonlinear and
asymmetric cointegration relationship can be shown as follows:

$$BİST100_t = \theta_0 + \theta_y^+ y_t^+ + \theta_y^- y_t^- + \theta_{oil}^+ oil_t^+ + \theta_{oil}^- oil_t^- + \theta_{exc}^+ exc_t^+ + \theta_{exc}^- exc_t^- + \theta_i^+ i_t^+ + \theta_i^- i_t^- + e_t \tag{4}$$

e_t demonstrates the deviations from the long-term equilibrium in the cointegration
relationship presented in Eq. (3). Ɵ+ and Ɵ- denote the impacts of positive and negative
variations respectively in the explanatory variable on the dependent variable in the long-run.
The asymmetric cointegration model can be obtained by the combination of Eq. (1) and Eq.
(4) as follows:

$$\Delta BİST100_t = \theta_0 + \theta_B BİST100_{t-1} + \theta_y^+ y_{t-1}^+ + \theta_y^- y_{t-1}^- + \theta_{oil}^+ oil_{t-1}^+ + \theta_{oil}^- oil_{t-1}^- + \theta_{DK}^+ exc_{t-1}^+ + \theta_{DK}^- exc_{t-1}^- + \theta_i^+ i_{t-1}^+ + \theta_i^- i_{t-1}^- + \sum_{l=1}^{p-1} \alpha_i \Delta BİST100_{t-i} + \sum_{i=0}^{q} \beta_y^+ \Delta y_{t-i}^+ + \sum_{i=0}^{q} \beta_y^- \Delta y_{t-i}^- + \sum_{i=0}^{q} \beta_{exc}^+ \Delta exc_{t-i}^+ + \sum_{i=0}^{q} \beta_{exc}^- \Delta exc_{t-i}^- + \sum_{i=0}^{q} \beta_i^+ \Delta i_{t-i}^+ + \sum_{i=0}^{q} \beta_i^- \Delta i_{t-i}^- + \sum_{i=0}^{q} \beta_{oil}^+ \Delta oil_{t-i}^+ + \sum_{i=0}^{q} \beta_{oil}^- \Delta oil_{t-i}^- \tag{5}$$

As mentioned, the lagged variables in the first part of Eq. (5) show long-term
asymmetric cointegration association. Following Shin, Yu, and Greenwood-Nimmo (2013),
first, classical OLS is applied to Eq. (5). To test the long-term asymmetric association among
variables, the FPSS test proposed by Pesaran et al. (2001) is conducted. This test has the
following null and alternative hypotheses that analyse the existence of cointegration.

$$H_0: \theta_B = \theta_y^+ = \theta_y^- = \theta_{oil}^+ = \theta_{oil}^- = \theta_i^+ = \theta_i^- = \theta_{exc}^+ = \theta_{exc}^- = 0 \tag{6}$$

$$H_1: \theta_B \neq \theta_y^+ \neq \theta_y^- \neq \theta_{oil}^+ \neq \theta_{oil}^- \neq \theta_i^+ \neq \theta_i^- \neq \theta_{exc}^+ \neq \theta_{exc}^- \neq 0 \tag{7}$$

The rejection of the null hypothesis supports a long-term asymmetric relationship.
The long-term coefficients of positive and negative shocks are normalised by θ_b. For the
long-term coefficients of oil price increases and decreases, the following formulae are used

respectively[7]: $L_{oil+} = \frac{-\theta_{oil}^+}{\theta_b}$ and $L_{oil-} = \frac{-\theta_{oil}^-}{\theta_b}$. The asymmetric relationship between the explanatory variable and the dependent variable is tested by using the Wald test. For example, if the null hypothesis of $L_{oil+} = L_{oil-}$ can be rejected, one can infer that the ups and downs in the oil prices have different effects on the stock market index.

The second part of Eq. (5) reflects short-term effects. For this equation, the expectation for the coefficients of y^+_{t-1}, dy^+_{t-i}, and variables are positive. The production growth is likely to increase company profits and cash flows, so production and stock prices are expected to move in the same direction. Interest rate increases are expected to affect stock prices in the short- and long-term negatively. A contractionary monetary policy reduces the demand for company stocks, so the stock prices decline. On the contrary, an expansionary monetary policy will stimulate the demand for company stocks so that the stock prices will rise. As a result, the expectations for the coefficients of i^-_{t-1} and d^-i_{t-i} variables are positive[8].

As an oil-importing country, we expect to observe an inverse effect of oil price increases on stock prices in Turkey. For the impact of exchange rate variations on stock markets, more than one factor plays a role. When the local currency depreciates, the competitive power of export companies increases, so their stocks will be appreciated, however, the imported inputs will be more expensive, and such a change in exchange rates will decrease stock prices.

3.3. The Quantile Regression Approach

Oil price- stock market association can also be sensitive to the origin of the oil price changes[9]. As Kilian (2009) noted, different oil shocks can explain the differences in stock markets in response to oil price fluctuations. Therefore, the asymmetric reaction of the stock market shown in the previous section can result from different oil price shocks. Mokni (2020) also notes that different states of stock markets (namely bearish, regular, or bullish markets) can respond differently to these shocks. In this section, we investigate the effects of different oil price shocks on the Turkish stock market returns for other market conditions.

Kilian (2009) defines oil price shocks as follows: *Supply-side shocks* reflect the availability of crude oil. *Aggregate demand shocks* are due to the changes in global oil demand driven by variations in the global business cycle. *Oil-specific demand shocks* are

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[7] The long-term coefficients of other variables in the model are computed in the same way: $L_{y+} = \frac{-\theta_y^+}{\theta_b}$ and $L_{y-} = \frac{-\theta_{\bar{y}}}{\theta_b}$ represent the increase and decreases in the industrial production. $L_{i+} = \frac{-\theta_i^+}{\theta_b}$ and $L_{y-} = \frac{-\theta_i^-}{\theta_b}$ are used for long term coefficients of interest rate increase and decreases. $L_{exc+} = \frac{-\theta_{exc}^+}{\theta_b}$ and $L_{exc-} = \frac{-\theta_{\bar{exc}}}{\theta_b}$ are employed to compute the long-term coefficients of exchange rate increase and decreases respectively.

[8] Recently, studies show that contractory monetary policy will have more effects on stock markets than expansionary policy (for example, Tiryaki et al., 2019).

[9] We would like to thank to the anonymous referee to draw our attention to this point.

caused by the increased demand for oil due to precautionary reasons, such as fears of future oil deficits. Based on the study by Baumeister and Hamilton (2019), we consider three types of demand shocks: economic activity shocks, oil consumption demand shocks, and oil supply shocks. Oil supply shocks reflect supply-side shocks. To observe the separate impacts of these shocks, the following linear model is employed:

$$dBIST100_t = \beta_0 + \beta_1 Oecon_t + \beta_2 Ocons_t + \beta_3 Oinvent_t + \beta_4 Osupply_t + \varepsilon_t \tag{8}$$

Where dBIST100 is the natural logarithm of stock market returns in the first difference, and the righthand side variables represent economic activity shocks ($O_{econ,}$), oil consumption demand shocks ($O_{cons,}$), oil inventory demand shocks ($O_{invent,}$), and oil supply shocks ($O_{supply,}$), respectively.

We also examine the effects of monetary policy changes on the oil shocks-stock market association described in Eq. (8) by adding interaction terms with short-term interest rates (I). Eq (9) shows this situation:

$$dBIST100_t = \gamma_0 + \gamma_1 Oecon_t + \gamma_2 Ocons_t + \gamma_3 Oinvent_t + \gamma_4 Osupply_t + \gamma_5 Oecon_t * I_t + \gamma_6 Ocons_t * I_t + \gamma_7 Oinvent_t * I_t + \gamma_8 Osupply_t * I_t + \vartheta_t \tag{9}$$

Both Eq (8) and (9), when estimated with OLS, summarise the average impact of oil price demand supply shocks on the stock market returns. In other words, these models defined in Eq (8) and (9) answer the following research question: "Do the oil shocks (and their interactions with interest rates) affect stock market returns?". In this paper, we argue that oil price changes can have an asymmetric impact on stock market returns, which may vary based on the state of the stock markets. Therefore, we need to ask whether oil price shocks affect different conditions of stock markets, namely in bearish, regular, or bullish markets. This research question can be answered through the quantile regression approach developed by Koenker and Bassett (1978). This model weights observations asymmetrically depending on the over or under-prediction of the true model. The weight for positive deviations from the regression line will be τ, whereas the negative deviations will be penalised by (1-τ) (Baum, 2013). Linear programming optimisation methods obtain the minimisation of the sum of deviations. Quantile regressions also have the advantage of being robust against non-normality in the error terms and the presence of outliers.

Quantile regression models have been used to examine oil price-stock market association (for instance, Lee & Zeng, 2011; Nusair & Al-Khasawneh, 2018; Mokni, 2020). The quantile regression models are defined below:

$$dBIST100_t(\tau/x) = \beta_0^\tau + \beta_1^\tau Oecon_t + \beta_2^\tau Ocons_t + \beta_3^\tau Oinvent_t + \beta_4^\tau Osupply_t + \beta^\tau E_t \tag{10}$$

This model takes the following form when the interaction terms are also added.

$$dBIST100_t(\tau/x) = \gamma_0^\tau + \gamma_1^\tau Oecon_t + \gamma_2^\tau Ocons_t + \gamma_3^\tau Oinvent_t + \gamma_4^\tau Osupply_t + \gamma_5^\tau Oecon_t * I_t + \gamma_6^\tau Ocons_t * I_t + \gamma_7^\tau Oinvent_t * I_t + \gamma_8^\tau Osupply_t * I_t + \gamma^\tau E_t \tag{11}$$

Following Nusair and Al-Khasawneh (2018), nine quantiles are computed ($\tau = 0.10$, 0.20, 0.30, …., 0.90). The three states of the stock market are defined as follows: Quantiles from 0.10 to 0.30 represent a bearish stock market, quantiles from 0.40 to 0.60 correspond to a regular stock market, and the rest shows a bullish stock market.

4. Empirical Findings

4.1. Asymmetric Relationship between Stock Returns and Macroeconomic Variables: NARDL Approach

The NARDL model can be used if the data is not integrated into order two. Therefore, this study begins with the unit root tests. The sample period covered in this study includes the 2008 financial crisis, which may cause a structural break. Therefore, to test whether the data is stationary, besides the traditional ADF test, the Breakpoint test, which also takes the structural breaks into account, is applied. The results are presented in Table 1.

Table: 1
Unit Root Test Results

Variable	ADF			Breakpoint			
	Model and Number of Lags	t-stat	Model and Number of Lags	t-stat	Structural Break Date	Result	
BIST100	a (1)	-2.43	(0)	-2.81	2009:02	I(1)	
dBIST100	b (0)	-16.44***	(0)	-17.03***	2008:10	I(0)	
y	a (5)	-2.97	(1)	-2.90	2010:02	I(1)	
dy	b (4)	-9.69***	(0)	29.76***	2020:06	I(0)	
oil	b (1)	-3.22*	(1)	-3.85	2004:06	I(1)	
doil	c (0)	-13.26***	(0)	-16.25***	2020:03	I(0)	
exc	a (12)	-1.10	(2)	-2.93	2016:09	I(1)	
dexc	a (11)	-6.55***	(0)	-12.71***	2018:08	I(0)	
a: Constant and trend; b: Constant; c: No constant or trend model							
*, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.							

ADF and breakpoint test results in Table 1 indicate that all variables are first difference stationary. The results in Table 1 also indicate different structural break dates for the variables employed in this analysis. These different structural break dates show the existence of specific factors affecting the macroeconomic variables. More specifically, this finding implies an asymmetric relationship in the short and long run. In addition, the structural break dates of the stock markets and exchange rates correspond to the global crisis in 2008 and the shock in the exchange rates in 2018, respectively.

Since BIST100 is integrated into order one and no series is integrated into order two, the best model to test the relationship between stock prices and the selected macroeconomic variables is NARDL.

The analysis starts with a model including 24 lags. The model is re-estimated by excluding insignificant explanatory variables. The findings from the cointegration test (FPSS) are reported in Table 2.

Table: 2
Cointegration (F_PSS) Test

	F Statistics F_PSS	Critical Values*		Conclusion
		I(0)	I(1)	
Bist100 = F(y, oil, exc, i)	17.77	2.86	4.01	Asymmetric Cointegration

This shows the null hypothesis of no cointegration at the 5% significance level. The critical values for the bound test are obtained from Pesaran et al. (2001).

The results in Table 2 reject the null hypothesis of no asymmetric cointegration since the computed F statistic is larger than the upper critical values. More specifically, this result supports the long-run asymmetric cointegration between stock prices and industrial production, oil prices, interest rates, and exchange rates. The coefficient of one period-lagged BIST100 variable, which demonstrates the cointegration relationship and is shown in Table 5, is also negative and significant, as expected.

Table 3 reflects the Wald test results in which the asymmetric effects of explanatory variables are tested. Wald test examines whether the coefficients of positive and negative partial sums of any explanatory variable are equal in the long run. If the equality of these partial sums cannot be rejected, one may conclude that a long-term symmetric relationship exists.

Table: 3
Wald Test Results for the Long-Run Asymmetric Relationship among Variables

	F statistic (Probability)	Conclusion
$WALD_{oil}$ ($Loil+ = Loil-$)	20.06*** (0.0000)	Asymmetric
$WALD_y$ ($Ly+ = Lyl-$)	13.97*** (0.0004)	Asymmetric
$WALD_i$ ($Li+ = Li-$)	11.18*** (0.0014)	Asymmetric
$WALD_{exc}$ ($Lexc+ = Lexc-$)	72.77*** (0.0000)	Asymmetric

The numbers in parentheses show probability values. They all indicate that the symmetric relationship is rejected at the 5% significance level.

The findings from this table reject the hypothesis stating that oil price changes create linear and symmetrical effects on BIST100. In other words, oil price changes affect stock prices asymmetrically. The same result is valid for other macroeconomic variables as well. The positive and negative partial sums for industrial production, interest, and exchange rates are unequal.

Next, the NARDL model is estimated to reflect the asymmetrical relationship between the stock market returns in Turkey and the selected macroeconomic variables. We re-estimate the NARDL model by excluding the variables that are statistically insignificant in explaining the dependent variable, and we obtain the finest model. The results from these estimations are shown in Table 4.

Table: 4
Results from NARDL Estimations for the Relationship between BIST100 and Selected Macroeconomic Variables

Dependent Variable: DBIST			
Variable	Coefficient	Prob.*	
C	2.939***	0.0000	
BIST(-1)	-0.458***	0.0000	
Y_P(-1)	-0.108	0.2242	
Y_N(-1)	0.091	0.4006	
OILL_P(-1)	-0.310***	0.0000	
OILL_N(-1)	-0.028	0.4390	
I_P(-1)	-0.005**	0.0478	
I_N(-1)	0.014***	0.0081	
EXC_P(-1)	0.820***	0.0000	
EXC_N(-1)	-1.004***	0.0000	
DBIST(-2)	0.385***	0.0000	
DBIST(-4)	0.351***	0.0001	
DBIST(-5)	0.969***	0.0000	
DY_P(-5)	0.850***	0.0000	
DY_P(-6)	0.739***	0.0003	
DY_P(-8)	1.133***	0.0000	
DY_P(-10)	1.138***	0.0000	
DY_P(-11)	1.453***	0.0000	
DY_N(-8)	-0.659***	0.0004	
DOILL_P(-5)	-0.245***	0.0006	
DOILL_P(-7)	-0.792***	0.0000	
DOILL_P(-10)	-0.316***	0.0009	
DOILL_P(-12)	0.122***	0.0000	
DOILL_N(-2)	0.288***	0.0000	
DOILL_N(-3)	0.414***	0.0000	
DI_N(-1)	0.122***	0.0000	
DI_N(-2)	-0.118***	0.0000	
DI_N(-3)	0.097***	0.0000	
DI_N(-4)	0.044***	0.0085	
DI_N(-6)	0.083***	0.0000	
DI_N(-13)	0.044***	0.0005	
DEXC_P(-1)	-1.756***	0.0000	
DEXC_P(-4)	0.947***	0.0001	
DEXC_P(-5)	0.863***	0.0003	
DEXC_P(-3)	-0.955***	0.0000	
DEXC_N(-10)	-1.249***	0.0010	
Diagnostic Tests			
Adjusted R-squared	0.802574	Ramsey-Reset	1.51(0.22)
LM	1.27 (0.25)	CUSUM Q	Sta.
BPG	124 (0.17)	CUSUM Q^2	Sta.

The bottom panel of Table 4 also shows the diagnostic tests regarding the validation of model assumptions. Lagrange Multiplier (LM) test and the Breusch-Pagan-Godfrey test indicate that the results are free from autocorrelation and heteroskedasticity. Therefore, it is possible to conclude that the NARDL model is well-specified[10].

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[10] *To conserve space, some of the short–term coefficients cannot be reported in this table. However, they are available on request.*

The coefficients that reflect the long-term relationship between BIST100 and selected macroeconomic variables are reported in Table 5. These long-term coefficients are obtained from the estimation of the NARDL model, which is shown in Table 4.

Table: 5
Long-Term Coefficients

Variable	Coefficient	Variable	Coefficient
$L_{oil}+$	-0.677***	L_i+	-0.012**
$L_{oil}-$	-0.061	L_i-	0.030***
L_y+	-0.236	$L_{exc}+$	1.791***
L_y-	0.200	$L_{exc}-$	-2.193***

*, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table 5 indicates that all coefficients except industrial production have the expected sign. Although the rise and decline of industrial production yield coefficients with unexpected signs, they are insignificant. That is, the variations in industrial production do not explain the changes in stock prices. Although industrial production does not yield significant positive and negative partial sums in the cointegration, it has a substantial contribution in the short run that is in line with expectations. Excluding industrial production affects estimation negatively. Therefore, we decide to keep industrial production in the model.

However, the changes in oil prices have different impacts on stock prices. Oil price increases have a significant and adverse effect on BIST100. Once they rise by 1%, the BIST100 index experiences a 0.67% decrease. On the other hand, oil price decreases do not affect Turkey's stock market since the long-term coefficient is insignificant. As expected, positive and negative changes in interest and exchange rates have different impacts on stock prices. A tighter monetary policy will have less impact on stock returns than an expansionary policy, which is in line with Bernanke and Kuttner (2005) and Tiryaki et al. (2019). Exchange rate variations have the highest impact on positive and negative shocks. Table 5 shows that when the Turkish Lira depreciates by 1%, stock returns in Borsa Istanbul increase by 1.79%. The effect of adverse shocks on the exchange rates of BIST100 is even more significant. When the exchange rates decrease by 1%, stock returns drawback of 2.193%. The findings in Table 5 reflect the asymmetrical impacts caused by the explanatory variables. The results are primarily in line with previous studies and economic theory.

To test the coefficient stability for the estimated relationship between BIST100 and selected macroeconomic variables, cumulative sum (CUSUMQ) and cumulative sum of squares (CUSUM of squares) are also conducted, as suggested by Brown et al. (1975). The results of CUSUMQ and CUSUM of squares are presented in Figure 2. Both plots show that CUSUM and CUSUM of squares stay within the critical bounds at the 5% significance level. Therefore, the coefficients of the estimated model are stable over the analysis period.

Figure: 2
CUSUMQ and CUSUM of Squares Results
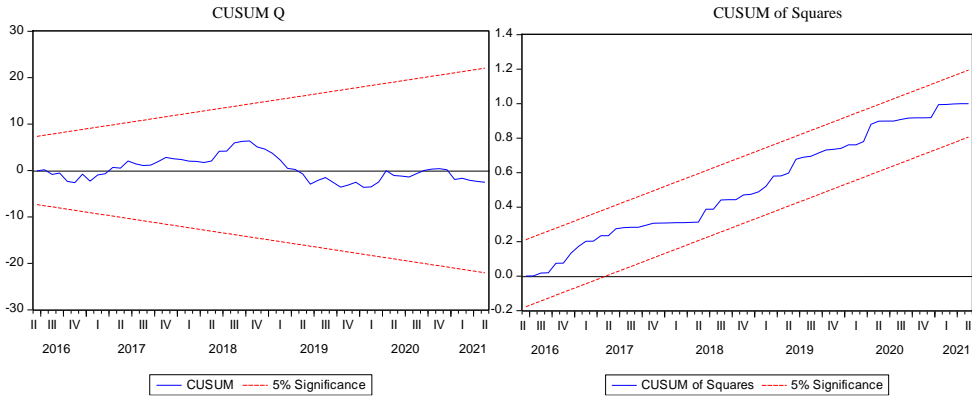
Overall, the findings imply that the effects of oil prices, interest rates, and exchange rates on stock returns in Turkey are asymmetric, which points out the NARDL as the correct estimation method. Tiryaki et al. (2019) show that the asymmetric effects on stock returns are more explicit when the interest rates and exchange rates rise together. This study shows that only increases in oil prices negatively affect stock returns. Decreases in oil prices have no significant impact. The lack of evidence for the oil price decreases must be taken into consideration by policymakers carefully. This finding suggests that the adverse effects of oil price increases on the stock market cannot be reversed easily by oil price falls. We cannot observe an uprising stock market when oil prices decline. Therefore, specific policies are required to manage the negative impacts of oil price hikes.

Demirer et al. (2020) note that oil price changes have important implications for the effectiveness of portfolio diversification. These changes can force many major asset classes, including stock prices, to act in the same direction, reducing the advantages of forming a portfolio. Depending on the size of the positive oil price shocks, portfolio shifts might be considered by investors.

Our findings are mostly in line with the increased production costs argument that claims that when oil cannot be substituted with another input, cash flows to the firm will be negatively impacted, and the stock prices will decrease. To avoid this negative consequence, alternative energy sources, especially renewable energy potential, must be evaluated carefully by policymakers. The dependency on oil as an input must be reduced. Besides, oil price increases have a strong potential to create inflationary pressure. Monetary policymakers must carefully consider this pressure, especially when a tighter monetary policy is not as effective as an expansionary monetary policy.

Our results also indicate that global factors dominate Turkish stock markets. The asymmetric response of stock markets to various macroeconomic variables, particularly oil prices as a commodity traded in stock exchanges, must be considered in portfolio diversification strategies.

4.2. The Role of Oil Price Shocks in the Asymmetric Oil Price - Stock Market Relation: Quantile Regression Approach

In the previous section, we have shown that the changes in oil prices and monetary policy have an asymmetric impact on stock market returns. In this section, we examine the possible sources of asymmetry. To do so, we explore the effects of specific oil price shocks and whether monetary policy change affects the oil shocks - stock returns relationship. The findings for Eq (8), in which only the oil price shocks are considered, are presented in Table 6.

Table: 6
Results from Quantile and OLS Regressions for the Relationship between BIST100 and Oil Price Shocks

	Bearish Market			Normal Market			Bullish Market			OLS
	$\tau_{0.1}$	$\tau_{0.2}$	$\tau_{0.3}$	$\tau_{0.4}$	$\tau_{0.5}$	$\tau_{0.6}$	$\tau_{0.7}$	$\tau_{0.8}$	$\tau_{0.9}$	
O_{econ}	0.013	-0.011	-0.002	-0.002	-0.006	-0.001	-0.002	0.001	-0.006	-0.005
	(0.0193)	(0.0113)	(0.0108)	(0.0112)	(0.0101)	(0.0094)	(0.0084)	(0.0091)	(0.0128)	(0.0073)
O_{cons}	0.003	0.004**	0.006***	0.006***	0.005**	0.001	0.001	0.002*	0.001	0.003**
	(0.0030)	(0.0018)	(0.0017)	(0.0020)	(0.0021)	(0.0023)	(0.0019)	(0.0013)	(0.0029)	(0.0016)
O_{invent}	-0.002	-0.005	0.003	0.008	0.007	-0.001	-0.002	0.003	0.003	0.002
	(0.0127)	(0.0147)	(0.0128)	(0.0110)	(0.0105)	(0.0108)	(0.0098)	(0.0084)	(0.0121)	(0.0071)
O_{supply}	-0.008	-0.008	-0.007	-0.009	-0.009	-0.009	-0.010	-0.003	-0.006	-0.007
	(0.0117)	(0.0058)	(0.0061)	(0.0082)	(0.0080)	(0.0091)	(0.0102)	(0.0116)	(0.0104)	(0.0049)
Constant	-0.087***	-0.056***	-0.026***	-0.007	0.004	0.030***	0.050***	0.070***	0.097***	0.008
	(0.0123)	(0.0083)	(0.0075)	(0.0060)	(0.0053)	(0.0060)	(0.0056)	(0.0049)	(0.0086)	(0.0057)
Observations	197	197	197	197	197	197	197	197	197	197
R-squared										0.063

*Standard errors are provided in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*

The findings in Table 6 indicate that only oil consumption demand shocks significantly influence the stock market returns, and this effect is observed in bearish and regular markets. For the higher quantiles, the significance of oil consumption shocks almost completely vanishes[11]. This finding is in line with Nusair and Al-Khasawneh's (2018) evidence. They note that the impact of oil price changes is more pronounced for the low levels of stock markets due to worries about the state of the economy. Smyth and Narayan (2018) note in their review that the asymmetric effects of oil prices are less visible in the upper quantiles than in the lower quantiles. Zhu et al. (2016) state that there is a co-movement between oil prices and stock markets for bearish stock markets in China, which disappears in the bullish markets.

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[11] *The same analysis is repeated with the oil price shocks that are decomposed into positive and negative price shocks. The results reveal that oil consumption shocks are significant for the bearish and normal market levels when the shocks are positive.*

The summary of the coefficients obtained from different quantiles and their comparison with the standard OLS estimates are provided in Figure 3.

Figure: 3
The Effects of Oil Shocks for Each Quantile
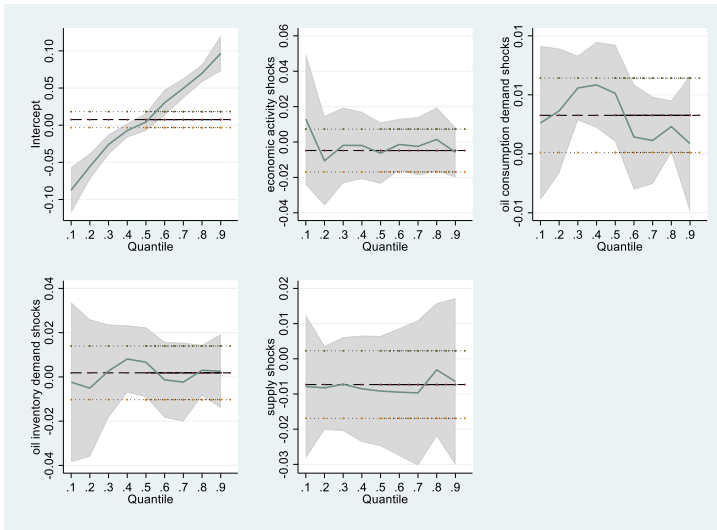
Figure 3 shows that each oil shock's effects and magnitude over quantiles differ significantly from the OLS estimations. In other words, the impact of oil shocks varies depending on the state of stock market returns. The variation is evident for the oil consumption shocks.

Observing the positive impact of oil consumption shocks on the bearish stock markets can be attributed to the investor sentiment approach. Demirer et al. (2020) argue that oil price changes significantly affect investor sentiment. Turkish investors seem to take oil consumption shocks as a sign of a future economic boom. They expect that it will be reflected in better corporate performance, as suggested by Smyth and Narayan (2018). This effect is more substantial when the market is in a bearish state. During the bullish market, they do not expect a more significant economic boom in the future. This finding is essential for policymakers since it shows which oil shock drives investor sentiment and stock market returns.

The same analysis is repeated with the interaction terms by adding a multiplication of each shock with short-term interest rates. The results are demonstrated in Table 7.

Table: 7
Results from Quantile and OLS Regressions with Monetary Policy Interaction Terms

	Bearish Market			Normal Market			Bullish Market			OLS
	$\tau_{0.1}$	$\tau_{0.2}$	$\tau_{0.3}$	$\tau_{0.4}$	$\tau_{0.5}$	$\tau_{0.6}$	$\tau_{0.7}$	$\tau_{0.8}$	$\tau_{0.9}$	
O_{econ}	0.013	-0.008	0.009	0.012	-0.006	-0.017	0.000	0.003	0.011	-0.003
	(0.0357)	(0.0289)	(0.0245)	(0.0246)	(0.0227)	(0.0215)	(0.0232)	(0.0273)	(0.0254)	(0.0167)
O_{cons}	0.004	0.005	0.008	0.009	0.006	0.004	0.007	0.000	-0.007	0.004
	(0.0051)	(0.0050)	(0.0054)	(0.0062)	(0.0068)	(0.0068)	(0.0076)	(0.0068)	(0.0066)	(0.0040)
O_{invent}	0.038*	0.027	0.040*	0.025	0.023	0.024	0.022	0.002	-0.010	0.023*
	(0.0215)	(0.0207)	(0.0226)	(0.0166)	(0.0166)	(0.0236)	(0.0243)	(0.0245)	(0.0244)	(0.0131)
O_{supply}	0.007	-0.000	0.007	0.008	0.011	0.007	0.009	-0.005	-0.008	0.004
	(0.0241)	(0.0131)	(0.0102)	(0.0141)	(0.0140)	(0.0143)	(0.0185)	(0.0232)	(0.0230)	(0.0086)
O_{econ} X Interest Rates	-0.000	-0.000	-0.001	-0.001	0.000	0.002	0.000	-0.000	-0.001	-0.000
	(0.0037)	(0.0028)	(0.0023)	(0.0023)	(0.0021)	(0.0021)	(0.0025)	(0.0028)	(0.0030)	(0.0017)
O_{cons} X Interest Rates	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.001	-0.000
	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0003)
O_{invent} X Interest Rates	-0.004*	-0.003	-0.003*	-0.002	-0.002	-0.002	-0.002	0.000	0.001	-0.002*
	(0.0020)	(0.0018)	(0.0018)	(0.0015)	(0.0015)	(0.0021)	(0.0023)	(0.0025)	(0.0027)	(0.0012)
O_{supply}	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001	-0.001	-0.000	0.001	-0.001
	(0.0023)	(0.0013)	(0.0009)	(0.0013)	(0.0013)	(0.0016)	(0.0018)	(0.0016)	(0.0018)	(0.0009)
Constant	-0.084***	-0.050***	-0.031***	-0.011**	0.006	0.031***	0.049***	0.070***	0.102***	0.008
	(0.0109)	(0.0089)	(0.0064)	(0.0052)	(0.0060)	(0.0072)	(0.0100)	(0.0093)	(0.0111)	(0.0058)
Observations	197	197	197	197	197	197	197	197	197	197
R-squared										0.087

*Standard errors are provided in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*

Table 7 reveals weak evidence for the impact of oil inventory demand shocks on stock returns. This effect is positive and significant only at the 10% level and valid for bearish stock markets. The interaction term for oil inventory shocks has a negative and significant coefficient. It means that the interest rate changes lower the impact of oil inventory shocks on stock market returns[12]. This effect disappears entirely for the third quartile (Q=0.3).

The reasons behind the lowering effect of interest rate changes on the impact of oil prices can be inferred by looking at the various channels in the transmission mechanism of oil prices to stock returns. We have explained that the positive effects of the oil price shock on the stock market return can be attributed to the higher investor sentiment by examining the results in Table 6. In addition to the investor sentiment channel, one must consider the monetary channel and production costs argument in the oil price-stock returns nexus together. The energy structure of Turkey is highly dependent on imported oil. Oil price shocks elevate production costs significantly. This result has already been put forth using the NARDL approach in the previous section. Increased production costs are reflected in the prices quickly, which creates inflationary pressure on the Central Bank. Here, the monetary channel in the transmission mechanism becomes prominent. As noted by Degiannakis et al. (2018), this pressure causes an increase in short-term interest rates. The rise in interest rates will decrease the value of future cash flows to the firms and eventually negatively affect the stock market. Therefore, the changes in the interest rates will be erased by the positive expectations in the bearish stock markets due to the oil inventory shocks.

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[12] *The linear test for the sum of coefficients of oil inventory shocks and the respective interaction terms is significant at 10% for the lowest quantile (τ=0.1) and insignificant for τ=0.30.*

Overall, our findings are in line with the previous literature. We find more pronounced impacts of oil demand shocks in the lower levels of stock markets, as in Zhu et al. (2016), Nusair and Al-Khasawneh (2018), and Smyth and Narayan (2018).

Mokni (2020) shows that oil-importing countries are less sensitive to oil price shocks than oil-exporting countries. Oil demand shocks are influential for oil-exporting countries, and the stock market reacts positively to these shocks. The oil-importing nature of Turkey can explain the lack of highly significant oil price shocks.

5. Conclusion

The literature on the impacts of oil prices on stock exchanges mainly considers developed countries. Their analyses are based on the assumption that this relationship is linear and symmetric. However, there is no reason to believe that such an assumption reflects the true nature of the oil price-stock exchange relationship. In this study, we use the NARDL approach to examine the nonlinear relationship between oil prices, industrial production, interest rates, exchange rates, and stock market index for the Turkish economy using the period between 2005:01 and 2021:06. Different from the existing literature, we use the short-term interest rates as the primary monetary policy tool while analysing the most current data for Turkey. We also look for the source of asymmetry in the oil price-stock market nexus by investigating the effects of different oil price shocks on stock returns. To do so, we employ OLS and quantile regression models, which allow us to detect any impact for varying stock market levels. In this sense, this study is the first that combines the NARDL and quantile regression approaches for the oil price changes - stock market association in Turkey.

Our results suggest a considerable degree of asymmetry in this relationship. More specifically, we show that only positive shocks in oil prices affect the stock prices negatively, while adverse shocks are insignificant. We also demonstrate that changes in interest rates and exchange rates have an asymmetric impact on stock markets. These effects on stock returns are more pronounced when interest and exchange rates rise together.

Our findings are important for both investors and policymakers. We show that oil prices as a global factor play a vital role in the formation of stock prices as risk indicators, besides traditional factors, namely future cash flows and dividends. The asymmetric part of oil prices is especially striking for the effectiveness of portfolio diversification. Oil price changes can force stock prices and other asset classes to move in the same direction, so the advantages of holding a diversified portfolio will be reduced. Depending on the size of the positive oil shock, this reduced effectiveness can be more pronounced. Therefore, investors might consider significant portfolio shifts conditional upon the size of the increase. In addition, investors must understand that only positive oil prices impact stock prices, which cannot be reversed by the oil price decreases.

From the policy formation standpoint, our results support the production cost argument. When oil as input is more expensive, future cash flows to firms will be negatively

affected, so stock prices decline. To manage these undesirable consequences, policymakers must concentrate on decreasing oil dependency at the production level by substituting it with alternative energy sources such as renewables. In addition, monetary policymakers must carefully consider the potential of oil price hikes to increase inflation.

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Does Public Debt and Investments Create Crowding-out Effect in Turkey? Evidence from ARDL Approach

Şeref Can SERİN (https://orcid.org/0000-0001-8575-9128), Harran University, Türkiye; scserin@harran.edu.tr

Murat DEMİR (https://orcid.org/0000-0002-1466-1104), Harran University, Türkiye; mdemir@harran.edu.tr

Kamu Borç ve Yatırımları Türkiye'de Dışlama Etkisi Yaratır mı? ARDL Yaklaşımından Kanıtlar

Abstract

The impact of public sector debt composition on the private sector is a matter of curiosity. This article explores the crowding-out effect of public debt and public investment on private investment in Turkey from 1975 to 2020, utilising the ARDL method. The findings reveal that public investment, public domestic debt stock, and external debt service create a crowding-out effect; on the other hand, the public external debt stock has a crowding-in effect on private sector investments. In this study, the crowding-out effect of public debt, which has not been directly related to private sector investments in the literature, is tried to be examined.

Keywords : Public Debt, Public Investment, Crowding-Out Effect, ARDL.

JEL Classification Codes : E62, H63, C32, O40.

Öz

Kamu kesimi borç kompozisyonunun, özel sektör üzerindeki etkisi bir merak konusudur. Bu makale, 1975-2020 dönemi için ARDL yöntemiyle kamu yatırımı ve kamu borcunun Türkiye'deki özel yatırımlar üzerindeki dışlama etkisini araştırmaktadır. Analizden elde edilen bulgular kamu yatırımı, kamu iç borç stoku ve kamu dış borç servisinin, özel sektör yatırımları üzerinde dışlama etkisi yarattığını göstermektedir. Kamu dış borç stoku ise özel sektör yatırımları üzerinde çekme etkisi yaratmaktadır. Bu çalışma, literatürde daha önce özel sektör yatırımları ile doğrudan ilişkisi araştırılmamış olan kamu borcunun dışlama etkisi incelenmeye çalışılmaktadır.

Anahtar Sözcükler : Kamu Borcu, Kamu Yatırımları, Dışlama Etkisi, ARDL.

1. Introduction

A lengthy discussion explores how the private sector is affected by the presence of the public sector, and its roots go back to the 18th century. It is not possible to say that a consensus has yet been reached on whether the existence of the public sector is a blessing or a disaster. In particular, countries' macroeconomic dynamics, development levels, and even social structures can differentiate the relationship between the private and public sectors. Financing the public sector is one of the critical structural problems of developing countries. On the one hand, a gradual increase and diversification of social demands and expectations put an extra burden on public expenditure. From another perspective, public expenditures were made with political preferences and priorities far from economic and financial rationality, creating considerable pressure on public spending.

On the side of public revenues, the quest for revenue increase, aside from solving the public finance problem, has revealed effects that cause the existing problems to deepen. For this reason, the impact of the public sector's expenditure, revenue, and even the use of debt instruments on the private sector is a matter of curiosity. In particular, the preference for expansionary fiscal policy in times of economic crisis caused deterioration in budget balances and severe increases in public debt in many countries (Yurdadog et al., 2021: 89). More importantly, the 2008 crisis that occurred in the housing market in the USA and affected the entire world, and the European Union debt crisis that followed this crisis, caused the share of the public sector in GDP to increase in most countries (Nautet & Meensel, 2011: 7). According to the IMF (2021), public debt stock/GDP in developed economies rose from 77% in 2008 to 120% in 2020. In developing countries, the public debt stock/GDP ratio, 34% in 2008, increased to 64% in 2020. The GDP share of Turkey's public domestic and external debt stock is also a sharp change, whose time path graph is presented in Figure 1. The effect of this sharp increase observed in the public debt stock on the private sector has become an issue that needs to be examined which is the primary motivation of this research.

Figure: 1
Public Domestic and External Debt Stock
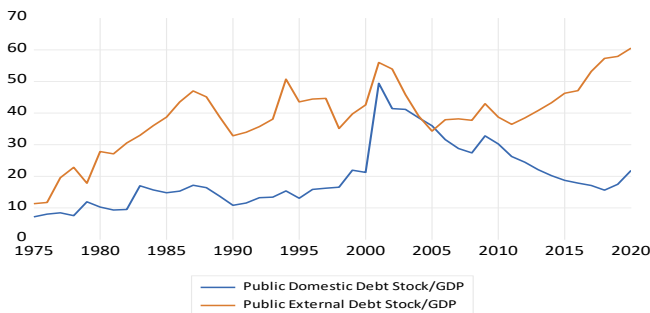
Source: TR Ministry of Treasury and Finance (2022).

Increasing tax revenues, resorting to central bank resources, and borrowing are the options that come to the fore as public revenues policy solves the public sector financing problem. In the part of expenditures, the priority is to reduce public spending. There are several constraints in using options for tax increases and central bank resources. As it is known, tax increases after a certain threshold create pressure on economic growth and development, while indirect tax increases create adverse effects on income distribution. Therefore, the issue that guides tax increases in the solution of the public financing problem is the negative effects of the tax increase on the social and economic structure rather than the financial resources required by the financing problem. Another option for the economic administrations facing some obstacles to the tax increase is the central bank resources. This resource's uncontrolled use undoubtedly causes deeper structural problems and exceptionally high inflation. In line with the fiscal rules applied in many countries, it is possible to say that the use of central bank resources is also subject to legal permissions. When it comes to reducing public expenditures to solve public financing problems, the type of expenditure primarily affected is investment expenditures.

Modern economic systems consist of not only the public sector but also the private sector. In this structuring, the state's ideological strategy is decisive regarding the share of the public and private sectors in the economy. Therefore, when analysed within the framework of macroeconomic theory, an increase in the use of resources by one of the sectors will cause the other to use fewer resources (Bilgili, 2003: 2). The goods and services offered by the public sector may include some social objectives instead of seeking profit. For this reason, private sector investments are vital for both developed and developing countries in terms of economic growth (Afonso & Aubyn, 2019: 48). With the Keynesian approach to sustainable economic growth, although the private sector's investments have a limited share in the total demand, it is an essential determinant of physical capital accumulation (Aschauer, 1989: 171). In this context, mixed economy models that accept the unity of the public and private sectors have been discussed for a long time in the literature of economic thought. The crowding-out effect, which has its roots in the classical economic view, has created comprehensive literature examining the impact of public expenditures on private investments by many authors (Sen & Kaya, 2014: 632).

It is observed that these studies, which investigate the effects of the public sector on the private sector, focus on three views: Keynesian, Neo-classical, and Ricardian approaches. Keynesian view-based studies argue that public expenditures have a complementary character to the private sector and therefore have a positive (crowding-in) effect on private sector investments (Khan & Gill, 2009: 6; Bahal et al., 2018: 323). However, studies centred on the Neo-classical approach also argue that public expenditures substitute for the private sector and create a negative (crowding-out) effect on the private sector's investments (Kustepeli, 2005: 186). Another approach within the scope of crowding-out effect studies is the Ricardian Equivalence approach, introduced to the literature by Barro (1974). Within the scope of Ricardian equivalence theory, it is argued that the public sector has neither a substitute nor a complementary effect on the private sector. This situation is because it is thought that tax increases in the future will finance the increase in public

deficits. Individuals who believe that tax rates will increase will not change their consumption/investment preferences by accepting that their income levels will not change. Therefore, it is argued that the deficits created by the public sector will neither have a deterrent nor an encouraging effect on the private sector (Taban & Kara, 2006: 16). If the public sector reduces the physical resources available to the private sector, there will be a direct crowding-out effect. However, suppose the expenditure structure of the public sector affects the private sector's cost structure because market conditions change. In that case, an indirect crowding-out effect comes to the fore.

The crowding-out effect is a concept that is theoretically based on public expenditures. Due to this structure, there are many studies examining the crowding-out effect empirically using various public expenditure compositions (Aschauer, 1989; Hyder & Qayyum, 2001; Kustepeli, 2005; Basar et al., 2011; Furceri & Sousa, 2011; Cural et al., 2012; Sen & Kaya, 2014; Yilanci & Aydın, 2016; Saidjada & Jahan, 2018; Funashima & Ohtsuka, 2019; Ebghaei, 2021). Unlike these studies, the number of studies examining the crowding-out effect of public investments on the private sector is substantial (Argimon et al., 1997; Cil-Yavuz, 2001; Uysal & Mucuk, 2004; Bilgili, 2003; Altunc & Senturk, 2010; Cural et al., 2012; Mahmoudzadeh et al., 2013; Yarasır-Tulumce & Buyrukoglu, 2013; Kesbic et al., 2016; Andrade & Duarte, 2016). However, studies examining the crowding-out effect of the public sector's debt structure on the private sector are relatively new and limited (Demir, 2017; Caskurlu, 2020; Ela & Pata, 2020; Kulu et al., 2021; Penzin & Oladipo, 2021; Vanlear et al., 2021). In short, various econometric methods, data sets, and samples are preferred in empirical studies. The following section provides a comprehensive review of the empirical literature examining the crowding-out effect.

In the studies conducted, there is no consensus on the impact of the public sector on private-sector investments. In addition, only a few studies in the literature directly deal with the crowding-out relationship between public debt components and the level of private sector investment, and current studies generally deal with public debt in one dimension as a domestic or external. With this study, the deficiency in the relationship between crowding-out and public debt in the literature has been tried to be eliminated. In this context, fixed capital investment in the private sector, fixed capital investment in the public sector, domestic debt stock, external debt stock, and external debt service variables are preferred for analysis.

The rest of the work is designed: Section two discusses the empirical literature. In the following section, the data set and econometric methodology are presented. In the fourth section, the study's empirical findings are given. The analysis results are associated with the literature and policy in this context in the last section. The study was concluded by making recommendations.

2. Literature

The roots of the theoretical literature examining the effects of the public sector on the private sector date back to the early periods of economic thought history. With the widespread use of econometric methods in light of scientific developments, many empirical studies have examined this theoretical literature from several aspects. It is observed that time series and panel data analysis is frequently preferred in terms of methods in studies conducted in this field. Although the literature examining the crowding-out effect has a common purpose in structure and model, the preferred model has a severe level of diversity in terms of sample and examination period. This diversity is valid in the findings obtained. This section discusses empirical studies examining the crowding-out effect of the public sector on the private sector and their conclusions.

Aschauer (1989) studied the crowding-out effect of public expenditures on private investment from the Neo-classical perspective for the United States from 1925 to 1985 using the FIML (full-information maximum-likelihood) method. As a result of research, increased public investment is expected to reduce one-to-one private investment. Argimon et al. (1997) used panel data methods to examine the crowding-out effect of government spending on private investment for 14 OECD member countries from 1979 to 1988. The study determined that public investment in infrastructure has a crowding-in effect on private investment. However, public expenditure on consumption has a crowding-out effect on private investment. Lächler and Aschauer (1998) examined the crowding-out effect in Mexico for the period 1970-to 1996 using the 2SLS (two-stage-least square) method. As a result of the study, it has been determined that public investment has a crowding-out effect on private investment.

Levaggi (1999) investigated the effect of the provision of pure and impure public goods crowding-out private consumption in Italy from 1960 to 1993 using the Maximum Likelihood method. The author argued that the provision of merit goods crowding-out effects occurs, but its impact is limited to private investment. In the case of pure public goods provision, the crowding-out effect have no significant impact on private consumption. Hyder and Qayyum (2001) studied the crowding-out effect of public investment on private investment and economic growth in Pakistan from 1964 to 2001 using Johansen co-integration and Granger causality methods. The authors concluded that public investment generates a crowding-in effect on private investment.

Hatano (2010) searched public investment's crowding-out effect on Japan's private investment from 1955 to 2004 using the Johansen co-integration and Granger causality method. In the research conclusion, the author points out a strong possibility of crowding-in relation to public investment on private investment. According to the Granger causality test result, there is a bidirectional Granger causality relationship between public investment and private investment. Furceri and Sousa (2011) performed an extensive study that focused on the crowding-out effect of government spending in 145 developed and developing countries from the period 1960 to 2007 by using the GMM (generalised method of moments)

estimation method. They found that government spending substantially crowds out private investment and consumption. Using the panel data method, Mahmoudzadeh et al. (2013) analysed the crowding-out effect of public expenditure on private investment for 38 (developed and developing) countries from 2000 to 2009. The authors found that public investment positively affects private investment in developing and developed countries. However, the crowding-in effect is more significant in developing countries than in developed countries. On the other hand, public consumption has a crowding-out effect in all samples. Additionally, the impact of the public deficit on private investment in developed and developing countries is crowding-out and crowding-in, respectively. Khan and Gill (2014) examined the crowding-out effect of public debt on the private sector in Pakistan from 1971 to 2006 using the Johansen co-integration method. The authors find a shred of evidence that the public debt crowd-in private investment.

Using the VAR method, Xu and Yan (2014) studied the crowding-out effect of public investment expenditures on private investment in China from 1980 to 2011. The authors investigate the public investment expenditure as two types: investment in public goods and investment in private goods. As a result of the research, the authors reported that when the government investment in public goods increases, it creates a crowding-in effect on private investment. However, government investment in private goods creates a crowding-out effect on private investment. Andrade and Duarte (2016) investigated the crowding-out effect of public investment on private investment in Portugal for the period 1960 to 2013 by using the VAR and ADL (augmented distributed lag) model. In conclusion, the author reported that public investment led to a crowding-in effect on private investment.

Atabaev et al. (2018) examined the public expenditure's crowding-out effect on private investment in Kyrgyzstan with monthly data from 2005 to 2013 using ARDL and VAR methods. The authors found that public spending affecting positively private investment in the transition economy of Kyrgyzstan. Bahal et al. (2018) analysed the public investment's crowding-out effect on private investment in India from 1950 to 2012 using the structural vector error correction (SVEC) method. The authors reported that public investment crowded out private investment from 1950 to 2012. In contrast to this finding, they are supported that there is a crowding-in effect in the more recent period 1980-2012. The authors explain the differences between results with the paradigm shift of India's economic growth model in the 1980s.

Saidjada and Jahan (2018) examined public investment's crowding-out effect on Bangladesh's private investment from 1981 to 2015 using the ARDL method. The authors found that public investment has a crowding-out effect on private investment. Using the VAR model, Afonso and Aubyn (2019) studied the macroeconomic impact of public and private investment in 17 OECD member countries from 1960 to 2014. They concluded that an increase in public investment led to a crowding-out effect for six countries (Belgium, Ireland, Finland, Canada, Sweden, and the UK). The crowding-in effect is valid for the rest of the sample.

Using spatial autoregressive panel data, Funashima and Ohtsuka (2019) performed innovative research about the crowding-out effect of government expenditure on the private sector in seven regions in Japan from 2001 to 2013. The authors found that the crowding-out effect differentiates from region to region, but the crowding-out effect of public investment might be negligible for the sample. As a result of the analysis of urban areas, public consumption has a partially crowding-in effect on private consumption. Nevertheless, in rural areas, there is a crowding-in effect. Using the panel data method, Kulu et al. (2021) examine the crowding-out effect of government domestic payment arrears on private investment for 33 Sub-Saharan African countries from 2007 to 2018. As a conclusion of the analysis, the authors point out that government domestic payment arrears have a crowding-out effect on private investment.

In the literature, some studies deal with the crowding-out effect outside of the dimensions of public expenditures and public investments. These studies investigate the crowding-out effect when the public sector prefers borrowing as a financing method.

Using panel data methods, Ahmet and Miller (2000) examined the crowding-out effect in the effect of debt-financed and tax-financed expenditures on private investment for 39 countries (developed and developing) from 1975 to 1984. The authors reported that debt-financed public spending has a crowding-out effect on private investment in developed countries; however, crowding-in for developing countries. However, tax-financed public expenditures crowd out private investment in all samples. Similarly, King'wara (2014) analysed the crowding-out effect of domestic public debt on private investment in Kenya from 1967 to 2007 using the Johansen co-integration method. The author reported a crowding-out effect of domestic public debt on private investment.

Akomolafe et al. (2015) analysed public debt's crowding-out effect on Nigeria's private investment from 1980 to 2010 using the Johansen co-integration method. In the research conclusion, the authors point out that domestic public debt has a crowding-out effect on private investment, though external public debt has a crowding-in effect in the long run but not in the short run. Mabula and Mutasa (2019) studied the impact of public debt on private investment in Tanzania for the period 1970 to 2016 by using the ARDL method. The authors found that external public debt has a crowding-in effect on private investment, but if the external debt/GDP exceeds the 40.89 thresholds, this relation turns into a crowding-out. Using panel data methods, Unsal (2020) studied the crowding-out effect of public expenditure on private investment in 17 OECD members from 1995 to 2017. The author reported that the public defence expenditure led to a crowding-in effect on private investment. On the other hand, the government's total public and social protection expenditures led to a crowding-out effect on private investment.

Using the GMM model, Vanlaer et al. (2021) examine the crowding-out effect of public and private debt on private investment for 28 EU member countries from 1995 to

2016. The authors found that public debt has a crowding-out effect on private investment. Finally, Penzin and Oladipo (2021) studied the crowding-out effect of domestic debt on private investment in Nigeria for 2000: Q1 - 2019: Q2 using the ARDL method. The authors reported that domestic debt negatively affects private investment.

The number of studies on the crowding-out effect on Turkey is also substantial. Studies on Turkey's public sector expenditures and investments report different results based on the preferred econometric method, the variables used, and the period examined. Cil Yavuz (2001) analysed the crowding-out effect of public investment and interest rates on private sector investment for Turkey in 1990: Q1-2000: Q4 using the Johansen co-integration method. The study determined that public investment has a crowding-out effect on private investment. Likewise, Simsek (2003) searched the crowding-out effect of public investment on private investment in Turkey from 1970 to 2001 using Johansen co-integration and Granger causality methods. The author reported that public investment has a crowding-out effect on private investment. Uysal and Mucuk (2004) investigated the crowding-out effect of public expenditure on private investment in Turkey from 1975 to 2000, employing the OLS method. As a result of the study, the authors reported that public spending has a crowding-out effect on private investment.

Kustepeli (2005) analysed the crowding-out effect of budget deficits on private investment in Turkey from 1963 to 2003 using the Johansen co-integration method. The author found that budget deficits create a crowd-out the private investment. Ismihan et al. (2005) studied the crowding-out effect of public expenditure on private investment in Turkey from 1963 to 1999 using the Johansen co-integration method. The authors point outs that public spending has a crowding-out effect on private investment. Comparably, Gunaydin (2006) searched public investment's crowding-out effect on private investment in Turkey for 1987: Q1-2004: Q3 by using the Johansen co-integration method. The author reported that public investment negatively affects private investment. In a similar period, Basar and Temurlenk (2007) investigated public expenditure's crowding-out effect on private investment in Turkey from 1980 to 2005 by using the SVAR (structural vector autoregression) method. The result of the study points out that the public expenditure crowd out private investment.

Using different indicators, Lebe and Basar (2008) studied the crowding-out effect of reel interest rates and foreign direct investment on private investment in Turkey from 1975 to 2006 using the OLS method. In the research conclusion, the authors found a crowding-in effect between foreign direct investment on private investment. However, the authors point out a crowding-out effect between reel interest rates on private investment parallel to the theoretical and empirical literature. Comparably, Bilgili (2003) examined the crowding-out effect of public expenditure on private investment for Turkey in 1988: Q1-2003: Q1 using VAR and VECM (vector error correction) models. The author reported a crowding-in relationship between total public expenditure on private investment. On the other hand, the author points out a crowding-out effect between public investment on private investment. Altunc and Senturk (2010) also studied the crowding-out effect of public investment on

private investment in Turkey from 1980 to 2009 using the ARDL method. According to the findings obtained, it has been suggested that there is a crowding-in relationship between public investment on private investment.

Basar et al. (2011) examined the crowding-out relationship between public expenditure and interest payment on private investment in Turkey for 1987: Q1- 2007: Q3 using the Johansen co-integration method. The authors found that public expenditure and interest payment generate a crowding-in effect on private investment. Cural et al. (2012) analysed the crowding-out effect of public investment on private investment in Turkey from 1970 to 2009 using the Carrion-I Silvestre and Sanso co-integration method. They reported the crowding-in effect of public investment on private investment. Sen and Kaya (2014) extensively analysed the crowding-out effect of public expenditure on private investment in Turkey for the period 1975 to 2011 by using the Johansen co-integration method. The authors concluded that public investment generates a crowding-in effect on private investment. However, the other type of public expenditure (government's current transfer, current spending, and interest payments) led to a crowding-out effect on private investment.

Kesbic et al. (2016) investigated public investment's crowding-out effect on private investment in Turkey from 1986 to 2014 using the Johansen co-integration method. The authors point out that public investment negatively affects private investment. Yilanci and Aydin (2016) searched the crowding-out effect of public investment on private investment in Turkey from 1980 to 2014 using the Maki co-integration analysis. As a result of the research, the author points out that public investment has a crowding-in effect on private investment. Similarly, Demir (2017) studied the crowding-out effect of public investment on private investment in Turkey from 1983 to 2013 using the ARDL method. The author reported that public investment generates a crowding-in effect on private investment.

Gultekin-Tarla and Temiz (2020) studied the crowding-out effect of public investment on private investment in Turkey for the period 1975 to 2016 by using the Johansen co-integration method. As a conclusion of the analysis, the authors reported that public investment led to a crowding-in effect on private investment. Ebghaei (2021) searched the crowding-out effect of public expenditure on private investment in Turkey from 1980 to 2018 using the Johansen co-integration method. The author points out that public investment has a crowding-in effect on private investment, but public expenditure has a crowding-out effect on private investment. Using different indicators, Kurul (2020) analysed the crowding-out effect of outward foreign direct investment on domestic investment in Turkey from 1970 to 2018 using the ARDL method. In the research conclusion, the author reported that foreign direct investment creates a crowding-out effect on domestic investment.

There is also relatively limited literature examining the effects of public-sector borrowing on the private sector. Taban and Kara (2006) searched the crowding-out effect of public domestic debt on private investment in Turkey for 1989: Q1-2004: Q4 using the OLS method. As a result of the study, the authors reported a crowding-out effect of public

domestic debt on private investment. Yarasir-Tulumce and Buyrukoglu (2013) searched the crowding-out effect of public debts on Turkey's private investment from 1980 to 2010 using the Johansen co-integration method. As a result of the research, the authors reported a crowding-out effect of rising interest rates because of public debt on private investment.

Caskurlu (2020) analysed the crowding-out effect of public debt on private investment in Turkey for the period 1975 to 2016 by using the ARDL method. As a result of the analysis, the author reported that public debt has a crowding-out effect on private investment. Also, Ela and Pata (2020) investigated the crowding-out effect of public debt on Turkey's private investment from 1987 to 2017 using the Bayer Hanck co-integration method. The authors found that the public external debt service has a crowding-out effect on private investment. The literature mentioned above examines public sector debts in a single dimension. The studies about the crowding-out effect of public debt in Turkey are somewhat limited. This study aims to address the public debt in Turkey with a multidimensional structure, trying to eliminate this gap in the literature and prepare a scientific basis for future works. In addition, the summary table regarding the empirical literature is presented in Appendix 2.

3. Data, Model and Methodology

3.1. Data and Model

This study will investigate the effect of public debt composition and public investment on private investment using annual data covering Turkey's period 1975-2020e model to be analysed in the study is presented in equation 1:

$$lnPI_t = \alpha_0 + \alpha_1 lnGI_t + \alpha_2 lnPddebt_t + \alpha_2 lnPedebt_t + \alpha_3 lnPedebtsrv_t + u_t \qquad (1)$$

Table: 1
Descriptive Statistics

Variables	Mean	Median	Max	Min	Std. Dev.	JB	JB (p-value)
lnPI	2.9031	2.8914	3.2241	2.4932	0.2415	3.0371	0.2190
lnGI	1.5698	1.5336	2.0281	1.1314	0.2624	2.8666	0.2385
lnPddebt	2.8707	2.8186	3.8999	1.9657	0.4794	0.7898	0.6737
lnPedebt	3.6129	3.6575	4.1033	2.4274	0.3595	40.483	0.0000
lnPedebtsrv	0.9026	1.0050	1.9100	-0.5300	0.6912	3.3984	0.1828

In Equation (1), the dependent variable as a proxy of Private investment PI represents the Private Fixed Capital Investment (% of GDP). As a proxy of public investment GI, the independent variable represents the Public Fixed Capital Investment (% of GDP). *Pddebt*, *Pedebt*, and *Pedebtsrv* are public domestic debt stock (% of GDP), public external debt stock (% of GDP), and public external debt service (% of GDP), respectively. The logarithm of all series expressed in Equation (1) has been taken. Descriptive statistics of the variables are presented in Table 1. The data was compiled using various sources such as the TR Ministry of Treasury and Finance, TR Presidency of Strategy and Budget, and The World Bank database, subject to their availability.

3.2. Methodology

The empirical analysis of the study consists of four stages. In the first step, the stationarity properties of the series will be tested by using the Fourier-ADF unit root test developed by Enders and Lee (2012) and the ADF unit root test developed by Dickey and Fuller (1979), then whether a cointegration relationship between the series will be investigated with the ARDL method developed by Pesaran et al. (2001). Diagnostic tests and long and short-run estimations will be presented if there is a cointegration relationship. Lastly, Phillips and Hansen (1990) Fully modified least squares (FMOLS) and Stock and Watson's (1993) dynamic least squares (DOLS) estimates will be performed to provide robust results.

3.2.1. Fourier-ADF and ADF Unit Root Test

The ADF unit root test, represented in equation 2, allows three regression specifications: no intercept and trend, only intercept and intercept with the trend.

$$\Delta y_t = \alpha(t) + \delta t + \vartheta y_{t-1} + \sum_{i=1}^{p} \beta_i y_{t-i} + u_t \tag{2}$$

In Eq. (2), the deterministic term as a function of time is (t), optimal lag length determined by the Akaike or Schwarz information criteria denoted by p. u_t is a stationary error term with variance σ_u^2. Lasty, ϑ and β_i are coefficients. Furthermore, lagged values of Δy_t are included in a model to prevent autocorrelation problems. By adding nonlinear terms (*Fourier*) to equation (2) above, the Fourier ADF unit root test equation expressed by Enders and Lee (2012) is defined.

$$\Delta y_t = \alpha_1 + \delta t + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \sum_{i=1}^{p} \beta_i y_{t-i} + \vartheta y_{t-1} + u_t \tag{3}$$

The Fourier ADF test's null hypothesis is that the series has a unit root. The table critical values in which the t-statistic is compared can only vary according to Fourier frequency (k), and the number of observations (T) (Pata & Aydın, 2020: 6). During the Fourier ADF testing process, bootstrap simulation or Monte Carlo calculates t statistics. If the t statistic value > the value of the t table, the variable is judged to have a stationary process. The F constraint test calculates the significance of the Fourier terms. As a first step, we tested the significance of the Fourier terms according to the F constraint test. Then, as a second step, the Fourier test statistic is calculated. If the F statistic calculated in the first step is lower than the F table value, the Fourier ADF equation turns into the ADF (1979) equation. In other words, the ADF test is used when the F statistic is not statistically significant.

3.2.2. The ARDL Method

Researchers in the empirical literature frequently prefer the ARDL model developed by Pesaran et al. (2001). The ARDL method provides flexibility to researchers as it allows independent variables to be I (0) or I (1) under the assumption that the dependent variable is

I (1). To determine whether there is a cointegration relationship between the ARDL method and the series, Pesaran et al. (2001) F-bound test and t-bound test should be applied.

$$F_{test} \; H_0: \phi_1 = \phi_2 = \phi_3 = \phi_4 = \phi_5 = 0 \tag{4}$$

$$t_{test} \; H_0: \phi_1 = 0 \tag{5}$$

Pesaran et al. (2001) calculated an F-test statistic to determine the cointegration relationship. Suppose that the test statistic calculated according to this approach, known as the F-bounds test, is smaller than the critical value of the all-bound (0). In that case, the null hypothesis cannot be rejected, and it will be concluded that there is no cointegration relationship. Suppose that the obtained F test statistics are in the region of instability between the lower bound critical value I (0) and I (1) upper bound critical value. In that case, deciding on the cointegration relationship will not be possible. However, if the F-test and t-test value of Pesaran et al. (2001) or if it is greater than the critical values in Narayan (2005) adjusted for sample size, the null hypothesis will be rejected be decided that there is a cointegration relationship.

In this context, the econometric model to be evaluated with the ARDL method is presented in equation 6:

$$\Delta lnPI_t = \vartheta_0 + \omega_1 \sum_{i=1}^{h} \Delta lnPI_{t-i} + \omega_2 \sum_{i=0}^{s} \Delta lnGI_{t-i} + \omega_3 \sum_{i=0}^{c} \Delta lnPddebt_{t-i} + \omega_4 \sum_{i=0}^{p} \Delta lnPedebt_{t-i} + \omega_5 \sum_{i=0}^{k} \Delta lnPedebtsrv_{t-i} + + \phi_1 lnPI_{t-1} + \phi_2 lnGI_{t-1} + \phi_3 lnPddebt_{t-1} + \phi_4 lnPedebt_{t-1} + \phi_5 lnPedebtsrv_{t-1} + \mu_t \tag{6}$$

4. Empirical Results

First, the unit root properties of the variables are examined by Fourier ADF and ADF unit root tests. Table 2 shows the unit root test results:

Table: 2
Unit Root Test Results

Variables	FADF (model A)				ADF		
	I (0)	I (1)	k(p)	f	I (0)	I (1)	p
lnPI	-0.904	-7.673***	5(0)	4.657	-1.366	-6.450***	0
LnGI	-2.834	-6.511***	3(1)	1.753	-1.336	-5.953***	1
lnPddebt	-2.873	-8.307***	2(0)	3.596	-2.074	-7.453***	0
lnPedebt	-4.948***	-	2(4)	6.684	-3.483**	-	0
LnPedebtsrv	-1.760	-6.556***	1(0)	5.998	-2.156	-5.157***	0

*Note: ***, ** denote significance at 1% and 5% levels, respectively. (k) denotes the chosen frequency. Optimal lag lengths (p) were selected automatically using the SC.*

The results in Table 2 show that all variables except *lnPedebt* have a unit root at the level. It is observed that the variables become stationary at the first difference. Maximum integration of series is I (1). According to this finding, the integration degrees of the series are suitable for the ARDL model to be preferred. The econometric model specified in Equation (6) was tested within the framework of the constraints specified in equations (4) and (5), and the results are presented in Table 3:

Table: 3
ARDL Bound Test Results

Model (2,1,4,1,3)	F_{test}		t_{test}			
lnPI=f(lnGı lnPddebt lnPedebt lnPedebtsrv)	7.0270***		-63671***			
	Pesaran et al. (2001)				Narayan (2005)	
	F_{test}		t_{test}		F_{test}	
Critical Values	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
1%	3.74	5.06	-3.43	-4.6	4.42	625
5%	2.86	4.01	-2.86	-3.99	3.20	4.54
10%	2.45	3.52	-2.57	-3.66	2.66	3.83

*Note: *** denotes significance at the 1% level. Optimal lag lengths in the ARDL model selected by AIC.*

In Table 3, the results of the ARDL bound test are calculated according to the constraints specified in equations (4) and (5), and the critical values for measuring their statistical significance are presented. The critical values for the general F-test and t-test were taken from Pesaran et al. (2001), and the general F-test was adjusted for sample size from Narayan (2005). When the bound test results were examined, it was decided that the critical values specified in the three tests were more significant at the 1% significance level. Therefore, the cointegration relationship between the series is valid. In other words, the series move together in the long run. In this context, the ARDL long-term estimations and diagnostic tests are presented in Table 4:

Table: 4
ARDL Long-run Coefficients

Variables	Coefficients	t-statistics	Standard Errors	Diagnostic Tests
lnGI	-0.3622***	-4.4682	0.0810	LM=2.1952 (0.1332) ***
lnPddebt	-0.1079**	-2.0179	0.0534	BPG=0.942(0.5343) ***
lnPeddebt	0.5255***	6.153	0.0854	Ramsey=0.2879(0.7757) ***
lnPedebtsrv	-0.175***	-5.0976	0.0344	JB=0.2024 (0.9037) ***
				Cusum (CusumQ) = S(S)

*Note: ***, ** denote significance at the 1% and 5% levels, respectively. Probability values are in parentheses in diagnostic tests, and S denotes stable.*

Table: 5
ARDL Short-run Coefficients

Variables	Coefficients	t-statistics	Standard Errors
ΔlnPI	0.3717***	3.0145	0.1233
ΔlnGI	-0.1587	-1.6187	0.0980
ΔlnPddebt	-0.2900***	-5.1948	0.0558
ΔlnPedebt	0.2563***	2.0700	0.1238
ΔlnPedebtsrv	-0.2054***	-2.7993	0.0733
C	1.9693***	6.4086	0.3073
ECT_{t-1}	-0.9566***	-6.3671	0.1502

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

The result of the diagnostic test is presented in table 4. The model has no serial correlation, heteroscedasticity, functional form, and non-normal distribution problems. Also, Cusum and CusumQ test results indicate stable coefficients (see Annex). According to the results of the diagnostic tests in Table 4, the model is stable and fit. When the long-run estimation results are examined, it is observed that the public investment expenditure has a negative and statistically significant effect on private investment. In other words, parallel to the theoretical expectation of the Neo-classical approach, public investments crowd out private investments in the long run. Public investment in Turkey is a substitute

for private investment. According to the findings, when public investment increases by 1%, private investment decreases by 0.36%. Similarly, public external debt services and public domestic debt have a statistically significant and negative effect on private investment. So that we support that public domestic debt and public external debt services also crowd out private investment. Numerically, an increase of 1% in public domestic debt led to a decrease of 0.10% in private investment. Also, when the public external debt services increase by 1% reduces private investment by 0,17%. The increase in the domestic debt of the public sector in Turkey makes the private sector's access to capital more costly. As of December 2020, the banking sector provides 67% of Turkey's public domestic debt stock. This shows that the state uses the capital needed for domestic investment and creates an indirect crowding-out effect by increasing costs. In addition, the increase in external debt service leads to a further decrease in foreign exchange resources in Turkey, which has an insufficient composition of foreign exchange resources.

Contrary to these effects, public external debt has a positive and statistically positive impact on private investment in the long run. For this reason, the public external debt is creating a crowding-in effect on private investment. When the public external debt increases by 1%, private investment rises by 0,5%. As a developing country, Turkey needs external resources to achieve economic growth. In this context, foreign resource inflow to the Turkish economy, which needs imported inputs purchased with foreign currency, especially energy, can increase domestic investments in production preference.

In Table 5, it can be seen that public domestic debt and external debt services crowd out private investments, similar to long-term relationships. Public investment has a negative sign but is statistically insignificant. Public external debt has generated a crowding-in effect in the short run. However, lagged value of the private investment creates a crowding-in effect since it generates capital accumulation. Finally, the error correction coefficient was negative and statistically significant. To check the robustness, a re-estimation was made using Stock-Watson's (1993) dynamic least squares (DOLS) and Phillips-Hansen's (1990) fully modified least squares (FMOLS) methods, and the results are presented in Table 6. FMOLS and DOLS results are in line with ARDL long-term estimates.

Table: 6
FMOLS and DOLS Estimate Results

Variables	FMOLS		DOLS	
	Coefficients	t-statistics	Coefficients	t-statistics
lnGI	-0.5983*** (0.0962)	-6.2150	-0.5435*** (0.1165)	-4.6645
lnPddebt	-0.1425*** (0.0519)	-2.7610	-0.1784*** (0.0552)	-3.2326
lnPeddebt	0.3443*** (0.0896)	3.8391	0.4539 *** (0.1060)	4.2796
lnPedebtsrv	-0.1649 *** (0.0347)	-4.7524	-0.1780*** (0.0429)	-4.1428
C	3.1701*** (0.4105)	7.7213	2.8033*** (0.4784)	5.8592

*Note: *** denotes significance at the 1% level. Values in parentheses indicate standard errors.*

FMOLS and DOLS estimators' results presented in table 6 have fully supported the results of the ARDL method. Both public investment, public domestic debt and public external debt services have a crowding-out effect on private investments. On the other hand, the public external debt has a crowding-in effect on private investment.

5. Conclusion

The reduction in investment expenditures negatively affects economic growth and development and creates effects that deepen financing problems in the medium and long term. It can be said that the options for raising taxes, using central bank resources, or reducing public expenditures for the solution to the public finance problem do not have a wide range of action, and each option causes new problems with different symptoms. Another option for tackling the public finance problem is borrowing. From the point of view of efficiency, borrowing can sometimes lead to a crowding-out effect by reducing the number of available funds or increasing capital costs. It can potentially affect macroeconomic variables negatively. It is a fundamental reason for financing economic growth and development in some cases.

In this paper, the crowding-out effect for Turkey during the 1975-2020 period was analysed using the ARDL method, with private investment, public investment, public domestic debt, public external debt, and public external debt service. First, the series' integration degrees were tested using the Fourier ADF and ADF unit root tests. All series were stationary at the first difference except public external debt. The ARDL bound test was performed because the series that we used to have different integration degrees, and the ARDL bound test allows independent variables to be I (0) or I (1) under the assumption that the dependent variable is I (1). As a result of ARDL, the statistical values of the F-test and t-test were more significant than the critical values at the 1% significance level. For this reason, the cointegration relationship between the series is valid.

Firstly, it has been determined that public investment significantly negatively affects private investment in the long run. In other words, public investment in Turkey is a substitute for private investment. According to the findings, when public investment increases by 1%, private investment decreases by 0.36%. This finding is consistent with the empirical results (Aschauer, 1989; Lächler & Aschauer, 1998; Cil-Yavuz, 2001; Simsek, 2003; Uysal & Mucuk, 2004; Ismihan et al., 2005; Bilgili, 2003; Yarasır-Tumluce & Buyrukoglu, 2013; Kesbic et al., 2016; Bahal et al., 2018; Saidjada & Jahan, 2018; Afonso & Aubyn, 2019). On the other hand, a part of the empirical literature suggests that public investments have a crowding-in effect on private investment (Altunc & Senturk, 2010; Cural et al., 2012; Mahmoudzadeh et al., 2013; Sen & Kaya, 2014; Yılancı & Aydın; 2016; Demir, 2017). The reason behind reaching different findings is presumably related to the preferred variables and the preferred period to examine.

Secondly, it has been determined that public domestic debt significantly negatively affects long-term and short-term private investment. According to empirical findings, an

increase of 1% in public domestic debt led to a decrease of 0.10% in private investment. With another approach, public domestic debt decreased available loanable funds for the private sector and generated an indirect crowding-out effect and increased investment costs (Taban & Kara, 2006; King'wara, 2014; Akomolafe et al., 2015; Kurul, 2020). Parallel to these findings, the increase in the domestic debt level of the public sector causes the crowding-out effect. While the public sector domestic debt/GDP share was 7% in 1975, it increased to its maximum level of 49% in the 2001 economic crisis.

As public borrowing increases, the sustainability of debts becomes controversial, and after a while, debts become unsustainable. In a way, this means that public borrowing also excludes private-sector investments. Domestic debt stock, which started to decrease rapidly within the framework of the applied fiscal discipline, began to increase again after the 2008 crisis and reached 32%. The public domestic debt, which started to grow again after 2015, reached 20% in 2020. Another factor causing the crowding-out effect is public external debt service. The empirical results point out that an increase of 1% in public external debt services reduces private investment by 0,17%. Also, this finding is consistent with empirical literature (Were, 2001; Shabbir, 2013; Ela & Pata, 2020). High external debt service does not negatively affect local borrowing, making private sector borrowing more costly. Theoretically, it is seen that countries with high external debt services cause a decrease in their current foreign exchange reserves and therefore have a deterrent effect on investments (Ela & Pata, 2020). High external debt service also reduces domestic savings (Mabula & Mutasa, 2019). Moreover, when external debt servicing negatively impacts public investment, it exacerbates the crowding-out effect. Lastly, we concluded that public external debt has a statistically significant and positive effect on private investment. According to the findings, when the public external debt increases by 1%, private investment rises by 0.5%.

Based on the empirical findings, except for the public external debt, which creates a crowding-in, the other variables lead to a crowding-out effect. According to the neoclassical theory, private and public sectors receive the financing resources they need from national or international loanable fund markets. Therefore, the increase in the reserve of loanable fund markets in Turkey and the accessibility of the private sector to these markets causes the crowding in effect parallel to the theoretical expectations and vice versa. In this context, the government's preference for external debt resources instead of borrowing from internal loanable funds is necessary not to crowd out the private sector. In this context, the government not going into domestic borrowing will reduce the inflationary pressures following the unpleasant monetarist arithmetic put forward by Wallace and Sargent (1981), which will reduce the borrowing costs in the future. Furthermore, Suppose the additional resource created by public external debt is directed to infrastructure and social expenditures that complement the private sector. In that case, the crowding-in effect will be realised at a higher level with a spillover effect. The collaboration of the public and private sectors, which constitutes the economic ecosystem, can thus have a structure that encourages each other instead of preventing each other. Academically, although some studies address the exclusion effect of public debt, there is no study for Turkey that directly examines the effect of external debt on private investments. Future studies will likely make a meaningful contribution to the

literature by investigating and evaluating the crowding-out effect by considering these factors.

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Appendix: 1

Figure: 1
Plots of CUSUM and CUSUMSQ
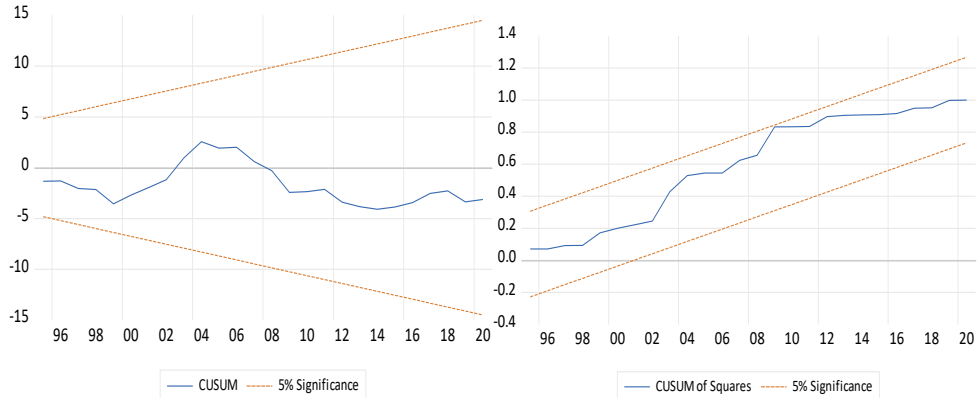
Appendix: 2

Authors	Sample		Method	Empirical Results	
	Period	Country		Variable whose effect on private investment is investigated	The effects of the variable
Aschauer (1989)	1925-1985	United States	FIML	Public investment	Crowding-out
Argimon (1997)	1979-1988	14 OECD Countries	Panel Data	Public investment in infrastructure	Crowding-in
				Public expenditure on consumption	Crowding-out
Lächler & Aschauer (1998)	1970-1996	Mexico	2SLS	Public investment	Crowding-out
Levaggi (1999)	1960-1993	Italy	ML	Provision of merit goods	Crowding-out
				Provision of pure public goods	Statistically insignificant
Ahmed & Miller (2000)	1975-1984	39 Developed & Developing Countries	Panel Data	Debt-financed public expenditure	Crowding-out (Developed countries) Crowding-in (Developing countries)
				Tax-financed public expenditure	Crowding-out
Cil-Yavuz (2001)	1990:Q1 2000:Q4	Turkey	Johansen co-integration	Public investment	Crowing-out
Hyder & Qayyum (2001)	1964-2001	Pakistan	Johansen co-integration Granger causality	Public investment	Crowding-in
Simsek (2003)	1970-2001	Turkey	Johansen co-integration Granger causality	Public investment	Crowding out
Uysal & Mucuk (2004)	1975-2000	Turkey	OLS	Public expenditure	Crowding-out
Ismihan et al. (2005)	1963-1999	Turkey	Johansen co-integration	Public expenditure	Crowding-out
Kustepeli (2005)	1963-2003	Turkey	Johansen co-integration	Budget deficits	Crowding-out
Gunaydin (2006)	1987:Q1 2004:Q3	Turkey	Johansen co-integration	Public investment	Crowding-in
Taban & Kara (2006)	1989:Q1 2004:Q4	Turkey	OLS	Public domestic debt	Crowding-out
Basar & Temurlenk (2007)	1980-2005	Turkey	SVAR	Public expenditure	Crowding-out
Lebe & Basar (2008)	1975-2006	Turkey	OLS	Foreign direct investment	Crowding-in
				Real interest rates	Crowding-out
Bilgili (2003)	1988:Q1 2003:Q1	Turkey	VAR VECM	Public expenditure	Crowding-in
				Public investment	Crowding-out
Hatano (2010)	1955-2004	Japan	Johansen co-integration Granger Causality	Public investment	Crowding-in
Altunc & Sentruk (2010)	1980-2009	Turkey	ARDL	Public investment	Crowding-in
Furceri & Sousa (2011)	1960-2007	145 Developed & Developing Countries	GMM	Public expenditure	Crowding-out
Basar et al. (2011)	1987:Q1 2007:Q3	Turkey	Johansen co-integration	Public expenditure	Crowding-in
				Public interest payment	Crowding-in
Cural et al. (2012)	1970-2009	Turkey	Carrion-I Silvestre & Sanso co-integration	Public investment	Crowding-in
Mahmoudzadeh et al. (2013)	2000-2009	38 Developed & Developing Countries	Panel Data	Public investment	Crowding-in
				Public consumption	Crowding-out
				Public deficit	Crowding-out (Developed countries) Crowding-in (Developing countries)
Yarasir-Tumluce & Buyrukoglu (2013)	1980-2010	Turkey	Johansen co-integration	Public debt	Crowding-out

Khan & Gill (2014)	1971-2006	Pakistan	Johansen co-integration	Public debt	Crowding-debt
Sen & Kaya (2014)	1975-2011	Turkey	Johansen co-integration	Public investment	Crowding-in
				Government current transfers	Crowding-out
				Government current spending	
				Government interest spending	
Xu & Yan (2014)	1980-2011	China	VAR	Public expenditure on public good	Crowding-in
				Public expenditure on private good	Crowding-out
King'wara (2014)	1967-2007	Kenya	Johansen co-integration	Public domestic debt	Crowding-out
Akomolafe et al. (2015)	1980-2010	Nigeria	Johansen co-integration	Public domestic debt	Crowding-out
Andrade & Duarte (2016)	1960-2013	Portugal	VAR ADL	Public investment	Crowding-in
Kesbic et al. (2016)	1986-2014	Turkey	Johansen co-integration	Public investment	Crowding-out
Yilanci & Aydin (2016)	1980-2014	Turkey	Maki co-integration	Public investment	Crowding-out
Demir (2017)	1983-2013	Turkey	ARDL	Public investment	Crowding-in
Atabaev et al. (2018)	2005:M1 2013:M1	Kyrgyzstan	ARDL VAR	Public expenditure	Crowding-in
Bahal et al. (2018)	1950-2012	India	SVEC	Public expenditure (From 1950 to 2012)	Crowding-out
				Public expenditure (From 1980 to 2012)	Crowding-in
Saidjada & Jahan (2018)	1981-2015	Bangladesh	ARDL	Public investment	Crowding-out
Afonso & Aubyn (2019)	1960-2014	17 OECD Countries	VAR	Public investment	Crowding-in[1]
					Crowding-out
Funashima & Ohtsuka (2019)	2001-2013	Japan	Spatial Autoregressive Panel Data	Public expenditure	Crowding-in
Mabula & Mutasa (2019)	1970-2016	Tanzania	ARDL	Public debt	Crowding-in
Caskurlu (2020)	1975-2016	Turkey	ARDL	Public debt	Crowding out
Ela & Pata (2020)	1987-2017	Turkey	Bayer Hanck co-integration	Public external debt services	Crowding-out
Unsal (2020)	1995-2017	17 OECD Countries	Panel Data	Public defence expenditure	Crowding-in
				Total public expenditure	Crowding-out
				Social protection expenditure	Crowding-out
Gultekin-Tarla & Temiz (2020)	1975-2016	Turkey	Johansen co-integration	Public investment	Crowding-in
Ebghaei (2021)	1980-2018	Turkey	Johansen co-integration	Public investment	Crowding-in
				Public expenditure	Crowding-out
Kurul (2020)	1970-2018	Turkey	ARDL	Foreign direct investment	Crowding-out
Kulu et al. (2021)	2007-2018	33 Sub-Saharan African Countries	GMM	Public domestic payment arrears	Crowding-out
Vanlaer et al. (2021)	1995-2016	28 EU Countries	GMM	Public debt	Crowding-out
Penzin & Oladipo (2021)	2000:Q1 2019:Q2	Nigeria	ARDL	Public domestic	Crowding out

Not: ADL (augmented distributed lag), ARDL (Autoregressive Distributed Lag), FIML (Full-information maximum-likelihood), GMM (generalized method of moments), ML (The Maximum Likelihood), OLS (Ordinary least squares) VAR (Vector autoregression), SVAR (structural vector autoregression) SVEC (Structural Vector Error Correction) 2SLS (two-stage-least square).

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[1] *Crowding-in effect is observed in Belgium, Ireland, Finland, Canada, Sweden, and the UK. Crowding-out effect is valid for the rest of the sample.*

Sectoral Non-Performing Loans Cycle in Turkey: An Empirical Analysis

Tacinur AKÇA (https://orcid.org/0000-0002-4071-9525), Ordu University, Türkiye; tacinur@windowslive.com

Türkiye'de Sektörel Batık Krediler Döngüsü: Ampirik Bir Analiz

Abstract

This study examines how much of the total loans are in follow-up and which sectors have difficulties repaying these loans, using the monthly data from the post-2000 period using the Event Study method. Undoubtedly, banks' loans to the sectors are the most basic investment element. It is a significant problem on which sectors these loans are concentrated on and the contribution of these sectors to the country's economy, and their effects on the economy. Another critical problem is the recycling problem in the payment of loans extended by banks. This situation, called non-performing loans in short, is of great importance in terms of being the leading indicator of crises. The research findings showed significant increases in almost all selected sectors in the pre-crisis, crisis, and post-crisis periods. From this point of view, the rate of growth in non-performing loans of banks provides some predictions about the general course of the economy.

Keywords : Non-Performing Loans, Default Credit, Banking System, Event Study.

JEL Classification Codes : C32, E32, E44, E5.

Öz

Bu çalışmanın amacı toplam kredilerin ne kadarının takibe düştüğü ve hangi sektörlerin bu kredileri geri ödeme konusunda sıkıntı yaşadığı, 2000 sonrası dönem aylık veriler kullanılarak Olay Çalışması yöntemi ile incelemektir. Yatırımların en temel unsuru şüphesiz bankalar tarafından sektörlere kullandırılan kredilerdir. Kullandırılan bu kredilerin hangi sektörler üzerinde yoğunlaştığı ve bu sektörlerin ülke ekonomisine katkıları, ekonomi üzerindeki etkilerinin neler olacağı önemli bir sorun teşkil etmektedir. Bir diğer önemli sorun ise bankalarca kullandırılan kredilerin ödenmesindeki geri dönüşüm sorunudur. Kısaca sorunlu krediler olarak adlandırılan bu durum krizlerin öncü göstergesi olması bakımından büyük önem taşımaktadır. Araştırma bulgularında, hemen hemen seçilen bütün sektörlerde kriz öncesi, kriz dönemi ve kriz sonrası dönemlerde belirgin artışların yaşandığı sonucuna ulaşılmıştır. Bu açıdan değerlendirildiğinde, bankaların batık kredilerindeki artış oranları ekonominin genel gidişatı ile ilgili bir takım öngörüler sunmaktadır.

Anahtar Sözcükler : Takibe Düşen Krediler, Batık Kredi, Bankacılık Sistemi, Olay Çalışması.

1. Introduction

There is always a risk that the company or individual will not repay the loans made by banks within the agreed period. Non-performing loans occur when both principal and loan interest is not paid for a long time, contrary to the terms and conditions of the loan agreement. A loan becomes problematic when there are indications that the borrower will not be able to repay the loan or if more than 90 days have passed before the borrower has paid the agreed instalments (FED, 2018; ECB, 2020).

Reducing the non-performing loan rates of banks to reach the economically desired profit figures will ensure that they are protected against the risk of any financial difficulties in the future. One of the critical factors that cause banks to face especially non-performing loans, is the maturity mismatch problem. This problem arises from the maturity problem between the bank's assets and liabilities. The main problem here is that the deposits they collect are generally short-term, as well as the banks' desire to give long-term loans. In this case, banks will be faced with the possibility of selling their assets to meet their short-term liquidity needs or even the risk of being sold at a price lower than their value (OECD, 2010). It can be said that another factor that may cause non-performing loans is the inability of individuals to pay their obligations as a result of the ineffective functioning of financial markets in developing countries because the ratio of non-performing loans in the banking sector is an important factor in the emergence of banking or financial crises (Greenidge et al., 2010). In general, Mileris (2014) listed the factors that may cause non-performing loans in banks, such as deterioration in the basic building blocks of the country's economy, ineffective credit risk measurement management in banks, and unconscious use of credit. In addition, the decrease in the market power and profit margins of banks may cause a reduction in the concession value of the bank in cases where competition conditions increase. Improving incentives with capital increases will lead banks to risk more losses to make more risky decisions. Banks can choose riskier and lower-quality portfolios, take more credit risk, or take a path such as lowering their capital levels. Such risky behaviour may result in higher NPL rates or increase the risk of bankruptcy. This may make banks more fragile and unstable (OECD, 2010).

According to Stiglitz and Weiss (1981), high-interest rates increase the risk probability in loan portfolios due to adverse selection (incomplete information) and incentives. Therefore, those willing to pay high-interest rates are less likely to pay off the loans they use. In risk environments, banks may have difficulty determining the probability of repayment of loans. As a result, the higher the interest rates, the higher the average risk of borrowers, which results in lower profits for banks. In his study, Vos (1994) found that international credit markets went to overlending due to incomplete information and assessments to increase their market share. The loans given were distributed among specific borrowers and tended to cluster, leading to excessive risks.

The reasons such as the opening up policies implemented especially after 1980 in Turkey, the economic instability experienced in the post-1990 period, the increase in foreign

currency and interest rate risks in the period after the 2001 crisis, and the high costs of using loans were effective in the rise of non-performing loans. Non-performing loans in the Turkish banking system increased significantly with the financial crisis in 2001. After the 2001 crisis, the share of non-performing loans in total loans reached almost one-third (BDDK, 2009). However, the 2008 crisis, which had an impact worldwide, increased unemployment rates and the NPL loan ratio extended in all sectors, especially individual loans.

In the post-2001 period, there has been an increase in short-term capital inflows, especially from developed countries to developing countries with higher interest rates, such as Turkey[1]. The fact that the Turkish lira has become more valuable with the increase in foreign currency in the country has increased foreign dependency by fuelling imports. As a result, Turkey has been exposed to high current account deficit rates (TurkStat, 2022). With the expansion in consumer loans, domestic demand has revived, and high growth rates have made the current account deficit even higher. The revenues obtained are not used in productive sectors such as manufacturing but in non-productive ones (Akça, 2022a: 171). In the private sector, where foreign debt ratios are high, especially in the post-2010 period in Turkey, debt burdens have increased even more due to rising exchange rates. Because companies with cash problems could not pay their bank debts, non-performing loans started to grow.

In the global crisis originating from the USA in 2008, the insufficient total supply level caused the prices to increase. With the bursting of the credit-based bubble, the demand fell, and as a result, the prices started to decrease. In Turkey, unlike this situation, too many credit funds, especially in the banking sector, caused excessive credit expansion. The main factor that determines the crisis is investments. The source of investments is savings. Savings in Turkey are financed by external debt. Consumer loans and construction loans are the cheapest and easiest way to convert savings into loans. This situation may contribute to the country's economic growth in the short term. Still, this growth, which is not supported by the increase in production capacity, may cause high external debt and current account deficit problems in the long term.

In Graph 1, the percentage of the total loans extended by banks in Turkey is shown as a percentage. The ratio of non-performing loans to total loans showed a significant decrease after the 2001 crisis, and then it did not fluctuate much, except for 2009. The share of non-performing loans in total loans remained below 1% in the 2000s. Regarding non-performing loans, the construction sector ranks first with 9.29%, the wholesale trade and

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brokerage sector ranks second with 5.72%, and the electricity, gas and water resources sector ranks third with 5.60%.

Graph: 1
Development of Total Loans by Year Inside Share of Nonperforming Loans in Turkey (%)
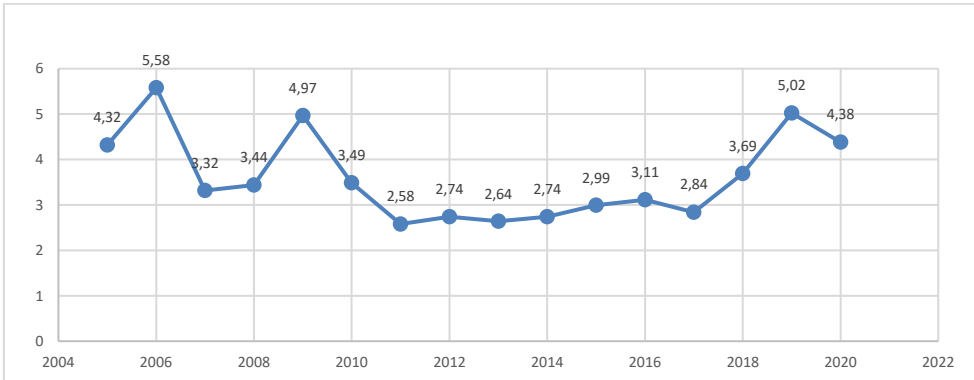
Source: The World Bank.

In this study, the loans to be liquidated, which show how much of the loans extended by the banks have fallen into liquidation, are examined as seven sectors. These sectors are; retail loans, wholesale retail, construction, metal, textile, food and transportation. In addition, total loans to be liquidated are also included in the analysis. 2000-2020 is considered time, and monthly data are used. The method we use to examine the loans to be liquidated by banks is the Event Study Method. With the Event Study method, the selected periods were divided into certain intervals, considering the effects of both the 2001 crisis and the 2008 USA Mortgage Crisis in Turkey. Thanks to these data intervals, the NPL analysis of the relevant sectors was made.

One of the study's contributions to the academic literature has been the analysis of the banks' NPL ratios, especially in the last twenty years. Previous literature studies on the subject have generally dealt with the relationship between non-performing loans and macro variables. This study discusses the rate of non-performing loans in critical sectors, which are the backbone of the economy. In this way, while it was revealed to which sectors the banks channel their deposits, the sectors that constitute a risk factor were determined. It is thought that the study can be a guide, especially for a country like Turkey with bad banking experiences. In addition, it has an original value as the method used. Because the Event Study method has never been used in previous studies on this subject, in this respect, the analysis technique provided by the Event Study method has provided an important framework for evaluating non-performing loans.

The first part of the study consists of the introduction part. In the second part, there are literature reviews on the subject. The third section contains information about the variables used and the method. In the fourth chapter, the results of the analysis are given.

2. Literature Review

There are many national and international studies on the subject of investigation. In the results obtained, the general opinion is that the negativities in macro variables trigger the increase in non-performing loans more.

In studies on Turkey, Akça (2022b) examined the relationship between problem loans and macro variables in the 2000-2020 period. In the analysis findings, it has been determined that unemployment, economic growth, inflation, exchange rate and interest rates cause non-performing loans in the short term. Baş et al. (2021) found that the increase in interest rates and total loan volume for 2008 and 2017 will increase non-performing loans. Koten (2021), in his analysis for the period of 2010-2020, concluded that the increase in the non-performing loan rates of banks decreases the profitability ratios over time. In his research for the 2002 and 2017 periods, Us (2020) found that non-performing loans were negatively affected by capital adequacy, profitability and economic growth while positively affected by inflation, unemployment, external debt stock, lending and bank size. Cifter et al. (2009) examined the relationship between industrial production and non-performing loans in the 2001 and 2007 periods. Their findings determined that the industrial production cycles affect the NPL cycles in different periods.

Alnabulsi et al. (2021), in their analysis of Jordan, examined the relationship between non-performing loans, financial instability and economic growth between 2002 and 2009. As a result of the examination, it was determined that non-performing loans were negatively related to GDP and unemployment and positively related to the money supply, interest rates, capital lending adequacy ratio and total deposits.

Collaku et al. (2021) found that every 1% increase in non-performing loans decreased the profitability ratio by 0.19% in Kosovo from 2010-2019. On the other hand, Khan et al. (2020) found that non-performing loans had a negative impact on operating efficiency and profitability while positively impacting capital adequacy and income diversification for the period 2005-2017 in Pakistan. Akter et al. (2017) found a negative effect in their study on non-performing loans and profitability in Bangladesh during the 2008-2013 period, and Khan et al. (2020) found similar results.

Beck et al. (2015), in their study on 75 countries between 2000 and 2010, show that decreases in global economic activity and stock prices cause an increase in non-performing loans.

Budiarto (2021) found that job prospects in Central Java (Indonesia) are directly proportional to debtor performance and solvency, and banks' economic performance impacts non-performing loans.

Jordan et al. (2013) analysed Bahama in 2002 and 2011; real economic growth affects non-performing loans negatively. As economic growth increases, non-performing loans in the country decrease.

Klein (2013), in his analysis of Central, Eastern and South-eastern Europe (CESEE) during the 1998-2011 period, increased unemployment and inflation, and depreciation of the exchange rate, causing an increase in non-performing loans. On the other hand, increases in non-performing loans negatively affect economic growth.

According to Messai et al. (2013), in their study of 85 banks in Italy, Greece and Spain for the period 2004-2008, found that non-performing loans were negatively related to economic growth and banks' profitability ratios and positively to unemployment, interest rate and loan loss reserves.

Muhovic et al. (2019) found that non-performing loans were negatively related to unemployment, economic growth, inflation and banks' profitability rates in their study of Western Balkan countries between 2000 and 2015.

Sánchez Serrano (2021), in his analysis of 75 European Banks during the 2014-2018 period, found that banks with low NPL ratios tend to lend more to the real economy.

Singh et al. While non-performing loans are positively related to economic growth and inflation in Nepal in the period (2021), 2015 and 2019, it is negatively related to bank size, Capital Adequacy Ratio (CAR) and profitability ratios.

Ghosh et al. (2015), in their analysis of the USA for the 1984-2013 period, factors such as increases in total loans, liquidity risk, and low credit quality increase non-performing loans. On the other hand, increases in bank profitability have a reducing effect on non-performing loans.

Accornero et al. (2017), in their analysis of Italy between 2008 and 2015, concluded that the increase in non-performing loans negatively affected loan growth.

Balgova et al. (2017) analysed 190 countries by considering different periods between 1990 and 2014. As a result of the analysis, it has been determined that the decreases in non-performing loans contributed to economic growth and caused an increase.

Basten et al. (2019), in their study involving 32 banks in Europe, examined the impact of the 2008 Global Crisis on banks. The research findings determined that the high risks that were not priced in the banking sector in the pre-crisis period were high. In the post-crisis period, the banks reduced these risks with the reforms made, making themselves more resilient with the regulatory reforms.

Louzis et al. (2012), in their analysis of Greece in the 2003-2009 period, found that non-performing loans are in direct relationship with macro variables (GDP, unemployment, interest rates, public debt) and bank management quality.

Zeng (2012), in his analysis of China, increases or decreases in non-performing loans depend on micro and macro factors. They are strengthening the internal management efforts of banks, making property rights reforms, and reducing asymmetric faulty information to reduce non-performing loans.

Espinoza et al. (2010), in their study of 80 banks in the Gulf Cooperative Council Countries (GCC) between 1995 and 2008, found that risk aversion and interest rates decrease non-performing loans, while decreases in economic growth increase non-performing loans.

Academic literature has generally examined the link between non-performing loans and macro variables, emphasising that loans play a key role in the economy. According to the general view obtained in the studies, non-performing loan rates are at lower levels since the periods of the rapid growth of the economy are generally optimistic, credit standards are relaxed, and risk appetite is high, while non-performing loans increase in the opposite periods when the economy starts to slow down.

3. Data and Methodology

While the event study method was used in the first application times, especially in measuring market efficiency, it has become a method frequently used in all areas of the economy in the following years. It is generally used to measure the abnormal values of the reaction to the event resulting from an event. This method was first used by Dolley (1933). Dolley (1933), in his study, examined the effect of stock splits into price increases and decreases. In the following years, the Event Study method became the preferred method in many studies with different calculation methods (Myers et al., 1948; Baker, 1956; Ashley, 1962). In the first step of the event study analysis, the event and date range to be investigated are determined. In the following steps, critical values are selected, normal and abnormal values are determined, abnormal values are combined and tested, and the model is finalised by considering the experimental results (Campell et al., 1997; Mackinlay, 1997; Konchitchki et al., 2011; Corrado, 2011). In the event study, the timeline usually consists of two parts; the actual event period surrounding the event day and the second is the previous forecast period.

According to Fama et al. (1969), the Event Study method, used the market index model to calculate the normal and abnormal values in the data. The formula used to calculate normal and abnormal values.

$e_{it} = R_{it} - E(R_{it})$

e_{it} = Normal value,

R_{it} = Real value,

$E(R_{it})$ = Expected value

Calculation of cumulative abnormal values.

$$CAG_{it} = \sum_{i=1}^{N} AR_{it}$$

This study tried to determine the unexpected /excessive growth rates of the sectoral loans to be liquidated with the Event study analysis. In this way, the effect of the 2008 crisis on non-performing loans will be seen more clearly. To see the non-performing loan growth, the non-performing loan growth of each sector was compared with the total non-performing loan growth because total non-performing loans are a portfolio of sectoral non-performing loans and show the systemic relationship.

Using the least squares method, the analysis estimated the relationship between sectoral non-performing loan growth and total non-performing loan growth. Error terms of each sector were calculated, and Cumulative Abnormal Growth rates (CAG) were created for all windows from the error terms. The cumulative error terms are taken as six months.

Figure: 1
Event Study Timeline for Wholesale, Retail and Sales, Construction, Metal, Textile, Food, and Transportation Sectors

(Estimation Window]   (Event Window]   (Post-Event Window]

2000:01 2007:06   2007:07   2010:12   2011:01 2020:12
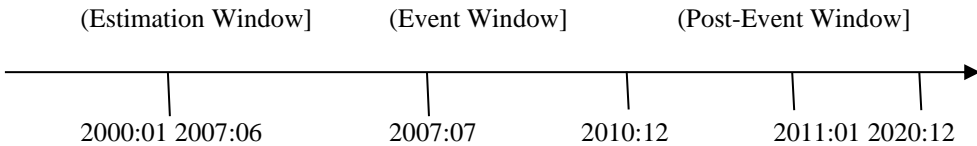
Figure: 2
Event Study Timeline for Personal Credits

(Estimation Window]   (Event Window]   (Post-Event Window]

2000:01 2007:06   2007:07   2010:12   2011:01 2020:12
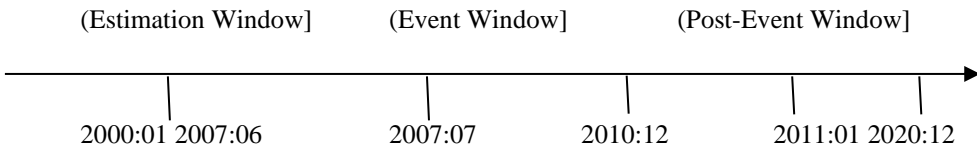
Two timelines were created to analyse the effects of the crisis. The first is the timetable of wholesale retail and sales, construction, metal, textile, food, and transportation sectors in Figure 1, and the second is the timeline of personal loans to be liquidated in figure 2. Figure 3.1 shows a 90-month dataset with a period of 2007:06 starting from 2000:01 in the estimation interval determined as the "Estimation Window". A 42-month dataset between 2007:07 and 2010:12 was used in the "Event Window" interval to represent the 2008 crisis. As the final stage, in the Post-Event Window part of the post-crisis period, there is a 120-month dataset between 2011:01 and 2020:12. Figure 2 shows a 36-month dataset with a time frame of 2007:06 starting from 2004:07 in the "Estimation Window" prediction

interval. A 42-month dataset between 2007:07 and 2010:12 was used in the "Event Window" interval. In the Post-Event Window, there is a 120-month dataset between 2011:01 and 2020:12. Since the date range covers the period before the 2001 crisis, 2000 was chosen as the starting year. Since only existing data on retail loans were published in 2004 and later, 2004 was included in the analysis as the starting year. In determining the event dates, the 2001 Turkish Banking Crisis and the 2008 USA Mortgage Crisis were taken as a basis.

In the Event Window, the error terms obtained for non-performing loans for seven different sectors are classified as a separate data group. The aim here is to consider the distribution of error terms in the pre-crisis period. For this purpose, specific statistical values were used. Cumulative excess returns are used here. Cumulative excess returns were calculated from these error terms, and both periods (Estimation Window and Post-Event Window) were compared.

$H_0 = \text{CAG} = 0$, Non-performing loans remained unchanged in the relevant sectors and insensitive to crises.

$H_1 = \text{CAG} \neq 0$, Non-performing loans increased or decreased in the relevant sectors; it didn't remain insensitive to crises.

The hypothesis established is whether there is a difference between the error terms of the Event Window period and the Post-Event Window period. In the CAG calculations for each sector, it is determined whether all values are equal to 0. If the H_0 hypothesis is rejected, it is concluded that non-performing loans are affected during crisis periods.

Hypotheses for each sector's average overgrowth between periods;

Hypothesis of term 1 and period 2;

$H_0 = CAG_1 = CAG_2$

$H_1 = CAG_1 \neq CAG_2$

Hypothesis of term 2 and period 3;

$;H_0 = CAG_2 = CAG_3$

$H_1 = CAG_2 \neq CAG_3$

Hypothesis of term 1 and period 3;

$H_0 = CAG_1 = CAG_3$

$H_1 = CAG_1 \neq CAG_3$

As a result, the equality of means hypotheses for all sectors was rejected[2].

The "z" test was used to measure the difference between the mean values of the variables for all three selected periods. Therefore, the "z" value for each sector has been calculated. The formula used for the calculated "z" value is as follows;

$$Z_h = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

$\bar{X}$ = The average value of the selected data for the relevant period

μ = Default average value

σ = Variance value

n = Number of observations

The hypotheses for comparing the z-values and averages calculated between the periods of the sectors are given below. The fact that the calculated "z" test statistic is more significant than zero indicates that overinvestment has occurred in the relevant variable[3].

The hypothesis of period 1 and period 2;

$H_{0=} z_{1,2} > 0$ ve $\mu_1 > \mu_2$ The non-performing loan growth rate in the crisis period is decreasing compared to the pre-crisis loan growth rate.

$H_{1=} z_{1,2} < 0$ and $\mu_1 < \mu_2$, The crisis period non-performing loan growth rate increases compared to the pre-crisis loan growth rate.

The hypothesis of term 2 and period 3;

$H_{0=} z_{2,3} > 0$ and $\mu_2 > \mu_3$, Post-crisis non-performing loan growth rate decreases according to crisis period loan growth rate.

$H_{1=} z_{2,3} < 0$ and $\mu_2 < \mu_3$, Post-crisis non-performing loan growth rate increases according to crisis period loan growth rate.

The hypothesis of term 1 and period 3;

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[2]   *Abnormal values of each variable were not included in this study because of included a long data set. It can be provided by the author upon request.*

[3]   *In all variables and parameters, "1" represents the pre-Event (Crisis), "2" represents the Event period, and "3" represents the post-Event.*

$H_{0=} z_{1,3} > 0$ and $\mu_1 > \mu_3$, Post-crisis non-performing loan growth rate decreases compared to pre-crisis loan growth rate.

$H_{1=} z_{1,3} < 0$ and $\mu_1 < \mu_3$, Post-crisis non-performing loan growth rate increases compared to pre-crisis loan growth rate.

Hypotheses created for "F" values calculated between periods for each sector;

The hypothesis of term 1 and period 2;

$H_{0=} F_{1,2} < F_{Critical\ value}$, Crisis period variance value and pre-crisis variance value are similar.

$H_{1=} F_{1,2} > F_{Critical\ value}$, Crisis period variance value and pre-crisis variance value are different from each other.

The hypothesis of term 2 and period 3;

$H_{0=} F_{2,3} < F_{Critical\ value}$, Post-crisis variance value is similar to crisis period variance value.

$H_{1=} F_{2,3} > F_{Critical\ value}$, Post-crisis variance value crisis period variance value is different from each other.

The hypothesis of term 1 and period 3;

$H_{0=} F_{1,3} < F_{Critical\ value}$, Post-crisis variance value and pre-crisis variance value are similar.

$H_{1=} F_{1,3} > F_{Critical\ value}$, Post-crisis variance value and pre-crisis variance value are different from each other.

4. Findings

As a result of the CAG values calculated for the analysis, all values were different from zero. As a result, the H_0 hypotheses was rejected and the H_1 hypotheses was accepted. In selected sectors, non-performing loans were affected by the crises during the crisis periods. Afterwards, graphs were created according to the CAG values for each sector. The cumulative overgrowth values of retail loans are shown in Graph 2. According to the results obtained according to the "z" calculated and "F" test statistical values of individual loans, the growth in non-performing loans during the crisis period increased compared to the pre-crisis period, the loan growth rate increased compared to the crisis period after the crisis and increased in the post-crisis period compared to the pre-crisis period. In other words, the results show that the NPL ratio in individual loans has increased continuously before and after each crisis. In wavelengths, while the pre-crisis-post-crisis and crisis-period

wavelengths differ, the pre-crisis and post-crisis wavelengths are similar. In short, the dimension of instability in retail loans is most visible in the crisis period.

Graph: 2
Cumulative Abnormal Growth Data for Personal Credits (CAG)[4]
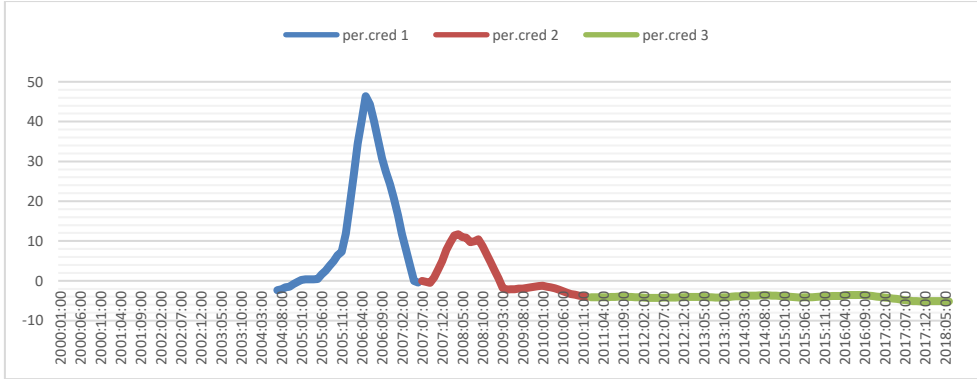
Graph 3 represents non-performing loan growth rates for the wholesale retail industry. When the "z" and "F" test results of the variable are evaluated, non-performing loan growth rates increased during the crisis periods compared to the pre-crisis period. After the crisis (event), the growth rate of non-performing loans decreased compared to the crisis period. While non-performing loan rates are similar in the crisis period and the post-crisis period, the pre-crisis and crisis-period non-performing loan rates differ. In short, non-performing loans increased during and after the crisis compared to pre-crisis.

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[4] *The blue striped line in all charts; pre-crisis (event), red line; the crisis (event) period, and the green striped line represents the post-crisis (event) period.*

Graph: 3
CAG for the Wholesale Retail Industry
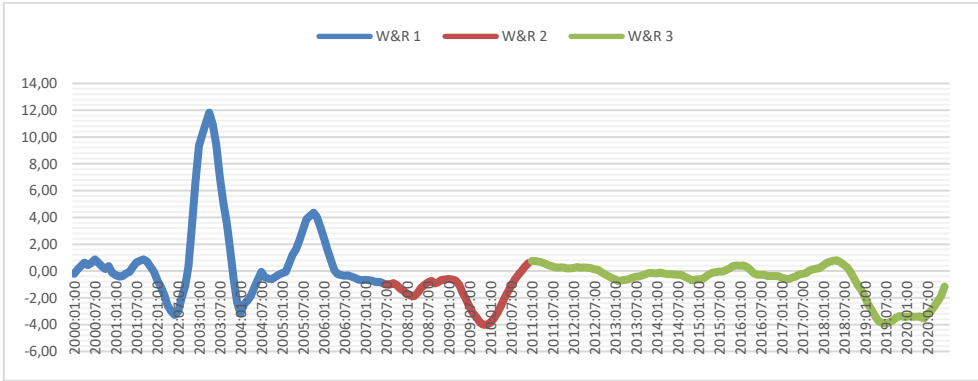
When non-performing loan growth values of the construction sector are evaluated in Graph 4, according to the "z" and "F" test results, non-performing loans remained the same in the pre-crisis and post-crisis periods but increased in the post-crisis period. The crisis period and pre-crisis differed in wave dimensions, but the crisis period and the post-crisis period were similar. In short, non-performing loans in the construction sector experience constant fluctuation and are unstable. Especially in the post-2001 period, significant decreases were experienced in non-performing loans in the construction sector, and significant increases were experienced in the post-crisis period in 2008 USA. Another remarkable point in the construction sector was in 2012. It is thought that problems such as economic problems (deceleration of growth, increase in unemployment rates, etc.), especially in the Euro Region in 2012, and the slowdown in growth in Turkey may cause this result.

Graph: 4
CAG for the Construction Industry
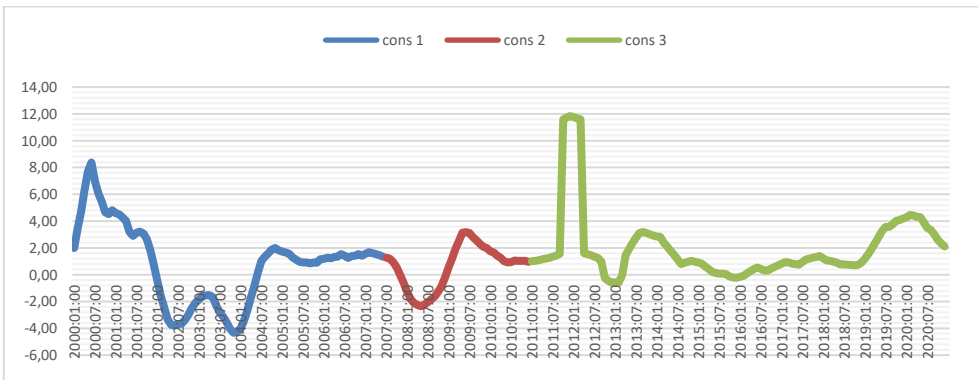
Graph 5 shows the non-performing loan growth rates of the main metal industry sector. When the "Z" and "F" test results were evaluated, the non-performing loan ratios, which started to increase in the pre-crisis period, increased both in the crisis and post-crisis periods. However, the fluctuations in the crisis period are parallel to the post-crisis fluctuations, and the instability's severity is higher than in the pre-crisis period. When evaluated in general, the metal main industry's non-performing loan rates increased during and after the economic crisis.

Graph: 5
CAG for the Metal Main Industry Sector
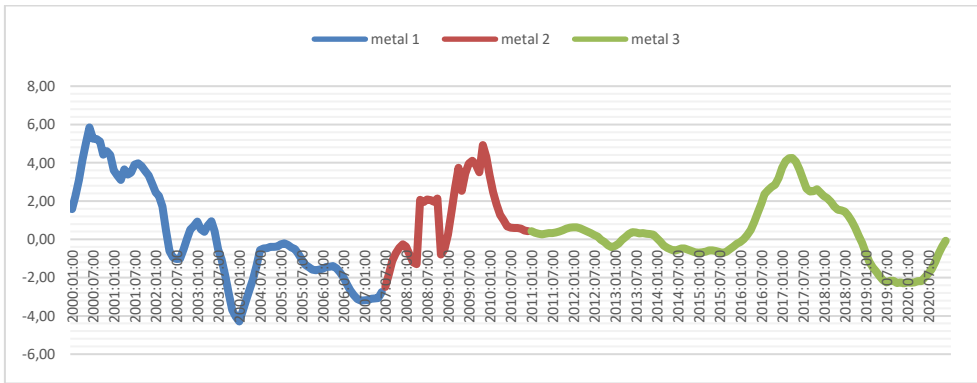
Graph 6 When the non-performing loans of the textile sector are evaluated according to the "z" and "F" test results, non-performing loans increase in crisis periods and post-crisis periods compared to the pre-crisis period. In addition, pre-crisis instability and fluctuations are similar to post-crisis instability and fluctuations. It is seen that the textile sector was particularly affected by the 2001 Turkish Crisis.

Graph: 6
CAG for the Textile Industry
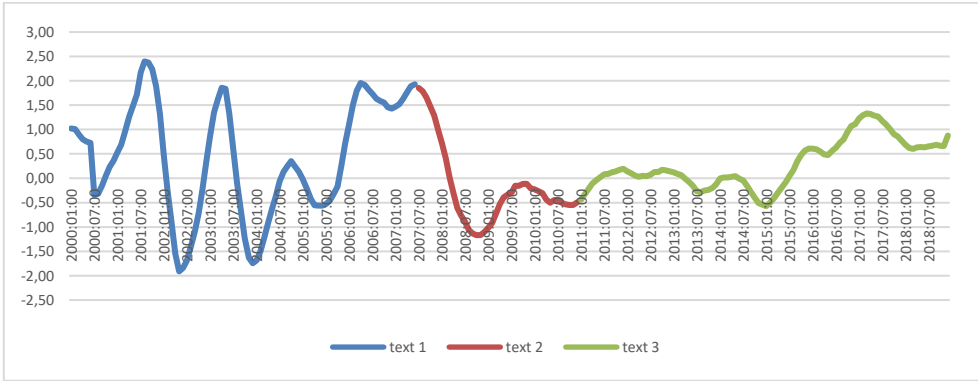
When the "z" and "F" test results of the food sector non-performing loans are evaluated, the non-performing loan rates increased continuously during and after the crisis. Regarding fluctuation, the periods before and after the crisis show similarities. The food sector has been growing, especially during the 2001 Crisis period, the 2008 Crisis period and after 2017.

Graph: 7
CAG for the Food Industry
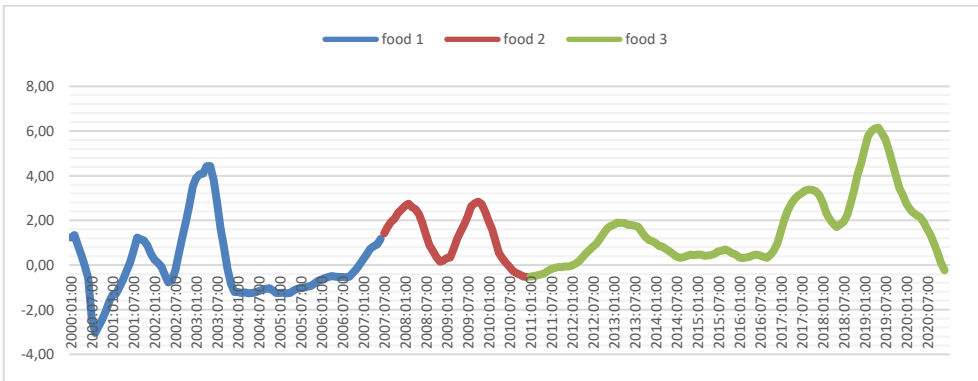
When the non-performing loan abnormal value graph of the transportation sector is evaluated according to the "z" and "F" test results, non-performing loan rates have consistently increased both in the crisis periods and in the pre-crisis and post-crisis periods. While the fluctuations between the pre-crisis and crisis periods were similar, the post-crisis period differed. In general, it can be said that the transportation sector has been dramatically affected by the economic crisis environment.

Graph: 8
CAG for the Transportation Sector
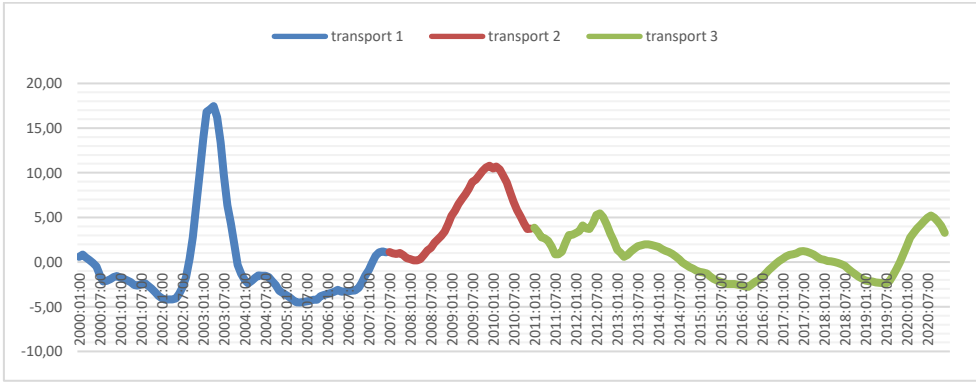
Graph 9 shows the NPL ratio of loans extended by banks to all sectors. According to the findings, non-performing loan rates increase continuously in the pre-crisis, crisis and post-crisis periods. The instability in non-performing loans, which started in the pre-crisis period, continues during and after the crisis. The size of the fluctuations is similar. Although it decreased partially in 2018, non-performing loan rates have increased continuously in recent years.

Graph: 9
CAG for the Total Loans
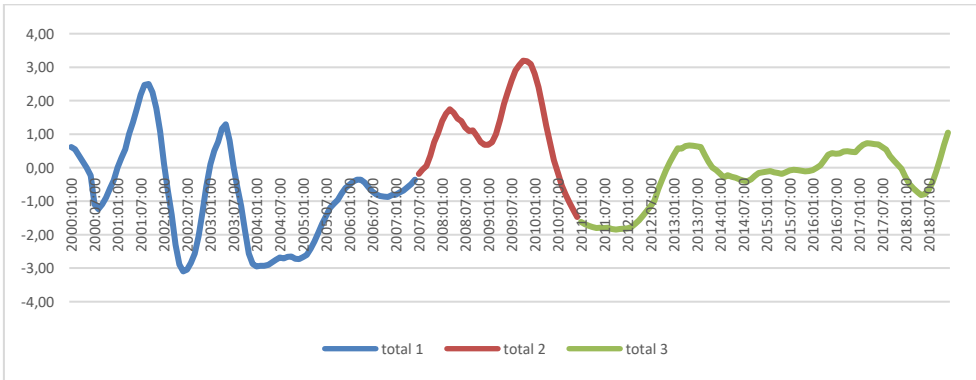
When the results of the analysis of the amount of non-performing loans extended by banks on a sectoral basis are evaluated in general, it is observed that there is an increasing trend in retail loans both before and after 2008. While the level of uncertainty and instability increases during the crisis period, it decreases in the post-crisis period. In the wholesale and retail sales sector, non-performing loans peaked, especially in the 2001 crisis and were less

affected by the 2008 crisis. In the post-2008 period, an increase is observed in non-performing loans. Compared to the 2001 crisis, the construction sector's non-performing loans increased significantly after the 2008 crisis. Especially in recent years, the construction sector has been the sector most affected by the economic conditions of non-performing loans. When the basic metal industry sector is examined, the effects of the 2001 and 2008 crises seem much clearer. Non-performing loans, which were at their peak in the 2001 crisis, declined to their lowest levels in the post-2001 period. The effect reflected on the credits in the 2008 crisis is at high levels, although not as much as the 2001 crisis. Even though non-performing loans decreased slightly in the post-2008 period, they entered an upward trend again after 2015. Like the metal sector, the textile sector was most affected by the 2001 crisis. Due to the fragile nature of the sector, there have been many fluctuations in the textile sector, especially over the years. The increase in the non-performing loan ratios of the textile sector in recent years is remarkable. Non-performing loans in the food sector are fluctuating and become unstable over the years, as in the textile sector. During the 2001 and 2008 crises, the bad debt ratios of the food sector increased, and this increase saw peaks, especially after 2016. In the 2001 and 2008 crises in the transportation sector, non-performing loans were at very high levels. While it has been observed that it has been dramatically affected by the crises, it has entered an upward trend again, especially in recent years. If we take a general evaluation based on non-performing loans, there were many increases during the 2001 Turkish crisis and the 2008 US crisis. While an improvement was observed in non-performing loans after 2009, it entered an upward trend again after 2011.

5. Conclusion

In the study, the loans extended by banks in Turkey in the period of 2000 and 2020 were analysed by the Event Study method by considering the sector. Sectors covered; personal loans (vehicle, housing, consumer goods, etc.), wholesale retail, construction, main metal industry, textile, food, and transportation sector. In addition, total non-performing loans covering all sectors are included in the study.

Banks are the most important institutions that mediate the flow of funds in the financial system. One of the tools banks use most when intermediating the flow of funds is the loans they have made available. In the 2000s, interest rates in developed countries were low, and short-term fund inflows to developing countries such as Turkey, where interest rates were higher, increased. On the other hand, for Turkey, the 2000s covered a period in which privatisations were experienced a lot. The existence of too many credit funds in the banking sector in Turkey has caused excessive credit expansion. During this period, the rate of lending to the markets by banks increased rapidly. In this period, loans were generally extended to sectors with low added value and no long-term return to the economy[5]. The rapid growth of loans and the use of these loans by non-productive sectors negatively affect the

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[5]   *For relevant data: TBB, (2021),*
      <https://www.tbb.org.tr/Content/Upload/Dokuman/7769/Sektorel_Kredi_Dagilimi_Mart_2021.pdf>,
      28.02.2021.

economy and increase the fragility of banks. Therefore, after determining the causes of non-performing loans, the effects of these loans on the banking sector and the economy should be taken into account, and necessary measures should be taken to ensure that loans do not become problematic loans.

In this study, the course of non-performing loans in domestic or worldwide economic disruptions is examined based on important sectors that are the backbone of the economy. Especially in the pre-crisis and post-crisis periods, it is thought that how non-performing loan rates changed according to the sector and making a sectoral analysis is an important feature for Turkey. As a result of the findings obtained from the study, solution suggestions for policymakers and economic actors are listed below.

- A supervisory mechanism can be established for banks to use their deposits.
- Loan interest rates may vary according to the sector or the efficiency of the sector. For example, sectors related to technological products (automobiles, mobile phones, etc.) or important sectors such as the main metal industry can be supported with low-interest rates.
- Since Turkey has an inflationary economic structure, expenditures made by individuals can be controlled through loans.
- In addition to the supervisory activities of banks, a well-designed asset management system can be established.
- By taking into account the imbalances and strategic errors between the sectors and taking these errors and omissions into account in future economic programs, a stable economic structure can be created in the longer term.

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Appendix

Table: 1
Statistical Values of the Variables

Variables	Var	stdev	Average	Obs.
Per.Cred. 1	242,59	2.99	12.82	36
Per.Cred. 2	28,06	1.94	1.75	42
Per.Cred. 3	0.80	0.96	-4.61	120
Wholesale Retail 1	10.37	1.59	0.96	90
Wholesale Retail 2	1.45	1.07	1.12	42
Wholesale Retail 3	1.75	1.12	-0.69	120
Cons. 1	8.74	2.79	6.60	90
Cons. 2	2.79	1.22	0.60	42
Cons. 3	6.60	1.45	1.98	120
Metal 1	7.11	3.52	2.48	90
Metal 2	3.52	1.28	1.19	42
Metal 3	2.48	1.19	0.25	120
Textile 1	1.37	0.65	0.21	90
Textile 2	1.06	0.56	0.73	42
Textile 3	0.21	1.03	0.73	120
Food 1	2.57	1.20	2.62	90
Food 2	1.20	1.23	1.21	42
Food 3	2.62	1.21	1.58	120
Trans. 1	27.08	1.93	-0.47	90
Trans. 2	13.93	13.89	13.79	42
Trans. 3	5.12	5.38	0.72	120
Total Loans 1	2.14	1.16	-0.87	90
Total Loans 2	1.50	1.49	1.49	42
Total Loans 3	1.68	1.11	0.21	120

Table: 2
Z Table for the Variables

	z1_2	z2_3	z1_3
Per.Cred.	4.07 (0.99)	33.19 (0.33)	6.71 (0.99)
Wholesale Retail	6.57 (0.49)	-1.30 (0.49)	4.57 (0.32)
Cons.	0.54 (0.99)*	-10.92 (0.99)	-3.0 (0.99)
Metal	-2. 78 (0.99)	3.19 (0.15)	-0.35 (0.48)*
Textile	-0.23 (0.99)*	3.44 (0.99)	-1.86 (0.99)
Food	-5.36 (0.99)	-6.34 (0.13)	-7.13 (0.99)
Trans.	-17.93 0.43	14.09 0.49	-2.03 0.31
Total Loans	-9.67 (0.30)	3.84 (0.27)	-5.55 (0.16)

Notes: *Ho Red, a=0,05, critical z value 0,12 or 0,13, If Z Value > 0, H_0 Red.

Tablo: 3
F Table for the Variables

	F1_2	F2_3	F1_3
Per.Cred.	8.64 (1.84)	0.02 (1.53)*	304.2 (1.53)
Wholesale retail	7.12 (1.65)	0.83 (1.74)*	5.94 (1.53)
Cons.	3.13 (1.65)	0.42 (1.65)*	1.32 (1.53)*
Metal	2.02 (1.65)	0.70 (1.74)*	2.86 (1.53)
Textile	2.08 (1.74)	1.84 (1.74)	0.88 (1.53)*
Food	2.14 (1.74)	2.19 (1.74)	0.98 (1.53)*
Trans.	0.51 (1.65)*	2.72 (1.65)	5.28 (1.53)
Total Loans	1.42 (1.74)	0.88 (1.65)*	1.26 (1.53)*

Notes: *Ho Red, If F Value > F Critical value, H_0 Red.

Informal Economy and Financial Development: The Role of Institutions

Abdulkadir BULUT (https://orcid.org/0000-0001-6351-0583), Hitit University, Türkiye; kadirbulut@hitit.edu.tr

Kayıt Dışı Ekonomi ve Finansal Gelişme: Kurumların Rolü

Abstract

This paper assesses the interactive impact of financial development and institutional quality indicators on the informal economy using data from 67 developing countries from 2002-2017. We employ the fixed-effect model with Driscoll-Kraay standard errors that are heteroscedasticity consistent and robust to the general form of cross-sectional and temporal dependence. Findings reveal that financial development and institutions are substitutes for reducing the informal economy. Financial development decreases the size of the informal economy only in the absence of efficient institutions and vice versa. Finally, the study provides several essential policy suggestions for combatting the informal economy.

Keywords : Informal Economy, Financial Development, Institutions.

JEL Classification Codes : E26, G20, O16.

Öz

Bu çalışma 67 gelişmekte olan ülkenin 2002-2017 verilerini kullanarak finansal gelişme ve kurumsal kalitenin kayıt dışı ekonomi üzerindeki interaktif etkisini araştırmaktadır. Çalışmada değişen varyans ve yatay kesit bağımlılığını dikkate alan Driscoll ve Kraay Standart Hatalar ile Sabit Etkiler tahmin yönteminden yararlanılmıştır. Bulgular, finansal gelişme ve kurumların, kayıt dışı ekonomiyi azaltmada ikame işlevi gördüğünü ortaya koymaktadır. Kurumsal kalitenin en düşük olduğu ülkelerde finansal gelişmenin kayıt dışı ekonomi üzerinde en fazla etkiye sahip olduğunu göstermektedir. Öte yandan, finansal sektörün daha az gelişmiş olduğu ülkelerde güçlü kurumlar kayıt dışı ekonomi üzerinde daha etkili olmaktadır. Son olarak, çalışma kayıt dışı ekonomiyle mücadele konusunda birkaç temel politika önerisi sunmaktadır.

Anahtar Sözcükler : Kayıt Dışı Ekonomi, Finansal Gelişme, Kurumlar.

1. Introduction

The informal economy[1] is a common feature of all economies in the world. The impacts of informality on social and economic development can be compelling and profound since scarce resources are wasted or used unproductively, national accounts do not reflect accurate figures, and public finance works against public policy (Blackburn et al., 2012: 243).

In the last two decades, researchers have discussed the phenomenon of the informal economy and used several indicators to determine the factors which drive individuals and corporates into the informal sector. Of these, one strand of the literature stresses the role of financial development on the size of the shadow economy (Bose et al., 2012; Blackburn et al., 2012; Capasso & Jappelli, 2013; Berdiev & Saunoris, 2016). Another strand of the studies addresses the importance of institutional quality on the shadow economies (Johnson et al., 1998; Friedman et al., 2000; Schneider, 2005; Guha-Khasnobis et al., 2006; Bovi & Dell'Anno, 2009; Dreher et al., 2009; Torgler & Schneider, 2009; Torgler et al., 2011; Dreher & Schneider, 2010; Teobaldelli, 2011). This paper exploits both these strands of the literature to evaluate if institutional quality has any role in moderating the effect of financial sector development on informality.

This study closely follows the works of Compton and Giedeman (2011), Blanco and Dutta (2021) and Cepparulo et al. (2016). These studies investigate if financial development and quality of institutions demonstrate substitutability in their effect on growth, poverty alleviation and domestic investment, respectively. This paper aims to expand on their work by investigating if institutions and financial development work as complements or substitutes in tackling informality.

Evaluating this relationship is essential in determining the most appropriate resource allocation between these two factors. In a policy design to combat the shadow economy, it is crucial to identify whether the constraints stem from the financial or institutional framework and act accordingly. If they work as substitutes, investing in a financial system where the institutions are inefficient will be more sensible. Likewise, improving institutions can compensate for the absence of a sound financial system to combat shadow economies. To the extent of our knowledge, this study is the first to analyse the critical relationships between the size of the shadow economy, financial development, and institutions. We contribute to the present literature on the informal economy by assessing the interactive effect of financial development and institutional quality indicators.

Findings reveal that financial development significantly impacts the informal economy when institutional quality is the lowest. In other words, in the absence of a sound institutional setup, financial development diminishes the negative impact of weak institutions on the formal economy. On the other hand, a higher level of institutional quality

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[1] *Informal economy, informality, shadow economy or underground economy are used interchangeably.*

is more effective in combating shadow economies in countries where the size of the financial sector is small. To put it more explicitly, we find a substitution effect among these priorities. One possible explanation behind this substitution effect might be that some of the tasks associated with efficient institutions are also fulfilled by financial development to decrease informality and vice versa. For example, economic agents might prefer to operate informally due to high transaction and information costs in the presence of weak institutions. However, a well-functioning credit market can alter their preferences by reducing these costs and thus compensate for the deficiencies of inefficient institutions.

The rest of the paper is structured as follows. Section 2 presents a brief review of the literature. Section 3 describes the models and methodological issues. Section 4 introduces the variables, descriptions and data sources. Section 5 provides the empirical results and robustness checks. Lastly, section 6 is the concluding remarks.

2. Literature Review

Researchers discuss the phenomenon of the informal economy and use several indicators to identify the factors which lead individuals and corporates to operate informally. Of these, the impact of financial development and institutions on the informal economy has received considerable attention in recent academic studies.

The theoretical background for analysing the linkage between the shadow economy and financial development can be attributed to Becker's (1968) seminal paper on the economics of crime. He suggests that rational individuals will weigh the profit of illegal activities against the costs of detection and punishment. Thus, any economic agent will rationally compare the advantages of operating in the shadow economy, such as regulations and avoiding taxes and costs related to the formal economy. Following Becker's (1968) influential study, several important studies have theoretically argued the linkage between the shadow economy and financial sector development (Straub, 2005; Antunes & Cavalcanti, 2007; Dabla-Norris et al., 2008; Bose et al., 2012; Blackburn et al., 2012; Capasso & Jappelli, 2013). The studies suggest that the financial sector is a particular type of institution that may influence the shadow economy's size (Berdiev & Saunoris, 2016). When individuals or firms operate in a shadow economy, their ability to declare assets or revenues is limited, and therefore credit costs become higher. In this sense, as markets financially improve, effective intermediaries enter into the official economy, and the credit costs decrease, thus, increasing the opportunity cost of continuing informal activities and driving economic agents into the official sectors (Capasso & Jappelli, 2013: 167).

Several papers empirically contribute to the existing literature studying the linkage between financial development and the shadow economy. For instance, Bose et al. (2012) analysed the link between financial development and the size of informality for 137 countries between the years 1995-2007. They found that improvements in the banking sector reduce informality size. Berdiev and Saunoris (2016) examined the linkage between informality and financial development for 161 economies from 1960 to 2009. They

concluded that financial development and informality size are negatively correlated. Other papers have analysed this relationship within single countries (see, amongst others, Capasso & Jappelli, 2013, Beck & Hoseini, 2014, Bayar & Aytemiz, 2017). These studies conclude that financial sector development is associated with a smaller shadow economy size.

Institutional quality is viewed as another critical factor determining informality. North (1991) defines institutions as "the humanly devised constraints that structure political, economic and social interaction". A sound institutional setting reduces the asymmetric information problem, risks and transaction costs and allows easy access to credit and enforcing contracts and property rights (Canh et al., 2021: 50). Therefore, better institutional frameworks incentivise individuals and firms to operate formally. On the contrary, weaker institutional settings such as poor contract enforcement, overregulation, and an inefficient judicial system reduce economic agents' incentives to work officially. On this point, Johnson et al. (1998) suggest that the extent of regulatory and bureaucratic discretion is the primary driver of the size of the informality. Likewise, Friedman et al. (2000) analysed the relationship between the underground economy and institutions in 69 countries. They concluded that higher taxes are not the primary drivers of the informal economy. Instead, over-regulation, a weaker legal environment and more corruption are associated with a larger informal economy. Schneider (2005), Dreher et al. (2005), Guha-Khasnobis et al. (2006), Dreher et al. (2009), Dreher and Schneider (2006), Bovi and Dell'Anno (2009), Torgler and Schneider (2009), and Teobaldelli (2011) are the other studies suggesting that strong institutions are associated with a smaller shadow economy size.

Although the available empirical studies on the impact of financial development on the shadow economy are pretty rich, literature on how institutions impact the shadow economy-financial development link is scarce. Thus, this paper differs from the previous studies by evaluating the interactive effect of financial development and institutions.

This paper closely follows the works of Compton and Giedeman (2011), Blanco and Dutta (2021) and Cepparulo et al. (2016). Compton and Giedeman (2011) investigate whether the relationship between financial development and growth depends on institutional quality. They suggest that financial development's beneficial effect on economic growth diminishes where institutions work better. They interpret this as evidence that financial development and institutional quality are substitutes in the growth process. Following a similar approach, Cepparulo et al. (2016) suggest that the pro-poor impact of credit market development is smaller where institutional quality is higher and stronger when institutions function ineffectively, meaning that institutions and financial development work as substitutes in the poverty alleviation process. Blanco and Dutta (2021) analyse the interaction effect of financial development and institutions on gross domestic investment. They find a substitution effect among financial development and institutions, meaning that credit market development is more effective on informality in countries with poor institutions.

This paper aims to expand on their work by investigating whether institutional quality interacts with the relationship between financial development and the size of the shadow economy. Evaluating whether institutional quality influences the impact of financial development on the shadow economy is crucial for policymakers because especially developing countries that face resource constraints can allocate available resources to improve their financial system and/or institutions. Therefore, we intend to answer the following questions. First, are the financial development, and the institutional quality complements in combatting informality? If yes, policymakers will invest in both the financial system and institutions. Second, are the financial development and the institutional quality substitutes? If yes, investing in a financial system where the institutions are inefficient will be more sensible. Likewise, improving institutions can make up for the absence of a sound financial system to decrease informality.

3. Methodological Framework

This paper examines how institutional quality affects the financial development-informal economy relationship. Based on the above arguments, the baseline model is as follows:

$$IE_{it} = f(FD_{it}, INS_{it}, CONTROL_{it}) \tag{1}$$

IE_{it} denotes the size of the informal economy as per cent of GDP for country i at year t, FD_{it} is the financial development measures as per cent of GDP for country i at year t, and INS_{it}[2] is the level of institutional quality for country i at year t. From equation 1, we adopt the standard specification of the cross-country equation. Thus, the specific model is as stated:

$$IE_{it} = \beta_0 + \beta_1 FD_{it} + \beta_2 INS_{it} + \beta_4 CONTROL_{it} + \mu_{it} + \varepsilon_{it} \tag{2}$$

μ refers to country-specific effects, and ε is the error term. Since this paper explores institutional quality's role in the shadow economy-financial development relationship, we add an interaction term. Therefore, equation 2 is re-written as:

$$IE_{it} = \beta_0 + \beta_1 FD_{it} + \beta_2 INS_{it} + \beta_3 FD * INS_{it} + \beta_4 CONTROL_{it} + \mu_{it} + \varepsilon_{it} \tag{3}$$

Where $FD * INS$ is the interactive term of financial development and institutional quality indicators.

The coefficients β_0, β_1, β_2, β_3, and β_4 denote the parameters to be estimated. In this paper, the coefficients of interest are β_1, β_2 and β_3. β_1 and β_2 capture the direct impact of FD and INS variables on the shadow economy, respectively. β_3 refers to the interactive term of FD and INS. This interactive term allows us to assess how the institutional quality in a country influences the impact of financial development on the shadow economy size. The direction and significance of β_3 reveal whether financial development and institutions are

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[2]   *INS represents six different institutional quality indicators. Details are in the data section.*

Table: 1
Variables Used in the Analysis

Variable	Description	Source
Informal Economy (IE)	Shadow economy size (% of GDP)	Medina and Schneider (2019)
Financial Development (FD1)	Domestic credit to the private sector (% of GDP)	The Global Financial Development Database
Financial Development (FD2)	Liquid liabilities (% of GDP)	The Global Financial Development Database
Financial Development (FD3)	Deposit money banks' assets (% of GDP)	The Global Financial Development Database
Control of Corruption (CC)	Control of corruption index (ranges from approximately -2.5 (weak) to 2.5 (high)	WGI
Government Effectiveness (GOVE)	Government effectiveness index (ranges from approximately -2.5 (weak) to 2.5 (high)	WGI
Political Stability and Absence of Violence (PSV)	Political stability and absence of violence index (ranges from approximately -2.5 (weak) to 2.5 (high)	WGI
Regulatory Quality (RQ)	Regulatory quality index (ranges from approximately -2.5 (weak) to 2.5 (high)	WGI
Rule of Law (RL)	The rule of law index (ranges from approximately -2.5 (weak) to 2.5 (high)	WGI
Voice and Accountability (VA)	Voice and accountability index (ranges from approximately -2.5 (weak) to 2.5 (high)	WGI
Government Expenditure (GE)	Government final consumption expenditure (% of GDP)	WDI
Trade Openness (TO)	Trade (% of GDP)	WDI
Growth (G)	GDP per capita growth (annual %)	WDI

The size of the informal economy (IE) as a share of GDP is the dependent variable, sourced from the study by Medina and Schneider (2019). The authors used the Multiple Indicators Multiple Causes (MIMIC) modelling approach to estimate the shadow economy size. Our main independent variables are financial development and institutional quality indicators. The study uses domestic credit to the private sector as a share of GDP (FD1), the most commonly used proxy to represent financial development in the related literature. For robustness checks, this paper utilises two measures of financial development widely used in the literature: liquid liabilities (FD1) and deposit money bank assets (FD2), both as a percentage of GDP. Financial development indicators are drawn from the Global Financial Development Database of the World Bank.

The institutional quality indicators are sourced from the WGI database. This study uses all the indicators of institutions provided by the WGI database, namely, control of corruption (CC), government effectiveness (GE), regulatory quality (RQ), the rule of law (RL), political stability and absence of violence/terrorism (PSV) and voice and accountability (VA). Estimates of each indicator range from approximately -2.5 (weak) to 2.5 (strong). Dreher et al. (2009), Torgler and Schneider (2009), Schneider (2010) and Abdih and Medina (2013) argue that institutional quality is one of the main determinants of the size of the informal economy.

We include three control variables previously used as potential drivers of the informal economy. Government spending (GS) as a per cent of GDP (GS) is a crucial factor in the decision to participate in the official economy or operate in the official economy (Schneider & Enste, 2000; Dell'Anno, 2010; Goel & Nelson, 2016; Dell'Anno et al., 2018). Higher government spending might distort the allocation of resources, crowd out private investment and lead to (potentially) higher levels of corrupt activities and therefore imply a larger informal economy size.

Trade openness (TO), defined as the ratio of the sum of export and import as a percentage of GDP, is another potential factor that gauges the impact of international trade on the shadow economy. Trade openness is expected to decrease informality by improving productivity and reallocating resources (Esaku, 2021).

Finally, we include GDP per capita growth (G) due to its close relation to the shadow economy. Elgin and Oztunali (2014) suggest that a higher growth rate would attract economic agents to the official economy. Hassan and Schneider (2016) and Schneider (2011) are other authors who find that the size of the informality diminishes with an increase in GDP growth. On the contrary, Zaman and Goschin, 2015; Wu and Schneider (2019) find the opposite; therefore, the effect of growth on informality is inconclusive and mixed.

Table 2 illustrates the summary statistics for all variables used in the analysis. It is observable that the variation in the size of the informal economy is considerable across countries. To illustrate, while Nigeria has the largest informal economy as a share of GDP (61.4), China has the smallest informal economy (11). We can also see the variation in financial development indicators. Guinea-Bissau and the Democratic Republic of the Congo have the least-developed financial systems, and China and South Africa are the most financially developed countries. On the average of the institutional quality indicators, Chile and Hungary have the highest institutional quality level.

Tablo: 2
Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
SE	1072	32.59	10.727	11	61.4
FD1	1072	37.079	30.332	0	160.125
FD2	1072	46.343	30.532	3.085	207.79
FD3	1072	44.4	31.602	.438	181.78
CC	1072	-.421	.633	-1.722	1.592
GE	1072	-.351	.658	-2.078	1.275
PS	1072	-.427	.859	-2.81	1.283
RQ	1072	-.253	.621	-1.684	1.539
RL	1072	-.421	.649	-1.817	1.433
VA	1072	-.347	.707	-1.907	1.293
TO	1072	74.612	34.263	20.723	210.374
G	1072	2.438	3.774	-36.557	28.676
GS	1072	13.951	4.608	.952	30.003

Note: Autor's calculation.

Table 3 displays the correlation matrix between variables in the dataset. The table reveals that all financial development, institutional indicators and control variables except growth rate are negatively and significantly[6] correlated with the shadow economy. Moreover, the independent variables do not strongly correlate with each other, which solves the multicollinearity problem apart from the financial development and institutional quality indicators; thus, we will include them in separate regressions.

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[6] *P values are not reported due to saving space.*

Tablo: 3
Matrix of Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) SE	1.00												
(2) FD1	-0.69	1.00											
(3) FD2	-0.42	0.44	1.00										
(4) FD3	-0.70	0.92	0.48	1.00									
(5) CC	-0.78	0.74	0.43	0.73	1.00								
(6) GE	-0.79	0.77	0.44	0.77	0.95	1.00							
(7) RQ	-0.74	0.74	0.43	0.73	0.92	0.95	1.00						
(8) RL	-0.81	0.76	0.44	0.76	0.96	0.96	0.94	1.00					
(9) PS	-0.64	0.56	0.35	0.55	0.77	0.76	0.74	0.79	1.00				
(10) VA	-0.54	0.58	0.31	0.55	0.77	0.78	0.81	0.80	0.65	1.00			
(11) GS	-0.54	0.41	0.13	0.44	0.58	0.56	0.54	0.58	0.48	0.50	1.00		
(12) TO	-0.31	0.28	0.59	0.35	0.36	0.37	0.39	0.35	0.42	0.14	0.00	1.00	
(13) G	0.03	-0.08	-0.02	-0.08	-0.07	-0.04	-0.06	-0.07	-0.03	-0.08	-0.26	0.07	1.00

Note: Autor's calculation.

Tablo: 4
Estimation Results

Dependent Variable: Informal Economy (IE)						
	1	2	3	4	5	6
FD1	-0.127*** (0.019)	-0.132*** (0.022)	-0.132*** (0.023)	-0.119*** (0.022)	-0.129*** (0.022)	-0.143*** (0.020)
CC	-2.000*** (0.586)					
GE		-1.239** (0.529)				
RQ			-3.107*** (0.747)			
RL				-4.250*** (0.431)		
PS					-1.889*** (0.325)	
VA						0.209 (0.546)
GS	0.438*** (0.051)	0.445*** (0.046)	0.447*** (0.046)	0.430*** (0.046)	0.438*** (0.041)	0.439*** (0.053)
TO	-0.038*** (0.009)	-0.036*** (0.010)	-0.036*** (0.010)	-0.040*** (.009)	-0.040*** (0.010)	-0.037*** (0.009)
G	-0.063 (0.036)	-0.063 (0.037)	-0.058 (0.040)	-0.056 (.037)	-0.057 (0.036)	-0.067* (0.037)
FD1* CC	0.027* (0.014)					
FD1* GE		0.026* (0.013)				
FD1* RQ			0.023** (0.010)			
FD1* RL				0.052*** (0.017)		
FD1* PS					0.032 (0.022)	
FD1* VA						-0.021*** (0.004)
Countries	67	67	67	67	67	67
Observations	1072	1072	1072	1072	1072	1072
Adjusted R2	0.26	0.26	0.27	0.29	0.27	0.26
F-statistic	604.93	138.95	100.35	176.19	145.27	86.02
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00

*Note: Driscoll-Kraay robust standard errors are in parentheses. ***, **, * are significant levels at 1%, 5%, and 10%, respectively. Informal economy (IE) is the dependent variable. FD1 is domestic credit to the private sector. The interaction refers to the interaction term between FD1 and institutional variables.*

5. Empirical Results

Table 4 presents the analysis findings using six indicators of the institutions. In regression 1, corruption control (CC); in regression 2, government effectiveness (GE); in regression 3, regulatory quality (RQ); in regression 4, the rule of law (RL); in regression 5, political stability and absence of violence (PS) and finally, in regression 6, voice and accountability (VA) are used as the measure for institutional quality.

As expected, β_1 (the coefficient of *FD*) is negative and statistically different from zero at the 1% level in all the models indicating that financial development decreases informality. This finding is consistent with Berdiev and Saunoris (2016), who highlighted the importance of financial development in reducing the size of the shadow economy. Therefore, financial development incentives economic agents to operate in the official economy and take advantage of easy access to credit.

Meanwhile, the coefficients for institutional quality indicators are negative and significant in all the models except for VA. That is to say that better institutions are associated with a smaller size of informality. Therefore, the development of institutional frameworks leads firms and individuals to operate formally.

The results for the control variables are in line with our expectations. The sign for the government spending is positive and significant at the 1% level in all the models implying that a larger government increases informality. More government spending, possibly resulting in higher taxes, could crowd out investment, distort resource allocation, and lead to a much larger shadow economy.

Trade openness reveals a negative and statistically significant impact at the 1% level in all the models, as would be expected. This finding suggests that higher trade openness leads to a smaller informal economy. This result is in line with the findings of Schneider et al. (2010). Finally, the growth of GDP per capita negatively affects the size of the informality even though the coefficient is insignificant at conventional levels almost in the models except for model 6. Thus, we do not observe clear evidence for the impact of growth on the informal economy.

To evaluate the overall influence of financial development on informality, we focus on the interactive terms between institutional indicators and financial development. The positive coefficients of the interaction term imply that institutions and financial development each have the maximum impact on the size of the shadow economy when the other variable is at its lowest level. We can observe that almost all the coefficients of the interaction terms are positive and statistically different from zero, regardless of the proxy for institutions except for VA. These findings show a significant substitution effect between these variables. Specifically, financial development has the largest impact on shadow economy operations when institutional quality is the lowest. In other words, in the absence of a sound institutional setup, financial development should diminish the negative impact of institutions on the

formal economy and vice-versa. On the other hand, better institutions might mitigate the negative effect of the low levels of financial development on informality. This substitution effect could be because some of the tasks associated with efficient institutions are also fulfilled by improvements in credit markets to decrease the shadow economy's size and vice versa. For example, economic agents might prefer to operate informally due to high transaction and information costs in the presence of inefficient institutions. However, a well-functioning credit market can alter their preferences by reducing these costs and thus compensate for inefficient institutions' deficiencies.

Tablo: 5
Estimation Results with Alternative Financial Development Measure
(Liquid Liabilities)

	Dependent Variable: Informal Economy (IE)				
	1	2	3	4	5	6
FD2	-.0131***	-.136***	-0.137 ***	-0.118***	-0.130***	-0.171***
	(0.025)	(0.028)	(0.029)	(0.025)	(0.024)	(0.033)
CC	-2.382***					
	(0.543)					
GE		-3.09***				
		(0.818)				
RQ			-5.018***			
			(0.982)			
RL				-5.501***		
				(0.560)		
PS					-2.825***	
					(0.532)	
VA						1.342**
						(0.618)
GS	0.437***	0.446***	0.465***	0.428***	0.441***	0.446***
	(0.053)	(0.046)	(0.046)	(0.051)	(0.046)	(0.054)
TO	-0.039***	-0.039***	-0.038***	-0.043***	-0.047***	-0.038***
	(0.013)	(0.013)	(0.013)	(0.012)	(0.014)	(0.013)
G	-0.049	-0.046	-0.041	-0.042	-0.044	-0.058
	(0.035)	(0.037)	(0.039)	(0.035)	(0.034)	(0.036)
FD2* CC	0.033***					
	(0.010)					
FD2* GE		0.055***				
		(0.007)				
FD2* RQ			0.045***			
			(0.010)			
FD2* RL				0.068***		
				(0.014)		
FD2* PS					0.051**	
					(0.022)	
FD2* VA						-0.041***
						(0.012)
Countries	67	67	67	67	67	67
Observations	1072	1072	1072	1072	1072	1072
Adjusted R2	0.27	0.28	0.29	0.30	0.29	0.27
F-statistic	77.58	131.57	190.88	184.94	124.07	69.43
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00

*Note: Driscoll-Kraay robust standard errors are in parentheses. ***, **, * are significant levels at 1%, 5%, and 10%, respectively. Informal economy (IE) is the dependent variable. FD2 is liquid liabilities (% of GDP). The interactions refer to the interaction term between FD2 and institutional variables.*

The estimations were conducted with two alternative financial development measures for robustness checks: liquid liabilities (FD1) and deposit money bank assets (FD2) as financial development indicators. The results of these estimations are presented in Tables 5 and 6. These tables are organised in the same way as the previous tables. It can be

observed that our results are robust to using different indicators of financial development and conform to our benchmark findings. Financial development is more effective in tackling informal economies in countries with low institutional quality. Similarly, efficient institutions are more effective in decreasing informality size, whereas the financial sector is inefficient. Therefore, they act as substitutes.

Tablo: 6
Estimation Results with Alternative Financial Development Measure
(Deposit Money Banks' Assets)

Dependent Variable: Informal Economy (IE)						
	1	2	3	4	5	6
FD3	-0.109*** (0.019)	-0.116*** (0.020)	-0.113*** (0.021)	-0.105*** (0.020)	-0.115*** (0.021)	-0.133*** (0.019)
CC	-2.491*** (0.710)					
GE		-2.294*** (0 653)				
RQ			-3.798*** (1.042)			
RL				-4.830*** (0.552)		
PS					-2.892*** (0.459)	
VA						0.834 (0.557)
GS	0.493*** (0.058)	0.452*** (0.052)	0.445*** (0.051)	0.436*** (0.053)	0.445*** (0.048)	0.441*** (0.059)
TO	-0.048*** (0.008)	-0.048*** (0.009)	-0.047*** (0.009)	-0.051*** (0.008)	-0.055*** (0.009)	-0.047*** (0.009)
G	-0.061 (0.036)	-0.056 (0.038)	-0.053 (0.040)	-0.052 (0.037)	-0.051 (0.034)	-0.069* (0.038)
FD3* CC	0.038*** (0.011)					
FD3* GE		0.044*** (0.009)				
FD3* RQ			0.033** (0.011)			
FD3* RL				0.060*** (0.014)		
FD3* PS					0.049** (0.018)	
FD3* VA						-0.029*** (0.007)
Countries	67	67	67	67	67	67
Observations	1072	1072	1072	1072	1072	1072
Adjusted R2	0.28	0.28	0.28	0.31	0.31	0.27
F-statistic	274.53	216.29	507.58	246.50	119.12	99.99
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00

Note: Driscoll-Kraay robust standard errors are in parentheses. ***, **, * are significant levels at 1%, 5%, and 10%, respectively. Informal economy (IE) is the dependent variable. FD3 is deposit money banks' assets (% of GDP). The interactions refer to the interaction terms between FD3 and institutional variables.

This paper suggests that in a policy design to reduce informality, it is crucial to identify whether the constraints stem from the financial or institutional framework and act accordingly. Therefore, this analysis suggests how the shadow economy might be reduced through the improved financial sector for countries with inefficient institutions. However, It is also worth emphasising that this study does not suggest that financial development and institutions act as perfect substitutes. Instead, it indicates that some of the beneficial effects

of institutions on information and transaction costs may come from a well-functioning financial sector.

6. Conclusion

Researchers discuss the phenomenon of the shadow economy and use several indicators to determine the factors that drive individuals and corporates to participate in the shadow economy. Of these, the impact of financial sector development and institutions on the informal economy has received considerable attention in recent academic studies. This paper exploits both these strands of the literature to explore if institutional quality has any role in moderating the impact of financial development on the shadow economy. In other words, we investigate if financial development and institutional quality work as substitutes for reducing informality. Assessing this relationship is important in determining the most appropriate resource allocation between these two factors. In a policy design to reduce the shadow economy size, it is crucial to identify whether the constraints stem from the financial or institutional framework and act accordingly.

This paper analyses the interactive effect of financial development and institutions on the shadow economy using data from 67 developing countries from 2002-2017. Results show that financial development impacts informal economy operations most when the institutional quality is the lowest. In other words, in the absence of a sound institutional setup, financial development mitigates the negative impact of institutions on the formal economy. On the other hand, a higher level of institutional quality is more effective in combating shadow economies in countries where the financial sector is less developed. More specifically, financial development and institutions work as substitutes in reducing informality.

Overall, this analysis provides evidence of how the shadow economy might be reduced through development in the financial sector for countries with inefficient institutions. Ultimately, we can propose two main policy recommendations based on this article. Firstly, countries with low institutional quality can use their resources in favour of financial development to combat informal economies. Secondly, in the markets of countries that are not yet financially developed, the size of the informal economies can be reduced by giving higher priority to institutions in using resources. The main reason behind this substitution effect may be that some of the duties associated with institutions are also fulfilled by financial development to combat informality and vice versa. For example, individuals and corporates might prefer to engage in underground activities because of the high transaction and information costs in the absence of sound institutions. However, a well-functioning credit market can change their preferences by reducing these costs and thus compensate for the deficiencies of inefficient institutions.

However, it is also worth emphasising that this study does not claim that financial development and institutions are perfect substitutes. Instead, it suggests that institutions' beneficial effects on information and transaction costs may come from a well-functioning

banking sector. Although this study may offer a few policy recommendations for the macroeconomic framework, it does not propose any precise microeconomic instruments for how the quality of institutions relates to the linkage between the shadow economy and financial development. There is a need for further analysis of individuals and firms in deciding whether to operate informally. Future work might consider this relationship at microeconomic levels.

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Taxation in Virtual Worlds: Analysis Under United States of America and Turkish Tax Regulations

Derya YAYMAN (https://orcid.org/0000-0002-7098-5277), Akdeniz University, Türkiye; dyayman@akdeniz.edu.tr

Sanal Dünyalarda Vergilendirme: Amerika Birleşik Devletleri ve Türkiye Vergi Düzenlemeleri Kapsamında Analiz

Abstract

In today's day and age, there is a new world comprised of novel terms like virtual reality, virtual environment or virtual worlds. Virtual worlds allow participants to buy and sell virtual goods and services using virtual currency. Therefore, virtual world transactions bring large amounts of income. In countries that have adopted the recommendations of OECD and G20 countries, tax regulations have begun to be made on the subject. The study aims to discuss the taxation problems arising due to the incredible number of users spending time in virtual game worlds. In the study, Turkish and US tax regulations were examined. The study shows that virtual worlds are getting closer to the real world, there is a transition towards the meta-universe, people earn income in these environments, and there are differences between countries in the taxation of these incomes.

Keywords : Virtual Worlds, Virtual Game Worlds, Taxation of Virtual Values, Second Life, Metaverse.

JEL Classification Codes : K34, H25, H26.

Öz

Çağımızda sanal gerçeklik, sanal ortam veya sanal dünyalar gibi yeni terimlerden oluşan yeni bir dünya vardır. Sanal dünyalar, katılımcıların sanal para birimini kullanarak sanal mal ve hizmet alıp satmasına olanak tanır. Bu nedenle sanal dünya işlemleri büyük miktarda gelir getirmektedir. OECD ve G20 ülkelerinin tavsiyelerini benimseyen ülkelerde konuyla ilgili vergi düzenlemeleri yapılmaya başlanmıştır. Çalışmanın amacı, inanılmaz sayıda kullanıcının sanal oyun dünyalarında vakit geçirmesinden kaynaklanan vergilendirme sorunlarını tartışmaktır. Çalışmada Türk ve ABD vergi mevzuatları incelenmiştir. Çalışma, sanal dünyaların gerçek dünyaya yaklaştığını, meta-evrene doğru bir geçiş olduğunu, insanların bu ortamlarda gelir elde ettiğini ve bu gelirlerin vergilendirilmesinde ülkeler arasında farklılıklar olduğunu göstermektedir.

Anahtar Sözcükler : Sanal Dünyalar, Sanal Oyun Dünyaları, Sanal Değerlerin Vergilendirilmesi, Second-Life, Metaverse.

1. Introduction

Max Headroom, a 1980s television show, started its broadcast by using the slogan *"20 Minutes to the Future*". The plot of the show followed the life of a reporter named Edison Carter, who succeeded in creating a computer-generated alter ego named Max Headroom. As a digital product, Max could travel to the future and chat with people like himself, thanks to computer systems.

Max Headroom is no longer science fiction but today's reality. The commercial development of the Internet in the mid-1990s led to the embracement of networked computer systems spanning the globe (Switzer & Switzer, 2014: 1).

Virtual environments are technically developed from text-based internet chat rooms via Massively Multiplayer Online Games (MMOG) for X-Box and Play-station, MultiUser Dimension (MUD) and Massively Multiplayer Online Role-Playing Games (MMORPG) such as World of Warcraft and Lord of the Rings Online. The game element in these examples is very important. Future self-written virtual environments are not games but instead emphasise the creative, analytical, educational, and practical. In 1938, the French writer Antonin Artaud defined theatre as a virtual reality in which characters, objects, images, and everything that makes up the virtual reality of theatre generally evolves. The mobile phone and laptop have already started the wave of decentralisation that heterotopic sandboxes will further enable. The market for apps for Apple and Android devices has also led to the ever-growing trade in virtual goods. More importantly, the virtual goods market in the metadatabase brings people closer to Nelson's original idea of a decentralised internet where the producers are equal. In Nelson's understanding, reusing an item or object would carry a reference to the source and therefore allow free use of the 'works' while protecting the author's copyright (Hagerty, 2012: 97-99).

Virtual worlds without a specific plot can be seen on platforms such as Second Life, The Sims Online, and There. For instance, the owner of the game Second Life, Linden Lab, provides the fundamental setting, whilst users produce the great majority of the world's content. Virtual worlds offer a platform for any real-world activity. Real-world companies use the virtual world to promote their products. Second Life has attracted significant investment. For instance, Mazda debuted its Hakaze concept car in Second Life in early 2007 before doing so in reality. People who engage in virtual worlds often pay to participate, and many are there to entertain themselves. However, players frequently obtain in-game goods like virtual currency, gear, or weaponry, even when playing structured games. Some players will transfer such an item globally in exchange for actual cash. Many goods have discernible valuations as a result of such actual market transactions. These values can get relatively high. Some people support themselves by playing video games, utilising their online personas to gain valuable virtual goods, and then reselling them, usually on auction sites. Can someone who earns their income by conducting online auctions of virtual property be taxed on these profits? Is the value of an item an avatar finds or wins taxable to the owner? And is any increase in the value of an item that the player exchanges with another player in-

game (for another item or virtual money) subject to taxation? These questions are important when considering tax revenues (Lederman, 2007: 1621-1623).

Taxing economic transactions within virtual worlds is a problem for revenue administrations. Given that some virtual world economies are equivalent to some countries' economies, the problem could be exacerbated. Revenue administrations want to collect taxes on all kinds of earnings. However, the emergence of powerful internet platforms has affected the ability of revenue administrations to tax corporate profits. Transfer prices in virtual economic activities lead to a decrease in the tax revenues of governments. The development of virtual commerce also affects the tax collection powers of tax authorities. Due to the difficulty of determining tax transactions in certain geographical regions, the tax base on large internet platforms is also decreasing. The current situation led the states to think about the taxation of transactions and earnings in virtual economic environments, and discussions were held on this issue. This study will discuss the features of virtual worlds, virtual economic transactions, and taxation ways of the earnings resulting from these transactions. In addition, the virtual economic activities of the USA and Turkey will be examined and analysed in terms of tax regulations.

2. The Aspects of Virtual Worlds

Virtual worlds are computer-simulated spaces that emerged in the 1970s. They initially appeared with text-based games. Virtual games are generally tabletop games in which users act. Emerging virtual game worlds are multi-user, real-world simulation spaces. Some technologists predict that in the future human beings will live entirely in these worlds. These worlds are now described as metaverses. With projects such as The Sandbox and Decentraland, worlds are being created where users can communicate with each other and use virtual money (Brooks, 2022).

Virtual game users represent themselves in these places with their avatars. Users are often eager to create a digital identity with a younger version of themselves. They can change the look of their avatar with a few commands. According to studies, there is a deep connection between the user and the avatar. Most people create avatars that are representations of their identity, gender, and ethnicity. The game's avatars evolve, grow, and change as the player plays. Virtual artefacts that are exchanged or won are used for most of this exchange. Virtual artefacts can be anything from a hairstyle or a change of shoes or lands and the entire planet (Hagerty, 2012: 97-99). Virtual world participants participate in the game by accepting the terms of service and the issues specified at the end user agreements before entering this game world.

Virtual worlds are divided into structured and unstructured. In structured virtual worlds, game makers devise stories and goals for game participants. These worlds often contain adventures. Most of them participate in the game with their avatars, defeat their enemies and earn points. Structured worlds are endless. To preserve the subscriber count of a virtual game world, the game developers constantly update the game by installing patches.

Thus, they expand the boundaries of the game and introduce new game features. In such a case, subscribers must purchase a separate expansion pack or sequel. The Entropia Universe, World of Warcraft, Ultima Online, Final Fantasy XI, and Everquest series are structured worlds.

Unstructured virtual environments lack a predefined plot. Avatars start the game by accepting the rules and are allowed to move freely. They are not generally seen as a game world but as an environment that provides socialisation. Some worlds are places where real-world products are marketed. Second Life, There, Kaneva, and Habbo Hotel are examples of unstructured virtual worlds. (Chung, 2008: 736-737).

The most significant potential of virtual games is the decentralisation of markets for the production, ownership, and exchange of digital assets, as well as the conversion of players' virtual time, effort, and earnings into disposable income in the real world. The game world has an infrastructure that offers significant opportunities and wealth to the best players. The top players may qualify as top athletes, hold salaried team positions, take home tournament prizes, or handle sponsorship negotiations. Other players can earn money from their live streams by playing video games on streaming services like Twitch or YouTube Gaming.

Since they have overtaken linear TV, entertainment on demand, cinema, and music to become the most extensive media category in the world, virtual game worlds have also developed several characteristics. Most game-based economic activities are now centralised, giving game developers and publishers complete control over everything that occurs in their creations. Sales of in-game products, digital goods, and subscriptions produce billions of dollars as players become professionals in online gaming.

Individuals must have faith in the robustness and soundness of their digital assets and products if they spend considerable time, attention, and personal investment in digital environments. Early examples demonstrate that blockchain technology, which uses cryptography to establish digital trust and a decentralised store of value, can accomplish this.

Blockchain technology is used in many sectors, including the arts and banking. Blockchain technology is the foundation for value generation in games obtained through play, including non-fungible tokens (or NFTs). A unique, immutable digital asset is the subject of a digitally secured property claim known as NFT (Non-Fungible Token). NFTs can take on various shapes in virtual environments, including avatars, products, scenery, and cosmetic modification options like digital apparel. People who excel at the game can "win" the most valuable items and sell them for real money on their terms.

The key novelty in these digital assets is their decentralised integrity and security, which for the first time, can go beyond traditional ownership, custody control, and discretion of a firm or even government. For example, in-game resources can be sold for free on in-game and non-game markets rather than relying on publishers' or third parties' permissions

or rules. The potential of play-to-win games in creating a new economy has been highlighted by several communities that have surfaced recently. The video game "Axie Infinity" demonstrates that this is more than a witless idea. In a few months, the game's daily active user base increased from 4,000 to 2 million, with the Philippines and Venezuela seeing the most significant growth. The money that participants in these Global South nations can make online is significantly more valuable to them than what their local physical economies can provide. Virtual games have yet to completely and naturally eliminate the centralisation within them. They still require the game publisher's authority to define, publish, and restrict the asset traded as an NFT. The potential for decentralising markets for the creation, ownership, and exchange of digital assets, as well as the potential for situations where players can convert their digital time, effort, and earnings into disposable income in the real world, are the most significant promises made by play-to-play games (Hall & Lentz, 2021).

Virtual worlds are creative economies of which we know and ponder their possibilities. Still, as of this moment, their role in any future real-world economy needs to be clearly defined. The presentation of available economic data (for trade secrecy) is often incomprehensible and not open to easy analysis, but what is clear is that a significant economy exists. For example, a Forbes report on Linden Lab's Second Life stated that "the 25 largest residents of the virtual world collectively earned $12 million" in 2009. The rise in virtual world economies shows that tax authorities must proactively address emerging issues.

Second Life is a metadata store. It is a 3D graphics environment developed by San Francisco-based software firm Linden Labs. It is accessible via the web and allows many simultaneous users to interact. An avatar that can walk, fly, drive, and teleport into virtual settings and engage in various activities represents each user graphically. One of the newest and most well-liked systems for metadatabases, it provides for both synchronous and asynchronous communication as well as dynamic alteration of the virtual environment through the possibility for all users to build there. It constantly changes as avatars engage with the Second Life world and one another. Residents can acquire land, construct homes and businesses, and sell their goods to other program participants, all for free. Second Life was released in 2003 (Alrayes & Sutcliffe, 2011: 4). Second Life's content platform, Seraphim, grew approximately 34.3 per cent in 2021. The showcase page established a new record with 20 million page visits in 2021. Seraphim, founded in 2011, offers Second Life users a digital platform for hosting and disseminating user-generated content. For in-game things, including digital boutique items, tattoos, character skins, and interior design items, Second Life "residents" can browse the website. Since its founding, Second Life has attracted finance totalling around $11 million, and it has generated an in-game economy with a value of almost $500 million. Second Life reported having about 64.7 million active users on its platform as of 2021. Organisations, including Stanford University, the American Cancer Society, and Adult Swim, have utilised the platform for corporate-level virtual events (Greener, 2022).

Real-world sellers have begun to use these worlds as commercial space. For example, in Second Life, retailers started using Second Life for sales and marketing, as residents began to buy virtual goods made by other residents.

Dell, Cisco Systems, Xerox, and Nissan are all involved in the Second Life game. Second Life allows participants to design virtual items. In 2006, she won the Edelman public relations firm's business plan design competition for Second Life with her virtual island design, Aimee Werber Weber Studio. This project is a hybrid project. Studio; has been used by the United Nations, the American Cancer Society, the National Oceanic and Atmospheric Administration, and American Apparel.

Reuters News, Sony/BMG Music, Wired Magazine, and Starwood's W Hotels are participating companies. Except for real estate, most virtual worlds don't charge for their virtual elements. However, most receive monthly subscription fees (Bray and Konsynski, 2007:1-3, 14). Virtual world users can design virtual homes by paying real-world money. Virtual avatar Anshe Chung has earned more than $1,000,000 from selling real estate. EverQuest II launched a commercial promotion in February 2005 that allowed avatars to order pizza from their virtual world.

Virtual worlds charge their participants a monthly fee to use a virtual item they sell later, and the use of these items is limited to the time this world lasts. The virtual game operators will take back the virtual properties if the participant does not pay the monthly fee or leaves this world. In other words, the rights of avatars to use virtual property are limited to the duration of their existence in the game. Architects and city planners already accustomed to using Computer-Aided Design (CAD) are increasingly using virtual environments better to predict final construction and test evacuation and safety protocols.

Massively Multiplayer Online Role-Playing Games (MMORPGs) are virtual worlds where the virtual property can be discussed. They seek to make a pleasant, fantasy-based virtual environment where users can go on excursions together. The focus on developing computer-mediated, shared experiences that people can share without a meticulously planned plot is where Second Life, Entropia Universe, Cyworld, and other virtual worlds differ slightly. Instead, virtual players decide what to accomplish, their objectives, and how to construct their virtual world.

To transmit news on both the virtual and real worlds "out there," Reuters has established a virtual centre in Second Life. During sessions held in Second Life, a virtual live concert by Susanna Vega was broadcast by National Public Radio. IBM announced its intention to create twelve virtual islands for business meetings and staff events in December 2006 and hosted a virtual gathering of former employees. In Second Life, more than 40 companies are listed on Wikipedia (www.wikipedia.org). Additionally, several actual universities, like INSEAD and USC-Annenberg, create islands in virtual worlds and conduct classes there. The CyberOne course at Harvard Law School is partly taught on Second Life's Berkman Island.

Virtual currencies are used in virtual worlds to facilitate the trade of products and services. In Second Life, virtual avatars can trade Linden dollars. Other virtual world currencies are traded at set rates rather than fluctuating. Project Entropia Dollar, sometimes known as PED, is one example of a virtual currency used in Entropia Universe. Dotori, short for "acorn," is a virtual currency used on Cyworld (www.cyworld.com). Virtual participants are urged to use the acorns to buy virtual goods for their digital avatars, such as clothes, decorations, musical instruments, songs, videos, and other entertainment, for 100 Korean won ($0.010) each. Most Cyworld goods have expiration dates and disappear on their own when they do. Cyworld introduced a similar virtual world at the end of August 2006 focused on North American users.

Real-world business enterprises also create virtual worlds. The MTV music channel has created a virtual environment called "MTV's Virtual Laguna Beach", where users may interact with friends and fans while watching the MTV Laguna Beach television show. The service is free and still in beta. MTV has requested corporate sponsors to utilise the gaming environment to showcase product placement and advertisements included in the immersive experience. Participants could also use virtual currency to buy virtual and actual goods, including new music, films, and apparel. Participants can purchase virtual currency with real credit cards and earn MTV$ by participating in product placement activities. In addition, real-world bands and musicians give virtual concerts.

In virtual worlds, there are banks. Meta Bank is a virtual bank in the game Second Life. Customers can perform banking transactions. Meta Bank gives loans in L$ and charges interest. Wells Fargo bank is in Second Life (Bray & Konsynski, 2008: 2).

Virtual worlds offer unlimited collaboration opportunities to achieve defined goals. Simulation is used in real-world training as well as other real-world events. The Multinational Planning Development Team (MPAT) at the University of Edinburgh has developed virtual platforms and artificial intelligence (AI) algorithms on which real-world emergency response teams can be organised to prevent worldwide disasters.

It is predicted that the education industry will use virtual classrooms instead of real buildings. The University of Texas at Austin has launched an initiative to use Second Life as a year-round platform on all sixteen campuses. The initiative has been observed to have been innovative, cost-effective, and efficient for students, faculty, researchers, and administrators.

The virtual worlds have enormous potential for social and political change of the social avatar, possibly turning into a new, borderless world of global citizens. There is greater egalitarianism and equal opportunity in virtual worlds (Hagerty, 2012: 99-101).

Avatar accessories like clothing, hair, and other personal augmentations are the focus of most virtual goods transactions in virtual worlds. However, different sorts of property like automobiles, houses/apartments, virtual land, or a particular sword or weapon are also

included. A club, hotel, art gallery, resort, or even a classroom may require an entrance fee in some virtual worlds where residents can restrict access to their facilities. The services provided by other entrepreneurial avatars could range from advice to fortune-telling (Rumbles, 2011: 356-357).

The potential of virtual worlds to be used in political and military affairs can cause many legal problems. In some Massively Multiplayer Online Role-Playing Games, players' contributions to the game give them certain rights. In MMORPGs, virtual items gain a stable legal structure with the ownership model. There is no obstacle in considering virtual items as objects in such games. It is understood that virtual items carry the necessary elements for a thing to be qualified as an item according to the classical item doctrine. For example, a virtual sword in the popular game WoW falls within the definition of an item. Moreover, the sword's owner has the right to bar other players from using that sword. This feature is one of the most important features of property rights. The virtual world continues to spin even after the players exit the game. There is also the everyday use of resources and the constant interaction of the players with each other. All these features in MMORPGs lead to real-world economic rules to apply.

Transfer and succession of virtual elements are possible. Such transactions are made frequently, especially on eBay, IGE, Yahoo, and similar auction sites. After selling their virtual assets on eBay for real money, players meet in the corner of the virtual world and perform the virtual transfer. In some games, the password information of the avatar's account is transferred in real life for a specific price. So, despite the objections of game developers, all virtual items and avatars are exchangeable commodities. All these explanations show that virtual assets have the characteristics of movable goods in both the continental European and the Anglo-Saxon legal systems. No one can claim that a value that can be measured in money and that can be assigned and transferred in the market is not an item, even if this value consists of only an account password when necessary (Gemalmaz, 2019).

3. Economic Activities in Virtual Worlds

In a virtual game like Second Life, there are entire universes of transactions, including the sale of commodities and services. Shopping in person doesn't exist (Switzer & Switzer, 2014: 2-5). The virtual world is a 3D platform centred on avatars, with avatars standing in for actual people. A user's avatar is a graphic representation of them in three dimensions (3D) that allows them to interact with the virtual world and engage in virtual activities. Instant messages, virtual money, and virtual elements can all be traded between avatars. (Nazir & Lui, 2016: 2).

The financial power of virtual worlds is gradually developing. The first release of The Sandbox's digital real estate, known as land, was made in December 2019, earning owner Animoca Brands an estimated more than US$7 million. Nintendo's Animal Crossing game has been trending in the era of global Covid-19, and players have purchased their outfits for their avatars with real-world money.

By increasing the number of their active participants daily, popular games such as Fortnite, Minecraft, and Roblox turned into games with millions of people entering the network. Virtual resources in games offer smart investors opportunities to earn serious money in the real world. For example, players who become professional esports players or digital farmers are paid a salary. In the virtual economy space, the battle royale game Fortnite broke a record with revenue of $1.2 billion in its first ten months after its release in 2017 (Cooper, 2021).

Figure: 1
Worldwide Video Game Sales Total, By Segment (US$ bn)

Source: PwC, 2022: 8.
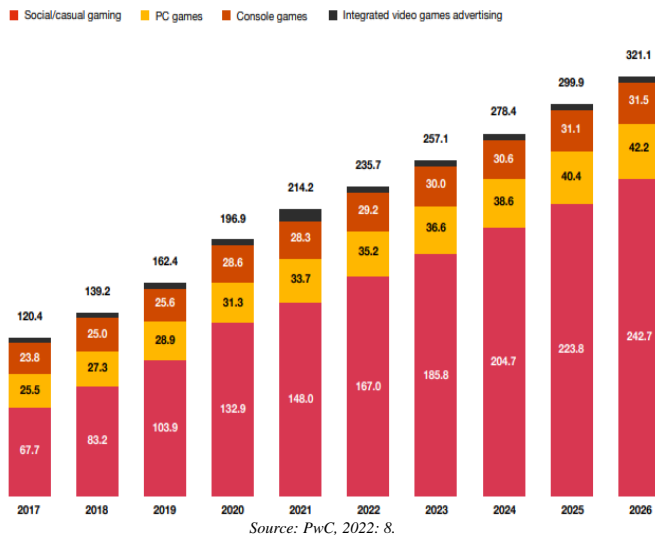
In 2022, PwC (PricewaterhouseCoopers) published its "Global Entertainment and Media Outlook Perspectives" report. According to the report, the digital gaming industry is experiencing the most significant growth. According to the information, Total video games revenue (excluding esports) in 2021 was $214.2 billion. It is estimated to rise to 321.1 billion dollars in 2026 with a compound annual growth rate of 8.4% (PwC, 2022: 8). Asia ranks first in in-game volume. A study by DFC Intelligence in August 2021 showed that Asian countries account for 1.48 billion of the total 3.2 billion players worldwide. In other words, 45% of the players live in Asian countries, with players based in Europe 22% (or 715 million) of the total (Wepc, 2022).

Figure: 2
Top Ten Countries by Consumer Growth, 2021-26, CAGR, %

Top Ten Countries By Customer Growth 2021-2026
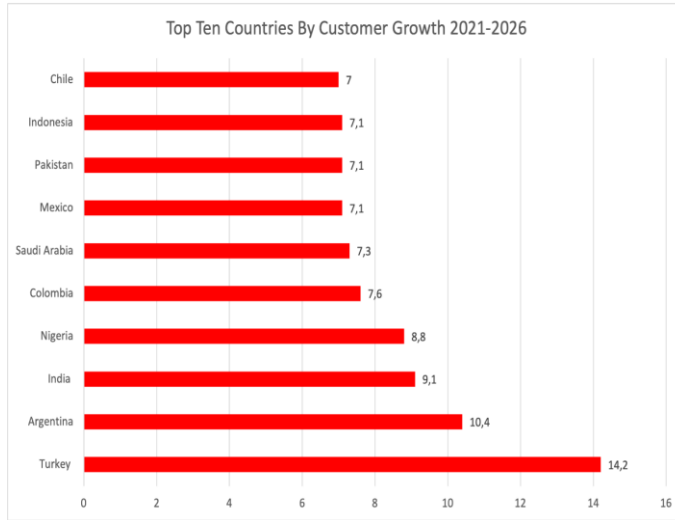
Source: PwC, 2022: 7.

The report announced that Turkey will be the fastest-growing video games market, with a compound growth rate of 24.1% in 2021 and 2026. Turkey is followed by Pakistan (21.9%) and India (18.3%). The research conducted by PwC also predicts that Turkey will be the fastest-growing country in terms of consumer income, with a rate of 14.2% from 2021 to 2026. Although this rate covers the entire entertainment sector, the most significant share comes from games. Argentina and India follow Turkey in terms of consumer income in the research. Turkey is currently the country that receives the most game investments in Europe. In the first six months of 2022, Turkish gaming start-ups received an investment of 333 million dollars, making Turkey the first in Europe in this regard. England follows our country with 158 million dollars and Norway with 60 million dollars in the ranking of the countries that receive the most investment in the gaming industry in Europe. In addition, Citibank's prediction that the Metaverse economy could be worth 13 trillion dollars by 2030 is also included in the report (PwC, 2022: 7).

Virtual world participation is mainly for recreational purposes for the majority of users. However, certain entrepreneurs may participate for commercial purposes. Although most participants occasionally do income-generating work in the virtual world, a few have made this business permanent (Chung, 2008: 730). In virtual worlds, an environment allows participants to make virtual economic transactions. Avatars join the story to introduce themselves and increase their power. Avatars usually start the game with a small number of items and money. As the game progresses, the avatars become stronger and obtain more powerful treasures. They spend virtual money on armour and weaponry to prepare for raids

or missions that will become more challenging. These sales require them to interact economically online with other avatars. This is how virtual commerce is born. Virtual worlds issue their currency as avatars engage in many different transactions. It has been observed that 100,000 young people in China and Vietnam generate income by providing "power levelling" (Rumbles, 2011: 359).

Most virtual properties have real-world monetary value. Virtual currency is a medium of exchange and a store of value. Virtual currency is offered according to the development of the game. For instance, World of Warcraft is a medieval game, and the currency is sometimes gold, sometimes silver, and sometimes archaic, depending on the game's development (Chung, 2008: 739).

Exchange tools such as Second Life's LindenX or Entopia's PED card allow money to be exchanged between the virtual and real worlds. In addition, some tools allow conversion between different art currencies. For example, Metaverse Cent (OM¢) is one of these tools.

The majority of virtual property transactions are undervalued. However, some transactions are of exceptionally high value. For example, in 2004, David Storey of Sydney bought a virtual island for $45,000. Cisco and IBM have set up private islands in Second Life and have turned these islands into international meeting venues. Almost every segment of society, from educators to real estate agents, uses these worlds. Millions of people in these worlds come together for fun or to use commerce. This has also intensified criminal activity in these worlds. According to the European Network and Information Security Agency's report, criminals are extremely quick to monitor monetary transactions. They are more likely to target the crossing points between the virtual and real worlds (Rumbles, 2011: 360).

Most virtual worlds have a closed economy and do not allow their users to make real monetary transactions. However, some users may circumvent these bans (RMT: Real Money Trading). In the first step of a simple RMT exchange, two participants accept the exchange and pay the seller their money in real-world currency. The virtual object is subsequently sent to the buyer's avatar by the seller's avatar. Most RMT transactions are made through online brokerages (Chung, 2008: 740-744).

Real money trading (RMT) in virtual worlds is important, and most worlds don't allow it. The second Life game enables users to create virtual items, buy virtual land, and make virtual business transactions. The Linden Dollar has a floating exchange rate to the US dollar (USD). The currency exchange system is LindeX. 3rd party companies can also exchange money.

Mindark's Entropia Universe allows real-world money to be exchanged for virtual currency. Participants in the game act as colonists who discover the planet Calypso. In a futuristic environment, as in many structured virtual worlds, avatars hunt and battle monsters. In addition, players can run shops, produce goods, buy land, and trade goods and

services. The Project Entropia Dollar (PED) is the currency of the Entropia Universe, and ten PEDs are one US dollar. Participants in the game can convert their PEDs into their country's currency.

MindArk has established the "Entropia Universe virtual platform", which offers the participant an opportunity to earn, and has issued a cash card that allows the earned virtual money to be withdrawn from a real-world ATM. Banks were also established on the platform, and those who earned income were disclosed to the public.

A high school senior earned $35,000 from selling virtual goods. A twenty-three-year-old participant bought a virtual island for an average of $27,500 and paid for it by renting it. Another user earned $100,000 by operating a virtual asteroid (Chung, 2008: 744-746). However, MMOGs (Massively Multiplayer Online Games) such as World of Warcraft and EverQuest prohibit the sale of virtual items for gold or currency. Such activities in such games are contrary to their terms of service and end-user license agreements. They banned the use of virtual currencies in auctions. However, numerous examples exist of people making a living by trading virtual goods. Second Life members have professions where they earn their living within the virtual world, such as jewellery makers, tour guides, musicians, landscape architects, nightclub owners, and lawyers. There are also third-party auction sites that act as intermediaries for in-world currency, virtual goods, and accounts worldwide.

Some malicious people can use virtual world transactions in money laundering, as it is almost impossible to track transactions in the virtual world and can be converted into real-world currency. In virtual worlds, crimes such as identity theft, hacking and credit card fraud can be committed. Dilla, Harrison, Mennecke and Janvrin; conducted a study investigating the fraud cases encountered by those entering the virtual world. In multiplayer game worlds, companies employ people for wages and direct profits from selling in-game items and properties. Julian Dibbell talked about how to profit from selling fictitious goods in his book "Play Money, or How I Quit My Day Job and Made Millions Trading Virtual Loot" and earned 11000 USD (Switzer & Switzer, 2014: 2-5).

4. Taxation in Virtual Worlds

Government officials and academics are starting to investigate the taxation of economies in virtual worlds. Taxing transactions in virtual worlds may have seemed absurd in the early days of virtual reality, but the concept is now receiving significant consideration. Over the past ten years, the online video game market has grown to billions of USD. The enormous reach of economic activities in virtual worlds has brought up the discussion of the taxation of virtual property, economic activities and virtual currencies used in these worlds, and countries have made taxation arrangements according to their tax legislation.

In the virtual game world, participants can buy title deeds, rent, and sell their land to other players to acquire virtual real estate. It is estimated that billions of dollars are returned

in this type of business. Earnings from selling land and works of art in digital environments must be taxed according to real-world tax laws.

The existence of virtual property is accepted all over the world. In virtual game platforms, the contracts made between people and service providers give people the right to use, and users can acquire properties in these virtual games according to the content of the service. Application unity has yet to be achieved as some virtual game platforms prevent the assignation and transfer of virtual property elements, and some do not. Most people sign and enter the game without reading the contract terms when opening any game account. Such contracts can't be accepted as contracts made with a full declaration of a will since there is no chance to go over the contract terms with the service provider in case of confusion or misunderstanding. Arguably, contracts that prohibit such ownership, assignment and transfer are the product of an easy and imposing mentality. These contracts have the nature of general transaction conditions by the principles of contract law and must be legally invalid. Virtual property established on virtual items has its characteristics. Unless new legal regulations are made, it has the "movable goods" feature in law.

Virtual games have monetary equivalents, and the service provider can prohibit third parties from using the virtual asset. Virtual property may be subject to compensation. While Turkey adopts no judicial jurisprudence in this regard, a court in China has ordered a service provider company to pay compensation to a person whose account was hacked and whose virtual property was stolen. Taiwan courts have also ruled that any virtual item is virtual property. In terms of moral compensation, a worldwide precedent decision has yet to be taken. Likewise, there are many precedents in countries such as the Netherlands, the USA, France, and Japan; even though in these countries, virtual currencies and cryptocurrencies are not classified or accepted as currency, they are considered transferable so that they can be subject to virtual ownership (Yıldırım, 2021).

In the metaverse, where millions of dollars of investments have been talked about recently, virtual lands are first among the most desired assets to be purchased. Second Life is a virtual reality game that can be considered one of the first examples of Metaverse. Game maker Linden Lab has stated that "sales tax" must now be paid on virtual land sales. Company officials explained the necessity of paying taxes with the law enacted in the USA in 2018, which obliges the payment of taxes on online purchases (Kaya, 2022).

Locating a Second Life user's residence can be difficult when they make "real world" money as a natural person, not through a business. A Second Life user can be required to pay income taxes in their home nation. Additionally, altering how money is made in the virtual world is simple to avoid paying taxes (Yıldırım, 2021).

In Germany, a German taxpayer earned income by renting virtual land. The taxpayer avatar exchanged the virtual currency he received for virtual land for real fiat currency. The taxation issue of this receipt went to the Cologne Fiscal Court, which decided that this

income should be subject to VAT according to customary German tax laws (Luther & Zawodsky, 2021).

Different tax systems are applied to virtual currencies around the world. Germany charges tax on earnings in virtual currency exceeding 600 Euros.HM Revenue and Customs of the UK does not accept virtual currencies as currency. Suppose it is used as an individual investment instrument. In that case, the administration qualifies it as an intangible asset, and in case of disposal, it is subject to capital gains and receives income tax. South Korea has started to work on the legal regulation on the taxation of 20% of the earned income. According to OECD's G20 Tax Report, almost all the countries except Italy, Netherlands, Portugal, and Switzerland regard the exchange of virtual currencies with nominal currencies as a "tax-generating event" (Ersoy, 2021).

In this section, the perspective of the USA, which is the homeland of the Second-Life game, will be discussed within the framework of the legal regulations made by the IRS. Then, the subject will be evaluated by considering the application of Turkey.

4.1. The USA Practice

The US Internal Revenue Service (IRS) recognises virtual currency as property. Virtual currency means all income from whatever source it is derived from and leads to tax liability. Virtual currencies that can be converted to world currencies are subject to income tax. This indicates that the general tax rules that apply to real property transactions can also be used for virtual property transactions. For this reason, earners who earn exchangeable virtual currency, namely taxpayers, are obliged to declare the sales price of virtual properties to their respective tax offices. Fines for violating IRS tax laws, such as underpayment and failure to disclose penalties, may apply to taxpayers who fail to record revenue from the sale or exchange of virtual currencies (Gabaie, 2020). States recognise the requirement to regulate and tax virtual transactions (Cole, 2021).

In the USA, while states with a sales tax assume that all sales transactions are taxable (unless there is a specific exemption or exception), most states have yet to clarify which sales tax laws apply to sales made in the metadata warehouse (Cole, 2022). It is rumoured that at the beginning of 2021, a group of participants in the USA bought the virtual properties of the game Citadel of the Stars for 1.6 million dollars. Virtual lands in other virtual worlds are also sold at very high prices. In March 2021, a virtual reality game called The Sandbox sold two of its virtual properties for approximately $2.8 million, after which it stated that its digital properties were worth approximately $37 million. With the legal regulation that made it compulsory to pay taxes on online purchases that came into force in the USA in 2018, a sales tax was introduced on virtual land sales, and this tax started to be applied for the first time with the world-famous virtual reality game Second Life last March (Kaya, 2022).

Notice 2014-21 concerning the sale, exchange, and use of convertible virtual currency to pay for products or tax services in real-world economic transactions was

published by the U.S. Internal Revenue Service in 2014. Mining activity in the virtual world is considered self-employment revenue and is subject to taxation, according to IRS Notice 2014-21. Transactions involving the sale of virtual currency, its usage to pay for products and services, etc., are taxable. On the other hand, 'closed-loop' currencies that cannot be converted into real-world money are not subject to taxation. According to the IRS, v-Bux and Robux from Fortnite and Roblox are not taxable because it is difficult to convert them into US cash (Brooks, 2022).

According to US tax regulations, those who make money from nothing are taxed like real taxpayers. Digital currency exchanges such as Coinbase record digital transactions and transfer records containing the user's name, taxpayer ID, date of birth, address, and bank statements to the IRS (Gabaie, 2020).

The IRS virtual currency guidance is relevant to many NFT transactions, and taxpayers should analyse NFT transactions by general tax law principles. NFT is a type of digital certificate that comes with certain rights attached to an asset. It relates to rights to physical assets, experiences, and digital assets. The US Internal Revenue Service (IRS) stipulates that NFTs should be taxed. The IRS taxes only those who have purchased cryptocurrencies and NFTs that have increased in value from the date of purchase. The U.S. Internal Revenue Code has provisions regarding physical assets and transactions (such as patents) involving more traditional intellectual property rights. The IRS has needed some help adapting tax laws to rapidly evolving technology. For example, there still needs to be regulations on how cloud-based transactions are taxed.

According to US intellectual property law, the owners of these rights can transfer their rights partially or entirely to someone else. Earnings from this transfer are calculated according to whether the transfer is a sale or a license transfer. The transferor may deduct the sale amount if it is a sale transfer. A license transfer is suitable for long-term capital gains rates if the intellectual property rights are for more than one year. The offset may continue in future years.

Intellectual property rights in NFTs are different from each other. However, purchasing an NFT does not transfer all ownership rights to the purchased work to the buyer. There is usually a limited transfer of licenses for viewing. This may require different taxation of first and second remittances of NFTs.

NFT makers must weigh the costs associated with producing and marketing their NFT. A creator can write off or capitalise expenses for tax purposes if they deliver NFTs as part of a business or business.

States and territories apply different tax laws when taxing digital assets. Most states impose income taxes. Organisations operating in other jurisdictions are generally taxed according to federal tax laws. Therefore, the issue of whether the transfer of an NFT is a sale

or a license is critical. As NFTs can be transferred without specifying where the transferee is located, transferors may need help to profit from NFT transfers.

Taxpayers must collect this information, although the transferee's position in NFT transfers is unclear. It is difficult to determine where an NFT is stored since NFTs are aggregated on the blockchain. The same can be said for digital assets. Most importantly, states have different views on the taxation of remote sellers (Giesselman et al., 2021: 17-23).

States and territories impose income, sales, and use taxes. Many states impose such taxes on revenue from the sale of goods and services. Some regions also impose these taxes on the transfer of specific digital properties, such as Texas.

In most cases, use tax is collected in the country where the product or service is used. The laws determine the taxation office of a physical asset. However, choosing a digital asset's taxation jurisdiction takes time and effort. Generally, the tax authorities tax the seller's place of residence (Giesselman et al., 2021: 17-23).

4.2. Turkish Practice

Virtual games in Turkey are accepted as an electronic service in article 9/1 of the No. 3065 VAT Law. According to the paragraph added to paragraph (1) of the 9th article of the Value Added Tax Law No. 3065 with the 41st article of the Law dated 28/11/2017 and numbered 7061: *"Ministry of Treasury and Finance may hold the parties to the taxable transactions responsible for the payment of the tax to secure the tax receivables. So far, the value-added tax related to the services provided electronically to real persons who are not VAT payers by those who do not have a residence, workplace, legal centre or business centre in Turkey is declared and paid by those who provide this service. The Ministry of Treasury and Finance is authorised to determine the rules and procedures regarding providing services in the electronic environment".* As can be understood from the paragraph of the article, since 01.01.2018, online service sales of foreign real or legal persons to Turkey are subject to VAT, and these persons are obliged to pay VAT in Turkey.

With the pin system [Electronic Serial Number (ESN/Epin)] developed by companies entering the Turkish gaming market, players can make bank transfers without a credit card or get membership from authorised dealers via PTT (Turkish Post). If a company in Turkey buys the game codes of a company abroad, it enables the company abroad to gain commercial income. Such payments are not subject to income tax withholding. VAT is incurred as soon as a real money payment is made to a virtual game that is initially downloaded for free, then to use some of the game's characters and assets. In other words, VAT liability is not realised when the game money is spent online but when the real-world payment is made in bulk. Therefore, it follows USA practice in that virtual transfers are taxable when exchangeable to real-world currencies.

The Revenue Administration must also monitor and detect all transactions of those who provide services to real persons from abroad. In this regard, the issue of whether it is possible for the service providers who fulfil their VAT obligations on behalf of the taxpayer to submit a declaration and make payments in some countries has yet to be clarified. If the service provider is a fully liable Turkish company or a real taxable trader, there is both VAT and income/corporate tax liability.

In the case of selling virtual products to other game users at a high price within virtual games, or if the game account is brought to a certain level and transferred to someone else for real money, the income obtained is subject to income tax. This is considered an incidental gain if taxable transactions are made very rarely. The incidental income exemption amount determined for 2022 in Turkey is 58,000 TL. No tax is payable on income from incidental works that do not exceed this amount. However, if these transactions are continuous, they are accepted as commercial earnings and income tax is charged.

According to the temporary article 2 of Law No. 4691, Technology Development Law, software and R&D-related earnings in these regions are exempt from Income and Corporate Tax until 31.12.2028. However, profits from marketing the said software on disc, CD or electronic media (except for parts corresponding to the license) cannot benefit from the exception.

The report on the BEPS [Base Erosion and Profit Shifting] plan of G-20 and OECD countries recommends that virtual economy activities be taxed through indirect taxes such as VAT. The principle of taxation of consumers in the country where they are located has been accepted (Gedik, 2020: 33).

In an increasingly digital world, the right to tax is not specific to commercial gains and is not restricted to mere physical presence, the OECD Report states. To adapt to the digital economy, it is stated that the new connection point and profit distribution rules should be evaluated together, such as "permanent workplace", "controlled corporate earnings", and "transfer pricing" (OECD, 2020). In terms of corporate tax, it has been recommended that virtual transactions be taxed either through "withholding tax" through "balancing tax" or within the scope of "permanent workplace".

Turkey has put into effect Law No. 7194 Digital Service Tax and Law on Amending Some Laws and Decree-Law No. 375 regulations on the subject. According to Article 1 of Law No. 7194, all kinds of advertising services offered in the digital environment and the sales of all sorts of audio, visual or digital content in the digital environment and the income from listening, watching, playing or recording this content or the services offered are subject to digital service tax. A .5% Digital Services Tax is applied to the gross earnings from providing and managing digital services such as advertising, software, applications, music, video and video games. However, income from digital services that does not exceed 20,000,000 TL (approximately 3.14 million Euros) in Turkey and 750 million Euros (or equivalent) worldwide is tax-exempt. Tax regulations regarding the taxation of important

digital assets, which do not aim to include digital services in a broader sense, are still in the draft stage.

Although virtual money is common in Turkey, it has yet to regulate the taxation of earnings from virtual or cryptocurrencies. The "Regulation on Not Using Crypto Assets in Payments", published in the Official Gazette dated 16.04.2021 and numbered 31456, stated that virtual currencies could not be used directly or indirectly in payments even though they are listed as payment options in international trade agreements arrived today. As a result, crypto assets were defined by Turkish law for the very first time. Although there is no regulation on the taxation of cryptocurrencies in Turkey, the developments on the subject are as follows.

- In 2013, the Banking Regulation and Supervision Agency ("BDDK") stated that cryptocurrencies are not electronic money.
- In the New Economy Program published at the end of 2020 stated that tax regulation is planned for the "acquisition, purchase, sale and transfer" transactions of crypto financial assets between 2021 and 2023.

Within the scope of the "Economic Reform Package" and "Economic Reforms Action Plan" announced on 03.2021, under the coordination of the Ministry of Treasury and Finance, the efforts to establish the virtual money's economic, technological, and legal infrastructure will be completed until 31.12.2021 by the Capital Markets Institution, the Revenue Administration, the Central Bank of the Republic of Turkey "CBRT" and the BRSA (Kılınç Hukuk & Danışmanlık, 2021). Considering the discussions on the subject in Turkey, it may be possible to qualify virtual currencies as commodities (Ersoy, 2021).

In Turkey, there is not yet a Court of Cassation decision regarding the legal nature of cryptocurrencies or virtual items and whether they can be subject to virtual property. However, in April 2021, a local court dismissed an appeal against a decision by the enforcement office stating, "account holding a debtor's cryptocurrencies can be seized", with the view that "cryptocurrencies can also be considered commodities and securities". In other words, it has given the decision that they can be seized (Yıldırım, 2021).

5. Conclusion

About 3 billion people around the world play in the virtual game world, and the game world represents an industry of approximately 200 billion dollars, which constitutes a large spectrum of software, hardware, and intellectual property. Virtual worlds play a leading role in converging the physical and digital worlds. Some theorists, game developers, and academics now expect that virtual worlds will cease to be virtual and become an extension of the real world.

As the gaming industry becomes decentralised, virtual games can put digital identity, assets, and property in the hands of players. Thus, it can play a role in promoting new paradigms in society. Virtual games, including blockchain technology, will give a sense of

trust to people who buy virtual assets by spending severe time, effort, and monetary gain in virtual realities.

Virtual worlds can be used as a place to gain additional income. However, they can also pose some dangers associated with the digital economy, such as low-level job security, unbalanced relationships between firms, employers, and virtual players, and failure to provide social security. Policymakers need to take these issues into account.

Virtual worlds mean more than virtual game environments. They can change how people perceive and interact with structures like financial institutions, markets, and governments as they create an open creative economy, independent financial system, universal digital representation, and virtual property. Virtual worlds are the first example of the meta-universe discussed in academic circles for the last few years.

The player has property rights over the values in the virtual worlds. For this reason, the player's virtual property rights should be superior to game developers or publishers. User license agreements signed by the player to enter the virtual world may contain provisions that violate or limit the player's property rights. Whether these provisions are valid should be evaluated separately for each case. In addition, the provisions of the Code of Obligations should be taken into account. Legal problems related to virtual property have started to come before courts worldwide. In countries such as China, South Korea, and the Netherlands, it is seen that the courts accept virtual property when such case decisions are examined. A Chinese court has ordered the return of all in-game assets of a player whose account was stolen and valuable virtual items stolen by a company that is the developer of the virtual world Red Moon (Honyue). South Korean courts have regularly considered the forcible taking of a player's virtual items by others as theft (Gemalmaz, 2019).

The existence of many people who spend their time in the virtual game world in Turkey has necessitated the recognition of all aspects of virtual worlds. Now, economic activities in virtual worlds are at a size that cannot be underestimated. There are significant opportunities in these worlds to solve the budget problems of almost all countries worldwide. Turkey made its first legal regulation on the subject with Law No. 7194, enacted in 2019. However, no legal regulation has yet taxed game codes and elements. This means a huge tax loss for the revenue administration. How, by whom and how virtual game characters and items are bought and sold should be monitored and determined closely. The infrastructure related to the subject should be established as soon as possible, and necessary tax regulations should be made. Virtual world economic transactions are almost intertwined with real-world economic transactions, making tax evasion increasingly common. It is possible for the income taxpayer to avoid tax, especially through virtual gaming. The increasing prevalence of such behaviours causes a decrease in country tax revenues and a significant increase in capital flows between the real and virtual worlds. For this reason, tax regulations in virtual worlds should be made to prevent tax avoidance or tax evasion and be implemented with determination.

It is necessary to end the complexity of cryptocurrencies in Turkey and accelerate the work. Cryptocurrencies should be defined as intangibles. The income of miners working under these conditions may be taxed as self-employment income. Taxpayers should be obligated to include their bitcoin revenues in their yearly income tax forms. The gain from the disposal of the cryptocurrency can be considered a business gain or a capital gain. Commercial activities are transactions that involve orders. Regardless, when assessed in cryptocurrency operating income, the tax's subject may be included in corporate tax. In this context, cryptocurrency mining, cryptocurrency trading, and cryptocurrency exchanges comprising ATMs can be counted among the examples of cryptocurrency businesses (Şahin & Çiftçi, 2022: 689). With the regulation to be made, it is important for the crypto asset companies to be included in the scope of the CMB (SPK) and to introduce the minimum capital requirement to protect the investors and public order. Considering the decision of the European Court of Justice to exempt cryptocurrency exchanges from value-added tax, it would be appropriate not to subject the cryptocurrency to VAT (Yüce, 2021). Being that many EU countries have implemented this decision. To ensure tax compliance with the EU, it is necessary to make a regulation in this direction in the tax legislation.

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Analysis of the Relationship between Service Export and Economic Growth in the Framework of South Caucasus Countries

Eser ÇAPIK (https://orcid.org/0000-0002-2754-023X), Suleyman Demirel University, Türkiye; esercapik@hotmail.com

Hidayet Gizem ÜNLÜ-ÖREN (https://orcid.org/0000-0001-6081-096X), Suleyman Demirel University, Türkiye; hidayetgizemunlu@sdu.edu.tr

Hizmet İhracatı ile Ekonomik Büyüme İlişkisinin Güney Kafkas Ülkeleri Çerçevesinde Analizi

Abstract

In this context, the current article examines the impact of the service sector on the economic growth of Azerbaijan, Armenia, and Georgia. In the study in which three separate causality analyses were made, the results of the Toda-Yamamoto causality test in Azerbaijan and Armenia showed no causality between service exports and economic growth, while for Georgia, there was a unidirectional causality from economic growth to service exports. This study, handled with a different perspective due to the inadequacy of studies on service exports in South Caucasian countries, contributes to filling the gap in the literature on the subject.

Keywords : Service Export, Economic Growth, Azerbaijan, Georgia, Armenia, Causality.

JEL Classification Codes : L8, O4, C51.

Öz

Ele alınan çalışmada Azerbaycan, Ermenistan ve Gürcistan için hizmet ihracatının ekonomik büyüme üzerindeki etkisi incelenmiştir. Üç ayrı nedensellik analizinin yapıldığı çalışmada Azerbaycan ve Ermenistan'da Toda-Yamamoto nedensellik testi sonuçları, hizmet ihracatı ile ekonomik büyüme arasında herhangi bir nedensellik ilişkisinin olmadığını gösterirken, Gürcistan için ise ekonomik büyümeden hizmet ihracatında doğru tek yönlü bir nedenselliğin olduğu tespit edilmiştir. Güney Kafkas ülkelerinde hizmet ihracatına yönelik çalışmaların yetersizliği nedeniyle farklı bir bakış açısı ile ele alınan bu çalışma, konuya yönelik literatürdeki boşluğun doldurulmasına katkı sağlamaktadır.

Anahtar Sözcükler : Hizmet İhracatı, GSYİH, Azerbaycan, Gürcistan, Ermenistan, Nedensellik.

1. Introduction

As proven by the survey of the history of the economy, the transition from an agricultural economy to an industry, then an industrial economy to a service economy, has taken place as an inevitable natural development for the whole world. Transformation in the economies experienced in these periods has introduced changes in household income, and increased demand for services in many domains as human needs have become less and less materialistic. Especially in line with the recent developments in Information and Communication Technologies (ICT), changes that emerged with the global economy have resulted in economic diversifications in the Caucasian Countries, the birthplace of the worldwide oil industry, which yielded significant consequences in the service industry through new initiatives. Although most developing countries are net service importers, it is possible to state that service export would be a new income resource for developing countries, which would display crucial economic growth potential. When such potential is taken into consideration not only as an input for commodity export but as well for services transformed into an ultimate export item for consumption, the objective of the present study is to determine the role of service export of Southern Caucasian Countries[1] in their economic growth based on an export-reliant growth model.

The service industry has grown in two fundamental waves: whereas conventional services constituted the first wave, the second one was built up by modern services (financial, communication, computer, technical, legal, advertisement, and business) (Eichengreen & Gupta, 2009: 15; Ghani, 2009: 24-25). The modern service industry is important to encourage a fast-track global economy and social development and to build up an innovation-oriented society and a world in harmony (Ghani, 2009: 29; Wu et al., 2016: 667). In the service export industry, the revenue generated by the export of modern service sectors usually exhibits growth-creating characteristics whose effect is greater than conventional service sectors (Ghani, 2009: 30; Ghani & Kharas, 2010: 3; Sahoo & Dash, 2017: 447). Graph 1 below summarises conventional and modern service exports for the period of 2016-2020:

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[1]   *Azerbaijan, Georgia, Armenia.*

Graph: 1
Total Service Export of the South Caucasus Countries (Current $)
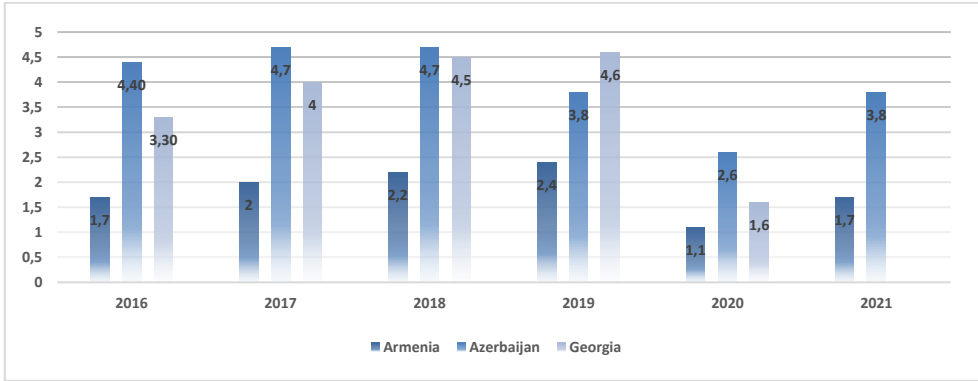
Resource: WDB, 2022.

Graph 1 shows that Azerbaijan has made the largest service export in the last six years since 2016, while Armenia has made the least. It is seen that service exports in Azerbaijan were 4.4 billion USD in 2016; this amount decreased to 2.6 billion USD dollars in 2020 and increased to 3.8 billion USD dollars in 2021. In the same graph, it is seen that the service exports of Armenia, which were 1.7 billion dollars in 2016, followed an upward trend until 2019, decreased to 1.1 billion USD dollars in 2020, and increased to 1.7 billion USD dollars in 2021. Finally, when the service exports of Georgia are examined, it is seen that the service exports of 3,30 billion USD dollars in 2016 continued to increase until 2019, decreased to 1.6 billion USD dollars in 2020, and rose to 3.8 billion USD dollars in 2021.

Below, Table 1 exhibits the overall distribution of service exports of Caucasian Countries by sectors:

Table: 1
Distribution of Service Exports of South Caucasus Countries by Sectors
(Million US$)

Country	Sector	Year	
		2019	**2020**
Azerbaijan	Construction	31,589	28,890
	Distribution/Repair	13,567	26,844
	Storage	1,107,970	1,644,680
	Commercial services	3,726,578	2,593,973
	Travel	1,791,514	304,185
	Manufacturing services	513	425
	Telecommunication	27,362	38,429
	Insurance and Retirement services	26,639	21,723
	Financial services	7,298	9,004
	Other personal, cultural and entertainment services	22,461	11,611
	R&D services	2,627	3,576
	Information services	18,639	13,668
	Computer services	12,437	13,058

Armenia	Construction	178,142	77,693
	Distribution/Repair	3,259	3,099
	Storage	273,749	239,758
	Commercial services	2,385,219	1,076,458
	Visual and Audiovisual services	4.460	3.520
	Travel	1,527,968	289,888
	Manufacturing services	27,236	37,472
	Telecommunication	19,728	14,651
	Insurance and Retirement services	31,483	29,282
	Financial services	19,033	19,128
	Other personal, cultural and entertainment services	14,860	6,820
	R&D services	-	-
	Information services	19,855	15,952
	Computer services	222,092	297,850
Georgia	Construction	5,065	7,201
	Distribution/Repair	98	-
	Storage	1,006,723	698,006
	Commercial services	4,509,691	1,503,415
	Intellectual Property Utility services	928	995
	Visual and Audiovisual services	5,281	5,665
	Travel	3,268,654	541,687
	Manufacturing services	14,067	2,763
	Telecommunication	46,271	39,664
	Insurance and Retirement services	12,019	12,556
	Financial services	23,539	21,323
	Other personal, cultural and entertainment services	14,930	18,978
	R&D services	980	2,898
	Information services	4,933	6,591
	Computer services	62,594	67,941

Resource: (ICT, 2022; UNCTAD, 2022; WTO, 2022) trade in services database.

The main driver of economic growth has long been explored in the economics literature. In this context, in 2019, transportation and travel services exports across all South Caucasus Countries were higher than export figures of other service industries. In 2020, the growth in computer services, especially in Armenia (298 billion USD), was significantly notable in addition to transport and travel services. Strong transportation infrastructure in Azerbaijan, a logistic corridor between Asia and Europe, allowed increasing trade flow between the continents which is reflected in the transportation services of Azerbaijan. In 2019, whereas the highest export figure was seen with the service export industry, travel services were regarded as one of the substantial sectors that grew beside the oil industry and were believed to contribute significantly to Azerbaijan's welfare. In 2020, the total service export was 1 billion USD in Armenia. Whereas logistics services constituted 21% of overall service export, travel services comprised 26.5%, and communication and computer services represented 14.6% (Knoema, 2020). In 2019, it was seen that transportation services export was 1.007 billion USD, whereas Georgia's travel services export was 3.269 billion USD. In 2020, a significant decrease occurred in both service industry exports.

The services industry emerged as the largest segment and driving power of the South Caucasus Countries' economy by contributing to trade, employment and GDP. Today, the service economy constitutes more than half of overall employment and value-added for most countries (Rubalcaba, 2013: 2). Employed data was collected from reliable domestic and international resources for the study's objectives. Graph 2 illustrates the value added created by the service industry within the economy in the light of data acquired from the World Bank:

Graph: 2
Share of Service Industry in Value Added (Services, value added (% of GDP)
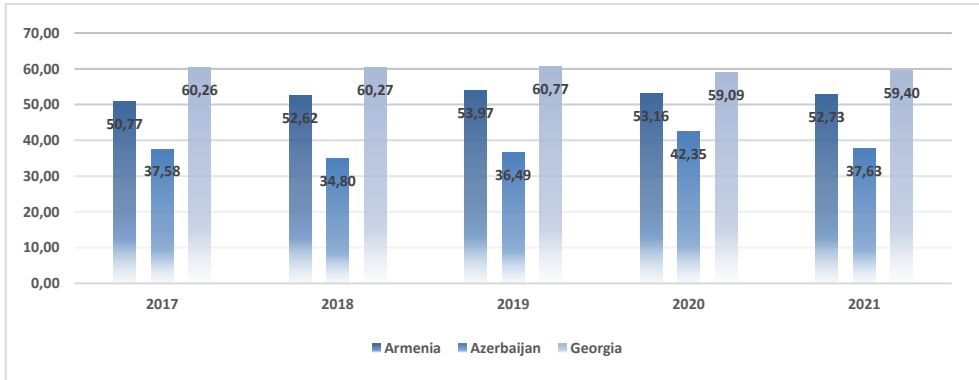
Resource: WDB, 2022.

According to Graph 2, it is seen that the added value of the service sector in Azerbaijan, which constituted 37.58% of the GDP in 2016, increased to 42% in 2020 and decreased to 37.63% in 2021. Similarly, it is observed that the value added of the service sector in Armenia rose from 50% in 2016 to 53% in 2020 and decreased to 52.73% in 2021, while the value added of the service sector, which was 61.5% in 2016 in Georgia, is 2020 It is seen that it decreased to 59% in Turkey and increased to 59.60% in 2021 with a slight increase.

Within the scope of the service trade across the South Caucasus Countries, the present study could be regarded as a fore step to evaluate the effect of service export, one of the main constituents of the growth strategies of developing countries, on economic growth because of the scarcity of the studies available on this subject in the current literature.

2. Literature Review

2.1. Theoretical Literature Review

Since Adam Smith's (1776: 214) research on the nature and reasons for the wealth of nations, an answer to why countries and individual commercial businesses have been indulging in international trade has been searched for in several theories within the relevant literature. The answer to this question is that countries are required to export goods and services to generate income (Kaliappan et al., 2017: 393). Since service export perceived as a new growth driver for countries in our contemporary period provides substantial input for the diversity of sectors, this situation could proliferate extensive portions of the economy (Hoekman & Mattoo, 2012: 9); thus, it could be regarded as the growth engine of country economy (Mishra et al., 2011: 2; UNCTAD, 2004: 15; Yusuf, 2015: 602). Trade of services which could be dated back to the studies of Adam Smith, David Ricardo and Karl Marx, who considered services differently than goods, has long been at the centre of interest

(Mishra et al., 2011: 4). It is suggested that although services display different characteristics than goods, factor lying beneath trades of goods exist for services as well (Kimura & Lee, 2006: 92). To support this view, it is reported that some activities traded by countries under service classification similar to goods possess comparative superiority developed by Ricardo (Nhớ & Hương, 2014: 54).

The growth theory emerged with the neoclassical growth model introduced by Solow (1956: 66), which relied on the complete utility of labour and capital. According to Solow, growth occurs when population, capital accumulation and technology come together. Romer (1990: 72) and Lucas (1988: 19) developed an endogenous growth theory of the mathematical explanation of human capital and technological advancement. The service industry plays a significant role in human capital, and hu and capital are effective in economic growth in Lucas's model. Moreover, Feder (1983: 59) suggests export-based growth theory, which asserts that the fundamental cause of economic growth is export.

2.2. Empirical Literature

Since the beginning of the 1980s, various studies have applied comparative superiority theory to service trade. In the precursor study of Sapir and Lutz (1980: 5), determinants of comparative superiority models of service trade are oriented; and comparative advantage of the transportation services are reported as capital intensity, scale, the composition of trade and distance. Hindley and Smith (1984: 370) claim in their study that standard comparative superiority based on Hecksher-Ohlin (H-O) framework and product-specialization concepts could also be applied to service trade. Melvin (1989: 1181) asserts that the comparative superiority principle and Heckscher-Ohlin (H-O) theory must be interpreted differently about their practice with services. The significance of service in GDP growth, increasing share of service in trade and transformation in service have motivated researchers to do further studies on it from different angles. The importance of services in growth Mattoo et al. (2008) also found that financial and telecommunication services are the driving force of long-term economic growth. Outsourcing of services plays an important role in GDP growth (Mishra et al. 2011: 4). Fixler and Siegel (1999: 177) studied the effects of outsourcing on output and productivity increase in service industries were examined, and it was concluded that outsourcing reduced service sector productivity in the short run.

Although service export is a substantial impulsive power of economic growth, there need to be more studies on its effect on economic growth. Furthermore, the number of such studies has increased recently owing to rising awareness and interest among researchers and policymakers about the view that service trade liberalisation is related to higher economic growth. Available studies usually depend on the Export-based Growth (EBG) hypothesis supported by Adam Smith and David Ricardo. Gabriele (2006a: 294) reports that service export positively affects GDP growth among developing countries in the long term, but this effect needs to be stronger among developed countries. Priyankara (2018: 479) analyses the

relationship between service export and GDP in Sri Lanka; and indicates the existence of one-way causality from service export to economic growth.

Mishra et al. (2011: 24) conclude in their study that service export complexity is substantial for the growth of per capita GDP, and it is a strong growth estimator for low- and middle-income countries. Similarly, Alege and Ogundipe (2015: 364) report that both service export and import enhance economic development, whereas Sermcheep (2019: 163) asserts that both modern and conventional service export contributes to the GDP growth in his study on Asian countries. Davtyan (2015: 12) analyses the effect of tourism on economic development in Armenia and concludes that tourism plays a key role in economic development. In the same way, Kaliappan et al. (2017: 393) considered the correlation between service export and growth for some Asian countries. They determined that service export significantly and positively affects economic growth. Ahmad et al. (2017: 113) study, the determinants of service exports in developing Asian countries were examined, and it was concluded that the value added of the exchange rate, foreign income, foreign direct investment (FDI), services and communication opportunities were the determinants of service exports.

3. Data and Methodology

Our study aimed to answer the question of "Is there any correlation between service export and economic growth?" for three Southern Caucasian Countries. In this section, the data set and methodology were introduced. The ADF unit root test was employed to determine stationarity. Toda *et al.* (1995: 227-245)'s causality test was preferred to Granger's because it is a relatively novel method.

3.1. Dataset

The data set utilised during the analysis was acquired from the World Bank (2022) statistical database. Macroeconomic variables, namely per capita GDP, service export, gross capital, and labour, were employed as time series covering the period of 1991-2020 in line with the objective of our model. Providing adequate observations, missing data was completed through interpolation and extrapolation. Variables included in the model were determined according to the theoretical and empirical literature. Per capita GDP, commonly used in empirical and theoretical growth literature, was estimated based on the 2015 US$ currency rate and included in the model as a dependent variable of Y. Investment, in other words, capital (K), frequently emphasised by the neoclassical and endogenous growth models, is regarded as one of the fundamental determinants of economic growth (Levine & Renelt, 1992: 945; Mankiw et al., 1990: 20). Variable of investment was included in the model by estimating the ratio of gross capital accumulation to GDP. Variable of labour, facilitating the adoption of products and ideas in most countries (Nelson & Phelps, 1966: 71), was included in the model as L, which refers to the ratio of the labour force to the total population.

Table: 2
Variable Table

	Variable	Description of Variable	Resource
Dependent variable	GDP Per Capita [2]	Y	World Bank
Control variable	Investment [3]	K	World Bank
	Size of the labour force [4]	L	World Bank
Relevant variable	Services Exports [5]	SE	World Bank

Resource: WDI, 2022.

3.2. Methodology

The stationarity of the series was analysed by Augmented Dickey-Fuller (ADF) (Dickey & Fuller 1981) unit root test. In the analysis of non-stationary time series, spurious regression issues could occur (Granger & Newbold, 1974: 111). This could cause false positive correlation results among variables even though no coefficient existed, or coefficients could be misinterpreted. Accordingly, Augmented Dickey-Fuller (ADF) test was implemented during our analysis to test the stationarity of the variables. In the next step, there was a need for maximum integration order, "m_{max}", obtained from the unit root test to implement the causality test. To reveal any causality relationship between service export and economic growth, it is required to show that they are co-integrated. In the case of more than two variables, multiple long-term equilibrium relationships could be determined. In this case, Johansen-co-integration (Johansen, 1988: 232-253) and (Johansen & Juselius, 1990: 170-209) methods were implemented. In the first phase of the co-integration test, the adequate number of lag-length is determined for stationary series at the same level. The VAR model is first structured to determine adequate lag length, and Akaike and Schwarz information criterion is utilised to determine the number of lags. The estimator model yielding minimum AIC and SBC would be selected for optimal lag length, and this lag length would be denominated by p.

The Toda-Yamamoto causality test (CT) was utilised in our study. If an *X* variable could yield a better estimation of variable *Y* by using all available information, it could be said that there is causality existed from *X* to *Y* (Granger, 1969: 424-438). On the other hand, Toda *et al.* (1995: 227-245) indicate how to estimate VAR models constructed at various levels and how to test restrictions that may occur with parameter matrixes even though series are integrative or co-integrative at different levels.

To implement this test, at first, maximum integration levels "m_{max}" of variables are determined by using unit root tests. The adequate lag length, referred to as *p* for the VAR model, was determined using information criteria. Then, the $p+m_{max}$ lagged VAR model was estimated. To check whether the coefficients were statistically different from zero, an

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[2]   *GDP Per Capita (Constant 2015 US$)*

[3]   *Gross fixed capital formation (% of GDP)*

[4]   *Total Labour Force/Total Population*

[5]   *Services exports % GDP*

asymptotic chi-square distributed Wald test was conducted; and the direction of causality was determined.

The VAR model could be structured as below to estimate the CT procedure for variables of *GDP, K, L,* and *SE*:

$$logK_t = \alpha_0 + \sum_{i=1}^{p} \beta_{1i} logK_{t-i} + \sum_{j=p+1}^{m_{max}} \beta_{2j} logK_{t-j} + \sum_{i=1}^{p} Y_{1i} logGDP_{t-i} + \sum_{j=p+1}^{m_{max}} Y_{2j} logGDP_{t-j} + \sum_{i=1}^{p} \delta_{1i} logL_{t-i} \sum_{j=p+1}^{m_{max}} \delta_{2j} logL_{t-j} + \sum_{i=1}^{p} \varphi_{1i} logSE_{t-i} \sum_{j=p+1}^{m_{max}} \varphi_{2j} logSE_{t-j} + u_{1t} \quad (1)$$

$$logL_t = \alpha_1 + \sum_{i=1}^{p} \theta_{1i} logK_{t-i} + \sum_{j=p+1}^{m_{max}} \theta_{2j} logK_{t-j} + \sum_{i=1}^{p} \mu_{1i} logGDP_{t-i} + \sum_{j=p+1}^{m_{max}} \mu_{2j} logGDP_{t-j} + \sum_{i=1}^{p} \pi_{1i} logL_{t-i} \sum_{j=p+1}^{m_{max}} \pi_{2j} logL_{t-j} + \sum_{i=1}^{p} \vartheta_{1i} logSE_{t-i} \sum_{j=p+1}^{m_{max}} \vartheta_{2j} logSE_{t-j} + u_{2t} \quad (2)$$

$$logY_t = \alpha_2 + \sum_{i=1}^{p} \omega_{1i} logK_{t-i} + \sum_{j=p+1}^{m_{max}} \omega_{2j} logK_{t-j} + \sum_{i=1}^{p} \rho_{1i} logGDP_{t-i} + \sum_{j=p+1}^{m_{max}} \rho_{2j} logGDP_{t-j} + \sum_{i=1}^{p} \sigma_{1i} logL_{t-i} \sum_{j=p+1}^{m_{max}} \sigma_{2j} logL_{t-j} + \sum_{i=1}^{p} \epsilon_{1i} logSE_{t-i} \sum_{j=p+1}^{m_{max}} \epsilon_{2j} logSE_{t-j} + u_{3t} \quad (3)$$

$$logSE_t = \alpha_3 + \sum_{i=1}^{p} b_{1i} logK_{t-i} + \sum_{j=p+1}^{m_{max}} b_{2j} logK_{t-j} + \sum_{i=1}^{p} c_{1i} logGDP_{t-i} + \sum_{j=p+1}^{m_{max}} c_{2j} logGDP_{t-j} + \sum_{i=1}^{p} d_{1i} logL_{t-i} \sum_{j=p+1}^{m_{max}} d_{2j} logL_{t-j} + \sum_{i=1}^{p} f_{1i} logSE_{t-i} \sum_{j=p+1}^{m_{max}} f_{2j} logSE_{t-j} + u_{1t} \quad (4)$$

Where p refers to optimum Lag Length, m_{max} refers to maximum integration sequence, and *u* is the white noise term. Determining the direction of causality, for example, with Equation (1), the null hypothesis asserting "GDP causes Granger-*K*" was tested by the Wald test. The results indicated that the alternative hypothesis asserting that "GDP does not cause Granger-K" would be accepted if the null hypothesis was refused. Causal relationships among other variables were tested in the same way.

4. Results

This section presents results from the unit root and causality tests for each of the three countries. Different causal correlations were determined fundamentally.

4.1. Results for Armenia

Regarding the ADF unit root test results exhibited in Table 3, the unit root hypothesis was refused at a % significance level in their first differences for the *OIL* and *GDP* variables for both equations with coefficient and with coefficient and trend. For the Equation with coefficient and the one with both coefficient and trend, when USD was applied to test during the second difference, it became stationary at a 1% significance level.

Table: 3
Unit Root Test Results

	ADF (Constant)			ADF (Constant and trend)		
	$1^{st}\ dif.$	$2^{nd}\ dif.$		Level	$1^{st}\ dif.$	$2^{nd}\ dif.$
LogGDP	-0.167618	-8.223302***	-	-3.707834**	-8.063063***	-
LogK	-1.669884	-5.624393***	-	-1.133187	-5.711078	-
LogL	-2.542605	-0.372413	-8.439972***	-1.728801	-0.727061	-8.889217***
LogSE	-2.350322	-3.194044**	-	-0.808792	-3.604438**	-

*** and * represent significance at 1% and 10%, respectively. Schwarz Information Criteria choose the lag length for the ADF test.

The stationarity of our series was determined as *I(1)* and *I(2)*. Considering all these findings, the maximum integration order was estimated as m_{max}=2; accordingly, it was decided that the additional lag length needed to be included in the estimated VAR model was two. The maximum lag length was determined by relying on regular information criterions such as AIC and SIC.

Table: 4
Determination of Lag-Length

Lag	LR	FPE	AIC	SC	HQ
0	0	7.720196	NA	9.01e-06	-0.265728
1	1	151.1119	235.5721	1.02e-09	-9.365135
2	2	177.7472	36.14793*	5.18e-10*	-10.12480*

* Indicates lag order selected by the criterion; LR: sequentially modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

Using various information criteria, the optimum Lag Length was determined as p=2 for the estimated VAR model. The estimated VAR (2) model was found to be stationary (see: Figure 1); the series were uncorrelated and homoscedastic (see: Table 15).

To Granger causality, the procedure was pursued by Toda and Yamamoto (1995: 227-245). During the causality analysis, the lag length of the endogenous variable was determined as $(m+p)$, a total of the values mentioned in the beginning.

Table: 5
Granger Causality Test Results

H_0	χ^2	Prob.	Decision
LOGL doesn't Granger-cause LOGY	0.185	0.911	logL $\cdots$ logY
LOGK doesn't Granger-cause LOGY	0.671	0.715	logK $\cdots$ logY
LOGSE doesn't Granger-cause LOGY	0.212	0.899	logSE $\cdots$ logY
All don't Granger-cause LOGY	2.269	0.893	All $\cdots$ logY
LOGY doesn't Granger-cause LOGL	46.617	0.000	logY $\rightarrow$ logL
LOGK doesn't Granger-cause LOGL	6.645	0.036	logK $\rightarrow$ logL
LOGSE doesn't Granger-cause LOGL	0.543	0.762	logSE $\cdots$ logL
All don't Granger-cause LOGL	65.475	0.000	All $\rightarrow$ logL
LOGY doesn't Granger-cause LOGSE	0.364	0.833	logY $\cdots$ logSE
LOGL doesn't Granger-cause LOGSE	6.456	0.039	logL $\rightarrow$ logSE
LOGK doesn't Granger-cause LOGSE	0.210	0.900	logK $\cdots$ logSE
All don't Granger-cause LOGSE	8.316	0.215	All $\cdots$ logSE
LOGY doesn't Granger-cause LOGK	2.847	0.240	logY $\cdots$ logK
LOGL doesn't Granger-cause LOGK	1.953	0.376	logL $\cdots$ logK
LOGSE doesn't Granger-cause LOGK	0.339	0.843	logSE $\cdots$ logK
All don't Granger-cause LOGK	7.483	0.278	All $\cdots$ logK
A $\rightarrow$ B means causality runs from A to B.			
A $\cdots$ B means no causality between A and B			

For the CT causality test, the VAR (4) model was estimated with a lag length of p+m_{max}=4; and the Wald test with p=2 was conducted.

According to Table 5, in cases when growth was the dependent variable in Armenia, it was seen that there was no causality from labour, gross capital and service export to economic growth; and there was no causality from all variables toward growth. When the dependent variable was labour, it was determined that there was causality from growth and gross capital toward labour; service export was not causality for labour, and the causality relationship was determined from all variables toward labour. In the model in which the only dependent variable was service export, it was determined that there was no causality from service export to growth and gross capital, but there was causality from labour to service export. In the meantime, there was no causality from all variables to service export. In case our dependent variable was gross capital, it was seen that there was no causality from growth, labour, and service export toward gross capital, and similarly, no causality was found from all variables toward the capital. Regarding the results in Table 5, "K Granger does not cause Y" and "Y Granger does not cause K". The null hypothesis was refused at a 1% significance level. Whereas "L Granger does not cause Y, Y Granger causes L". Whereas "L Granger causes SE" "SE Grange causes L". "K Granger causes SE; SE Granger does not cause K". "L Granger causes SE; SE Granger does not cause L". "Y Granger causes SE; SE Granger does not cause Y". For Armenia, one-way causality was determined from growth toward labour and from labour to service export.

4.2. Results for Azerbaijan

Table: 6
Unit Root Test Results

	ADF (Constant)			ADF (Constant and trend)		
		1st $dif.$	2nd $dif.$	Level	1st $dif.$	2nd $dif.$
LogGDP	-2.575601	-2.395806	-3.309146***	-2.646596	-2.776975	-3.871354***
LogK	-3.255286	-3.284662***	-	-2.603663	-3.218980	-5.545263***
LogL	-1.256272	-0.645708	-2.010133	-2.645125	-0.975326	-1.760355*
LogSE	-0.947155	-3.890265***	-	-1.298401	-3.801854**	-

*** and * represent significance at 1% and 10%, respectively. Schwarz Information Criteria choose the lag length for the ADF test.

Stationarity levels of our series were determined at *I(1)* and *I(2)*. Accordingly, the Stationarity level for the analysis was determined as two.

Table: 7
Determination of Lag Length

Lag	LR	FPE	AIC	SC	HQ
0	53.31428	NA	3.47e-07	-3.522448	-3.332133
1	130.7528	127.2205	4.38e-09	-7.910917	-6.959342
2	177.6307	63.62000*	5.22e-10*	-10.11648*	-8.403646*

The optimum lag length was determined as p=2 for the VAR model. The estimated VAR (2) model was stationary (see: Figure 2), uncorrelated as a series and homoscedastic (see: Table 15).

Table: 8
Granger Causality Test Results

H_0	χ^2	Prob.	Decision
LOGK doesn't Granger-cause LOGY	0.563	0.754	loK $\cdots$ logY
LOGL doesn't Granger-cause LOGY	10.915	0.004	logL $\rightarrow$ logY
LOGSE doesn't Granger-cause LOGY	3.579	0.167	logSE $\cdots$ logY
All don't Granger-cause LOGY	22.298	0.001	All $\rightarrow$ logY
LOGY doesn't Granger-cause LOGK	1.889	0.388	logY $\cdots$ logK
LOGL doesn't Granger-cause LOGK	14.281	0.000	logL $\rightarrow$ logK
LOGSE doesn't Granger-cause LOGK	8.445	0.014	logSE $\rightarrow$logK
All don't Granger-cause LOGL	24.086	0.000	All $\rightarrow$ logK
LOGY doesn't Granger-cause LOGL	1.238	0.538	logY $\cdots$ logL
LOGK doesn't Granger-cause LOGL	1.261	0.532	logL $\cdots$ logL
LOGSE doesn't Granger-cause LOGL	2.937	0.230	logK $\cdots$ logL
All don't Granger-cause LOGL	3.634	0.725	All $\cdots$ logL
LOGY doesn't Granger-cause LOGSE	0.275	0.871	logY $\cdots$ logSE
LOGL doesn't Granger-cause LOGSE	2.625	0.269	logL $\cdots$ logSE
LOGK doesn't Granger-cause LOSE	1.647	0.438	logSE $\cdots$ logSE
All don't Granger-cause LOGSE	10.848	0.093	All $\cdots$ logSE
A $\rightarrow$ B means causality runs from A to B.			
A $\cdots$ B means no causality between A and B			

To conduct the CT causality test, VAR (4) model with $p+m_{max}=4$ lag length was estimated, and the Wald test with $p=2$ lag length was conducted.

In the model in which the dependent variable was growth, it was seen that there was causality from labour to growth, whereas there was no causality from service export and gross capital toward growth; however, there was causality from all variables at the same time. In the model in which the dependent variable was gross capital, it was seen that there was causality from labour and service export toward gross capital, whereas there was no causality from growth to gross capital; however, there was causality from all variables to gross capital. In the model in which the dependent variable was labour, it was seen that there was no causality from growth, service export, and gross capital to labour and, similarly, no causality from all variables to labour. Finally, in the model in which the dependent variable was service export, it was seen that there was no causality from growth, labour and capital to service export, even though there was causality from all variables toward service export at a 10% significance level. According to the results exhibited in Table 8, it was concluded that "K Granger did not cause Y" and "Y Granger did not cause K". The null hypothesis was refused at a 1% significance level. "Whereas L Granger caused Y, Y Granger did not cause L". "Whereas L Granger did not cause SE; SE Granger did not cause L". "Whereas K Granger did not cause SE, SE Granger caused K". "L Granger did not cause SE; SE Granger did not cause L". "Y Granger did not cause SE; SE Granger did not cause Y". It was determined with Azerbaijan that there was one-way causality from labour to growth, and from service export to gross capital.

4.3. Results for Georgia

Table: 9
Unit Root Test Results

ADF (Constant)				ADF (Constant and trend)		
		$1^{st}\ dif.$	$2^{nd}\ dif.$	Level	$1^{st}\ dif.$	$2^{nd}\ dif.$
LogGDP	-0.295675	-7.817898***	-	-0.295675	-9.707107***	-
LogK	-1.979967	-4.229695***	-	-2.364815	-4.143810	-
LogL	-2.431873	-2.599761	-	-2.675360	-4.994660***	-
LogSE	-0.947155	-3.890265***	-	-1.298401	-3.801854**	-

*** and * represent significance at 1% and 10%, respectively. Schwarz Information Criteria choose the lag length for the ADF test.

It was determined that the stationarity of our series was at the *I(1)* level. Consequently, the stationarity degree was determined as one for analysis. It could be stated as m=1.

Table: 10
Estimation of Lag Length

Lag	LR	FPE	AIC	SC	HQ
0	9.782107	NA	7.66e-06	-0.428304	-0.236328
1	124.1866	186.4369	5.32e-09	-7.717522	-6.757643
2	153.8735	39.58257	2.11e-09	-8.731369	-7.003586
3	181.3623	28.50695*	1.15e-09*	-9.582394*	-7.086708*

The optimum Lag Length was estimated as p=3 for the VAR model. The forecasted VAR (2) model was stationary (see: Figure 3), uncorrelated as a series, and homoscedastic (see: Table 15).

Table: 11
Johansen Co-Integration Test

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
r=0 *	0.794379	94.65905	47.85613	0.0000
At most, 1 *	0.691966	53.53433	29.79707	0.0000
At most, 2*	0.450617	22.91820	15.49471	0.0032
At most, 3*	0.246111	7.345256	3.841466	0.0067
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level; * Denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values.				
Hypothesised No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
r=0*	0.794379	41.12472	27.58434	0.0005
At most, 1 *	0.691966	30.61613	21.13162	0.0017
At most 2	0.450617	15.57294	14.26460	0.0309
At most 3	0.246111	7.345256	3.841466	0.0067
Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level; * Denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values.				

The eigenvalue is a test based on Eigenvector values. Series are required to be stationary at the same degree to implement the co-integration test. Table 11 exhibits the Johansen Co-Integration test results. Hence, a long-term correlation was determined between the variables according to both the path test and maximum Eigenvalue test results. Obtained results from both tests suggested long-term correlation at a 5%-significance level. Estimated test results for the null hypothesis (r=0), which suggested no co-integration

existed among variables, were greater than the critical values. Therefore, the null hypothesis was refused.

Table: 12
Granger Causality Test Results

H_0	χ^2	Prob.	Decision
LOGSE doesn't Granger-cause LOGY	0.088	0.993	loSE ⋯logY
LOGL doesn't Granger-cause LOGY	5.843	0.119	logL⋯ logY
LOGK doesn't Granger-cause LOGY	1.214	0.749	logK ⋯logY
All don't Granger-cause LOGY	8.560	0.478	All ⋯ logY
LOGY doesn't Granger-cause LOGSE	22.749	0.000	logY→logSE
LOGL doesn't Granger-cause LOGSE	20.910	0.000	logL→logSE
LOGK doesn't Granger-cause LOGSE	22.325	0.000	logK →logSE
All don't Granger-cause LOGL	120.641	0.001	All → logSE
LOGY doesn't Granger-cause LOGL	3.828	0.280	logY⋯ logL
LOGSE doesn't Granger-cause LOGL	6.280	0.098	logSE→logL
LOGK doesn't Granger-cause LOGL	3.259	0.353	logK ⋯ logL
All don't Granger-cause LOGL	10.321	0.325	All ⋯logL
LOGY doesn't Granger-cause LOGK	14.421	0.002	logY→logK
LOGSE doesn't Granger-cause LOGK	7.090	0.069	logL→ logK
LOGL doesn't Granger-cause LOGK	0.162	0.983	logSE ⋯logK
All don't Granger-cause LOGSE	21.434	0.010	All →logK
A → B means causality runs from A to B.			
A ⋯ B means no causality between A and B			

To conduct the CT causality test, the VAR (4) model with a lag length of p+m_{max}=4 was estimated, and the Wald test with a lag length of p=3 was implemented.

In the precursor model in which the dependent variable was growth, it was seen that there was no causality from service export, labour, gross capital, and a combination of all variables toward growth. In the second model in which the dependent variable was service export, there was causality from growth, labour, and gross capital toward service export; and causality from a combination of all variables to service export. In the model in which the dependent variable was labour, it was seen that there was no causality from growth and gross capital toward growth, whereas a causality existed from service export toward growth at a 10% significance level. Similarly, this model determined no causality from the combination of all variables toward labour. Finally, the dependent variable in the model was gross capital; causality was determined from growth and service export toward gross capital; no causality existed from labour to gross capital. That is, based on the results exhibited in Table 12, it was determined that "SE Granger did not cause Y", "Y Granger caused SE", and "L Granger did not cause Y, whereas Y did not cause Granger L". Therefore, the null hypothesis was refused at a 1% significance level. Furthermore, "whereas K Granger did not cause Y, Y Granger caused K". K Granger caused SE whereas SE Granger caused K. L Granger caused SE whereas SE Granger caused L. Considering Georgia, it was concluded that there was one-way causality from growth to service export and from service export to gross capital. Moreover, two-way causality was determined from labour to service export and service export to labour.

5. Conclusion

Service export, perceived as a means to contribute to economic and social development in developing countries, has become the primary goal of almost all countries, including Caucasians, recently. When the literature is examined, it is seen that the studies on the effect of service exports on growth are generally grouped studies (Alege & Ogundipe, 2015: 364; Gabriele, 2006b: 315; Li et al., 2003: 12; Nordås, 2010: 496). Considering that the effect of service exports on economic growth may vary between countries, few studies have examined this effect using single-country data (Davtyan, 2015: 12; Eichengreen & Gupta, 201: 2; Mintina, 2017: 38). In our study, the relationship between service exports and growth has been discussed with three separate analyses using data from three different countries. The present study's causality test developed by Toda et al. (1995: 245) was utilised to explore the potential causalities between service export and growth. Our findings stressed important points for policymakers of concerned countries. Above all, it was determined with Georgia that there was one-way causality from growth to service export. This finding suggested that service export was sensitive to growth. Economic growth played a motivating role in service export in Georgia. Growth would allow greater service export, whereas service export would increase total exports of sectors, and these would trigger economic growth through export increase. According to the analysis results, no causality relationship was determined between service export and growth for Azerbaijan and Armenia. The result that there is no causal relationship between service exports and economic growth (Aigheyisi, 2020: 25) supports the findings of this study. This finding would be assessed for Armenia and Azerbaijan as that overall export was not an important determinant for the export of the service sector. For example, almost half of the workforce in Armenia is employed in the service sector. In recent years, serious progress has been made in the service sector in Azerbaijan, along with other fields. New hospitals, health centres, schools, kindergartens, hotels, and recreational facilities have been built in the regions is the best indicator of this.

Although there is an advanced level of development in the service sector, it is possible to say that service exports play an active role in the growth of the country in Georgia, but in Armenia and Azerbaijan, one of the world's leading oil producers, service exports do not have an important role in the growth of the country yet.

As mentioned earlier, Azerbaijan successfully implemented its petrol strategy, expanding its export volume. Today, Azerbaijan's fundamental priority is to diversify manufacturing and export in the developing non-oil sectors. In this regard, several strategies and policies have been followed in Azerbaijan. However, the share of crude oil and oil derivatives in the overall export is still high. Azerbaijan's export has gained increased, but diversification of export goods and services are important. One way to increase and diversify overall export is to increase service export. Additionally, Armenia specialises in modern service businesses, but these services are not yet exportable. Considering global economic trends, it is obvious that service export will gain further significance for economic growth in the near future. Even though oil product exports have currently of substantial importance

for Azerbaijan, it is expected that the share and weight of the service sector in the export of both Azerbaijan and Armenia will increase over time. For further studies, real values of variables could be employed, the data set could be expanded, and structural breaks could be considered.

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APPENDIX

Table: 13
Summary Statistics

	Variable	Obs	Mean	Std. Dev.	Min	Max
Armenia	Time	30	2005.5	8.803408	1991	2020
	Country	0				
	GDP	30	2395.677	1168.702	813.8298	4350.466
	K	30	24.45102	9.836949	12.4554	46.83332
	L	30	.41696	.0270399	.3896332	.4676295
	SE	30	2.41e+07	1.77e+07	1556008	5.59e+07
Azerbaijan	Variable	Obs	Mean	Std. Dev.	Min	Max
	Time	30	2005.5	8.803408	1991	2020
	Country	0				
	GDP	30	3390.442	1788.427	1120.247	5508.409
	K	30	26.75934	10.06219	11.4521	57.71025
	L	30	.5100751	.0151389	.482848	.5348645
	SE	30	1.81e+09	1.78e+09	1.49e+08	4.81e+09
Georgia	Variable	Obs	Mean	Std. Dev.	Min	Max
	Time	30	2005.5	8.803408	1991	2020
	Country	0				
	GDP	30	2653.482	1210.017	969.7129	4773.423
	K	30	21.1961	7.047507	2.64657	28.78693
	L	30	.5302043	.0164458	.5025451	.5612389
	SE	30	1.31e+09	1.54e+09	-8.06e+08	4.60e+09

Table 14
Correlation Matrix

Armenia						
	time	gdp	k1	lf	serex	goex
time	1.0000					
GDP	0.9675	1.0000				
K	0.1040	0.2232	1.0000			
L	0.7087	0.7353	0.2320	1.0000		
SE	0.9382	0.9314	0.0359	0.8196	1.0000	
Azerbaijan						
time	1.0000					
GDP	0.8850	1.0000				
K	-0.0817	-0.3540	1.0000			
L	-0.4605	-0.7062	0.2426	1.0000		
SE	0.8849	0.9030	-0.2611	0.8849	1.0000	
Georgia						
time	1.0000					
GDP	0.9276					
K	0.4539	0.3956	1.0000			
L	0.2745	0.2521	-0.2827	1.0000		
SE	0.9205	0.8980	0.3623	0.9205	1.0000	

Figure: 1
Inverse Roots of AR Characteristic Polynomial (Armenia)
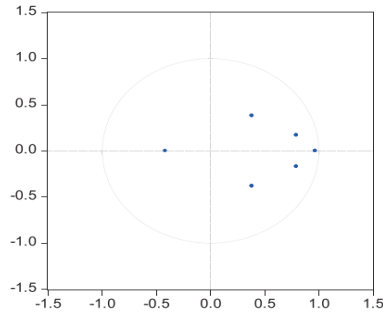
Figure: 2
Inverse Roots of AR Characteristic Polynomial (Azerbaijan)

Inverse Roots of AR Characteristic Polynomial
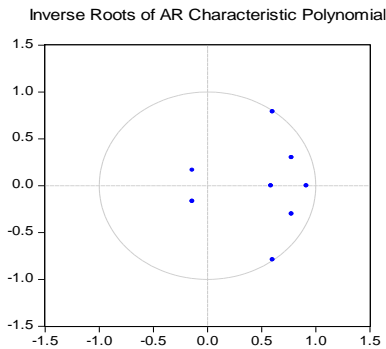
Figure: 3
Inverse Roots of AR Characteristic Polynomial (Georgia)

Inverse Roots of AR Characteristic Polynomial
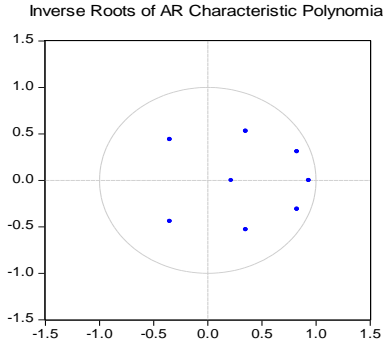
Table: 15
VAR Residual Serial Correlation LM and VAR Residual Heteroscedasticity Tests

VAR Residual Serial Correlation LM Tests (**Armenia**)		
Lags	LM-Stat	Prob
1	32.72484	0.0080
2	19.26573	0.2551
3	22.06815	0.1410
VAR Residual Heteroscedasticity Test (**Armenia**)		
Chi-sq		Prob.
177.4466		0.1638
VAR Residual Serial Correlation LM Tests (**Azerbaijan**)		
Lags	LM-Stat	Prob
1	22.93640	0.1154
2	20.10148	0.2157
3	19.25406	0.2557
VAR Residual Heteroscedasticity Test (**Azerbaijan**)		
Chi-sq		Prob.
180.1685		0.1313
VAR Residual Serial Correlation LM Tests (**Georgia**)		
Lags	LM-Stat	Prob
1	18.24987	0.3095
2	20.99953	0.1785
3	14.03087	0.5964
VAR Residual Heteroscedasticity Test (**Georgia**)		
Chi-sq		Prob.
241.4478		0.4616

The Effects of Tax Shocks on GNP and Inflation in Iran, A DSGE Approach

Seyed-nezamuddin MAKIYAN[1] *(https://orcid.org/0000-0002-8890-3890), Yazd University, Iran; nmakiyan@yazd.ac.ir*

Seyed-mohamad-saleh Najafi FARASHAH *(https://orcid.org/0000-0002-4897-7262), Yazd University, Iran; najafi134@gmail.com*

İran'da Vergi Şoklarının GSMH ve Enflasyon Üzerindeki Etkisinin Dinamik Stokastik Genel Denge Yaklaşımı ile Analizi

Abstract

This study investigates indirect tax shocks' influences on GDP and inflation in Iran's economy, using a DSGE (Dynamic Stochastic General Equilibrium) model. The results indicate that a shock cause equal to one standard deviation in tax on consumption can reduce GDP by 0.006% and inflation by 0.018%. Also, a shock in the import tax causes the GDP to decrease by 0.089% due to the decrease in demand for imported goods. Moreover, imported goods reduce by 0.4% with the occurrence of import tax shock; meanwhile, inflation increases by 0.89% in the short term. Accordingly, a possible reform for indirect taxes should be more carefully considered.

Keywords : Tax Shock, Consumption Tax, Import Tax, Dynamic Stochastic General Equilibrium Model.

JEL Classification Codes : C54, E62, H24, H3.

Öz

Bu çalışma, İran ekonomisinde dolaylı vergi şoklarının GSMH ve enflasyon üzerindeki etkilerini bir DSGD (Dinamik Stokastik Genel Denge) modeli kullanarak incelemektedir. Sonuçlar, tüketim vergisindeki standart sapmaya eşit bir şok nedeninin GSMH'yı %0,006 ve enflasyonu %0,018 azaltabileceğini göstermektedir. İthalat üzerinden alınan vergilerdeki bir şok ise, ithal mallara olan talebin azalması nedeniyle GSMH'nın %0,089 oranında düşmesine neden olmaktadır. Ayrıca, ithalat üzerinden alınan vergi şokunun meydana gelmesiyle ithal mallar %0,4 oranında azalırken; enflasyon kısa vadede %0,89 artmaktadır. Bu bağlamda, dolaylı vergiler için olası bir reform çalışması yapılırken daha dikkatli bir şekilde konu ele alınmalı ve tartışılmalıdır.

Anahtar Sözcükler : Vergi Şoku, Tüketim Vergisi, İthalat Vergisi, Dinamik Stokastik Genel Denge Modeli.

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[1] *Corresponding Author.*

1. Introduction

Reliance on the oil revenues, due to the volatile and exogenous nature of a significant part of it, has imposed adverse and detrimental effects on Iran᾿s economy. The mono-product economy, steady inflation, the devaluation of the national currency, the inefficient expansion of the public sector, and the weakening of the private sector are examples of these harmful effects. Accordingly, it is necessary to replace other revenues with oil revenues. Tax revenues are one of these types of revenues. Taxes are not only a means of providing government budget expenditures but also play a regulatory role in implementing macroeconomic policies and strategies (Chapardar & Geraeinejad, 2012: 82).

In Iran, the tax rate index to GDP has always been less than 10 % during the past years, so the goal of the Fifth Development Plan was to reach 10 %, which still needs to be achieved. The Sixth Development Plan for the years 2017, 2018, 2019, and 2020 was equal to 7.4, 8, 8.7, and 9.4, respectively, and the year 2021 was considered at 10%. The unfavourable situation of the country's tax system is well determined by comparing this ratio in Iran with other developed countries and countries with similar economic structures.

The ratio of taxes to GDP, or in other words, tax effort in Iran, is significantly lower than in other countries (below 8%). In this ratio, the average global performance is estimated at least twice that of Iran. Also, the average performance of European and Asian countries is estimated to be about three times that of Iran. Iran ranks 135th out of 140 countries ranked by the World Bank. This ratio is 12% in countries that are less developed than Iran, such as Azerbaijan, Nigeria, and Cameroon, and 17% for economies on the same level as Iran, such as Pakistan, Egypt, and Indonesia, and in developed European countries this rate is over 30% (Pajooyan & Darwish, 2010: 37). Corporate tax, individual income tax, goods and services tax (including value-added tax), import and wealth tax are currently considered the main parts of the country's tax revenue, which are included in a category with two general headings: direct tax (corporate tax and individual income tax) and indirect tax (tax on goods and services and import tax).

On the one hand, the lack of a comprehensive tax information system, the multiplicity of tax rates in different sectors of the economy and broad and varied tax exemptions, the application of personal opinions in the tax collection process, failure to consider parts of the economy in the tax inclusion process, inadequate technical supervision over the tax assessment and collection processes and the subsequent spread of corruption in some tax areas are among the most significant harms and shortcomings of Iran᾿s tax system. Meanwhile, the study of the effects of tax policies on macroeconomic variables in the country is significant. In other words, studying the effects of tax shocks on macroeconomic variables will be one of the most important prerequisites for examining and analysing the impact of a tax policy on the economic system. This is a study of how these policies affect the behaviour of economic agents or taxpayers.

In addition to the direct effects on tax revenues, the composition of tax bases or rates will also affect other economic variables such as consumption, savings, and investment. In this article, we examine the impact of indirect tax changes on GDP growth and inflation. For this purpose, a Dynamic Stochastic General Equilibrium Model will be used to understand and analyse the effects of these shocks. This article has been compiled into five sections. Theoretical foundations and research background are presented in the second part after the introduction. The research method in the third part, analysing and estimating the model in the fourth part, and finally, the conclusion and highlights in the fifth part will be presented.

2. Theoretical Foundations and Research Background

In this section, we will review the research background of this issue inside and outside of the country after a brief statement of theoretical foundations:

2.1. Theoretical Foundations

Taxes are the most acceptable and appropriate type of government revenue from an economic point of view. They are considered effective for macroeconomic goals such as economic stabilisation, job creation, improving social welfare, and economic growth. A comparison of this source with other sources shows that the higher the share of taxes in financing government expenditures, the significantly less the adverse economic effects. Thus, to achieve economic growth, an efficient tax system is essential.

During the twentieth century, tax levels increased dramatically in most developed countries. Taxes have risen from about 5 and 10 per cent of GDP at the beginning of the last century to 30 and 40 per cent in developed countries today. This significant increase in taxes has raised questions about the impact of taxes on economic growth and other macroeconomic variables. Taxes affect the labour supply, the amount of investment in human capital, and households' decisions about savings. They influence firms' production, job creation, investment, and innovation decisions. Economic growth is one of the critical macroeconomic goals of any country and has an undeniable effect on improving the welfare of society. Therefore, economists have always been interested in determining the factors affecting economic growth and how different policies affect the growth rate and inflation.

Exogenous growth models were proposed before the second half of the 1980s. Traditional neoclassical growth theories such as Solo and Ramsey-Cas-Kopmans attributed the long-term economic growth rate to population growth rates and technological change, all of which were considered exogenous. Therefore, the effects of tax policies on growth in these models could not be examined. Economists like Roemer and Lucas and other researchers such as King and Reblo (1989), Grossman and Helpman (1991), Aghion and Howitt (1996), and Jones (1995) provided literature related to the endogenous growth patterns in response to those exogenous ones. In these models, the steady growth rate depends on economic parameters such as utility functions, production, tax policy, etc. The theories of endogenous growth rate were proposed by optimising the decisions of economic

agents and policymakers after the era of exogenous growth models. Therefore, it was possible to examine the role of economic policies such as tax policy in such models with the long-term endogenous rate of economic growth and inflation. So, this study aims to analyse the effect of tax shocks on economic growth and inflation.

2.2. Research Background

The following works are the most important studies conducted in the field of research:

Zhou (1992) extended the inclusive model to government and technology spending by arranging disruptive shocks. In his model, there is no assumption that the capital tax rate should be zero in the long run. Zhou's findings indicate a negative effect of income tax on a human capital-based growth model without the effect of knowledge overflow. In his view, the impact of income tax on human capital growth models with the effect of knowledge overflow and innovation-based growth models, the public infrastructure-based growth models needed to be more apparent. In the field of consumption tax, Zhou believes that when the supply of labour depends on the choice between work and leisure, the effect of consumption tax on growth depends on the characteristics of the instantaneous utility function.

The economy's long-term growth rate depends on the current leisure utility growth rate. This, in turn, depends on the level of leisure and the consumption tax, which also affects leisure. In their paper, Mendoza et al. (1997) tested Harberger's theory that direct and indirect taxes affect investment and economic growth but have little effect. They analysed the impact of taxes on long-term growth in an endogenous growth model based on Human capital. The production uses human capital (H) and physical capital (K). In their work, return relative to scale is also assumed to be constant. In this model, the effect of taxes on physical capital and human capital based on the extracted equations is investigated separately. On the one hand, the physical capital tax reduces human capital growth (negative effect on growth) and, on the other hand, reduces the ratio of capital to manpower in the production process. In the allotted time between work-education and leisure, the total return on capital increases after tax (positive effect on production). The human capital tax increases the ratio of capital to labour in production at the time allotted between education and leisure and reduces the return on capital after tax, which affects the ratio of capital to labour in production. It should be noted that if the succession elasticity is high enough, it may have a negative effect on growth.

Heidari and Saeedpour (2015), with the help of analysing the impact of fiscal policy shocks and the increasing financial coefficient of the economy in the framework of the new Keynesian model, showed that the shock of increasing consumption taxes leads to reduced production in the short term. They also found that the shock of increasing government spending improves output in the short run and increases inflation in the long run.

Fotros and Dalaie (2016) have studied tax evasion in the context of a Random Dynamic Stochastic General Equilibrium Model. According to the results of their study, a positive productivity shock in the formal sector increases the production of the formal sector and reduces underground production, thus reducing tax evasion.

Mirmohamadi and Janati (2016) have reviewed the experience of tax reform in different countries and compared them with Iran's tax system reform. Accordingly, tax reform approaches generally focus on reducing the distorting effects of taxation to maintain the economy's competitiveness, reducing the diversity of tax rates to overcome unwanted distortions in relative prices, and extending VAT to lessen the tax burden on the manufacturing sector. These approaches have focused on vertical justice instead of horizontal justice, i.e., a broad, simple and transparent tax base and reducing administrative costs and tax compliance. The reform of tax organisations is one of the pillars of tax reform and includes a wide range of measures to improve tax enforcement processes. Modernisation of tax processes is one of the aspects of tax reform. According to this study, the move towards using information and communication technology in this sector, providing online services to taxpayers, facilitating online payment of taxes, etc., has accelerated in many countries. Some of these countries have even resorted to using mobile-based technologies in taxation.

The need to reform tax policies before the start of the tax reform program and, consequently, the modernisation of the administrative system is something that can be seen in examining the experience of tax reform programs in the world illustrated in this article. In other words, the relevant policies, laws, and regulations must be formulated for an IT-based. Regardless, tax-process mechanisation is accompanied by internal resistance and external opposition and may have little effect.

2.3. Empirical Studies

Experimental studies offer a wide range of tax effects on growth. Some empirical evidence is also presented in this section. Table 1 lists some of the studies relative to the impact of taxation on economic growth.

Table: 1
Selected Empirical Studies on the Economic Effects of Taxation

Case Study	Method	Country or Region	Summary of Results and Findings
Mertens & Ravn (2013)	Structural Vector Autoregressive	Changes in consumption and import taxes - America after World War II	A 1% decrease in the average consumption tax rate increases the GDP growth by 1.5% in the first quarter and 1.9% after the three quarters. A 1% decrease in the average import tax rate increases the GDP growth by 0.42% in the first quarter and by 0.66% after one year.
Dahlby & Ferede (2012)	Panel Data	The Canadian States 1997-2006	A 1% reduction in consumption tax increases the economic growth rate between 0.15 and 0.25.
Gemmell, Kneller & Sanz (2011)	Panel Data	17 OECD Countries 1970-2004	Income and consumption taxes have a negative impact on economic growth in the long run.
Arnold et al. (2011)	Panel Data	21 OECD Countries 1971-2004	Income tax reduces investment and productivity growth. A 1% transfer of tax revenue from income tax (individuals and companies) to consumption and asset taxes increases per capita GDP by 0.25% to 1% in the long run.
Alesina & Ardagna (2010)	Panel Data	OECD Countries 1970-2007	Tax incentives based on tax cuts are more likely to increase economic growth than incentives based on increased spending.
Barro & Redlick (2011)	Time Series	USA 1912-2006	A 1% reduction in the average final tax rate will increase next year's GDP by about 0.5% next year.

3. Analysis of Research Method

Like other General Equilibrium models, the structure of a Dynamic Stochastic General Equilibrium (DSGE) model is designed to describe the behaviour of the whole economy and to use the analysis of micro-decisions interactions at different levels. The decisions considered in most dynamic stochastic equilibrium models are related to the macro quantities studied in economics. These quantities include consumption, savings, investment, and labour supply and demand. Decision makers in this model are called brokers, which can consist of households, businesses, governments and even the central banks of different countries.

3.1. Household

In the context of a Stochastic Dynamic General Equilibrium Model, it is assumed that the economy is composed of a large number of homogeneous households (with index i) seeking to maximize the discounted interim expectation utility[2]:

$$E_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{(C_{T,t}^i)^{1-\sigma_c}}{1-\sigma_c} - \frac{\chi}{1+\eta} (L_t^i)^{1+\eta} + \frac{\zeta}{1-b} \left(\frac{M_t^i}{P_{T,t}} \right)^{1-b} \right) \tag{1}$$

$C_{T,t}^i$ is the consumption index of all goods consumed by the household and is considered as a combination of domestic consumer goods $C_{d,t}$ and imported consumer goods $C_{m,t}$ as follows:

$$C_{T,t} \equiv \left[(1-\alpha_c)^{\frac{1}{\eta_c}} (C_{d,t})^{\frac{\eta_c-1}{\eta_c}} + (\alpha_c)^{\frac{1}{\eta_c}} (C_{m,t})^{\frac{\eta_c-1}{\eta_c}} \right]^{\frac{\eta_c}{\eta_c-1}} \tag{2}$$

Where η_c is the Elasticity of Intertemporal Substitution of consumption between domestically traded goods and imported goods. Also, α_c and $(1-\alpha_c)$ are the share of imported goods and domestic goods in the household consumption basket, respectively.

Household expenditure for purchasing consumer goods is a combination of imported and domestically produced goods and can be written as follows:

$$P_{T,t}^c C_{T,t} = (1 + \tau_{d,t}^c) P_{d,t}^c C_{d,t} + \left((1 + \tau_{d,t}^c)(1 + \tau_{m,t}^c) \right) P_{m,t}^c C_{m,t} \tag{3}$$

Where $P_{T,t}^c$ is Total Consumer Price Index (CPI), $P_{d,t}^c$, is Domestic Consumer Price Index (equal to the price index of domestically produced goods) and $P_{m,t}^c$ is the Price index of imported consumer goods. Domestic consumer goods are taxed at the rate of $\tau_{d,t}^c$ (consumption tax rate on domestic goods) at the time of purchase. In addition to the rate

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[2]   *Details of the equations have been omitted for brevity. Readers can contact authors.*

$\tau_{d,t}^c$t) imported consumer goods are also subject to tax on the import of consumer goods at the rate of $\tau_{m,t}^c$.

3.2. Business Section

3.2.1. A Business Producing Final Product

In each period, there is a business that produces $Y_{j,t}$ units of the final commodity by purchasing $Y_{j,t}$ units of intermediate goods produced by the intermediate goods-producing businesses, at the price of $P_{j,t}$ and combining them that produce Y_t of final good.

3.2.2. A Business Producing Domestic Intermediate Goods

A group of monopoly businesses produce distinctive goods in the production unit of intermediate goods. These firms have intermediate goods using household labour and capital. They pay W_t ,nominal wages to households and pay actual income or the real rate of return on capital R_t^k in return for capital rent.

3.2.3. Pricing of Domestic Producers

In addition to minimising costs, pricing and price adjustments are another issue facing domestic manufacturing businesses. In this research, it is assumed that the prices of domestic businesses are not entirely flexible, and the rigidity of price levels in this sector is modelled by using the Calvo model.

3.3. Government and Central Bank

Due to the dependency of the central bank on the government in Iran, the government and the central bank have been considered in the modelling of the present study in one framework. Therefore, the government and the central bank are not modelled as two separate parts. The government's goal is to keep its budget balanced. Accordingly, the central bank also acts so that the government can maintain its budget in equilibrium. The government finances its expenditures through revenues from the consumption tax on domestic goods, the consumption tax on imported consumer goods, the corporate tax, the labour income tax, the co-tax, the sale of participation bonds and the income from the sale of oil.

3.4. Estimation of Model Parameters

The Bayesian method, which is a method between calibration and maximum likelihood, and the Metropolis-Hastings model have been used to estimate the parameters. Using the Metropolis-Hastings algorithm, five parallel chains with a volume of five hundred thousand samples are extracted to obtain the posterior density of the parameters.

Eleven visible variables of GDP (at base price 2011), the effective tax rate on the consumption of domestic consumer goods, the effective tax rate on the consumption of

imported consumer goods, the effective tax rate on companies and the effective tax rate on income tax, government expenditures, Private consumption expenditures, total investment, monetary base growth rate, consumer price inflation (CPI), nominal exchange rate growth in the open market and foreign inflation used to estimate the model.

The time-series database of the Central Bank of the Islamic Republic of Iran, the Statistics Center of Iran, the Ministry of Economy, the Tax Affairs Organization and the World Bank Data Base have been used to collect data. The data used are related to the period 1990: 1 to 2020: 4 and are seasonally adjusted so that first, the logarithm of the data is taken and, in the next step, declassified using the Hedrick-Prescott filter with $\lambda = 677$.

Parameters that need not be estimated should be identified and calibrated before estimating the parameters. Some parameters are derived from the steady-state values of the variables and do not need to be estimated. Some other parameters are the ratio of variables in the model's steady state. Accordingly, Table 2 lists the parameters that can be calibrated based on Iran's economic data.

Table: 2
Calibrated Parameters of the Model Based on Iran's Economic Data

Parameter	Parameter Definition	Symbol	Parameter Value	Resource
$\bar{\gamma}_d^c$	The ratio of the producer price index to the consumer price index	gamadbar	0.979	Research Findings
$\bar{\gamma}_m^c$	The ratio of the imported price index to the consumer price index	gamambar	1.2863	Research Findings
$\bar{\tau}_d^c$	Auto-regression coefficient of tax shock on domestic consumption	taudbar	0.03618	Hasanzadeh Jozdani (2016)
$\bar{\tau}_m^c$	Auto-regression coefficient of tax shock on imported consumption	taumbar	0.4551	Hasanzadeh Jozdani (2016)
$\bar{\tau}^l$	Auto-regression coefficient of tax shock on income	taulbar	0.0485	Hasanzadeh Jozdani (2016)

4. Estimation of Parameters Based on the Bayesian Method

The model parameters' distribution, mean, and standard deviation must be specified in the Bayesian estimation. Parameters can be estimated using the Bayesian method by considering the initial values for their mean and standard deviation. Model estimation is done by Matlab software in the Dynare program space. For this purpose, the Metropolis-Hastings Algorithm with five blocks and a sampling of five hundred thousand per block has been used. The prior distribution for each parameter was selected based on that parameter's characteristics and the desired distribution's characteristics. The acceptance rate of the model should be between 0.25 to 0.4. Diner runs the Hastings Metropolis Algorithm several times. The behaviour of these chains should be similar or converge towards each other if the results of these chains are logical.

The parameter estimation results are presented in Table 3 according to the above and using the Bayesian method.

Table: 3
Estimation of Model Parameters Based on the Bayesian Method

Parameters	Prior Distribution				Posterior Distribution			
	Type	Average	Standard Deviation	Source	Average	Standard Deviation	Confidence Interval 90%	
β	Beta	0.969	0.0125	Tavakolian (2015)	0.9564	0.0125	0.9302	0.98
α_c	Beta	0.15	0.05	Hassanzadeh Jozdani (2018)	0.0854	0.05	0.0403	0.1292
σ_c	Gamma	1.571	0.09	Tavakolian (2012)	1.8324	0.09	1.6871	1.978
η	Gamma	2.17	0.1	Tavakolian (2015)	2.665	0.1	2.4865	2.846
τ_π	Beta	0.511	0.07	Hassanzadeh Jozdani (2018)	0.5173	0.07	0.4033	0.632
θ	Beta	0.375	0.03	Hassanzadeh Jozdani (2018)	0.3126	0.03	0.272	0.35
w_1	Normal	-2.9	0.29	Hassanzadeh Jozdani (2018)	-2.4811	0.29	-2.9563	-1.98
ρ_a	Beta	0.926	0.01	Tavakolian (2015)	0.952	0.01	0.941	0.964

Also, the estimation of shocks in the model based on the Bayesian method is presented in the Table below:

Table: 4
Estimation of Model Shocks Equal to One Standard Deviation

Parameters	Prior Distribution		Posterior Distribution		
	Type	Average	Average	Confidence Interval 90%	
σ_a	Inverse Gamma	0.01	0.059	0.05	0.06
σ_g	Inverse Gamma	0.01	0.079	0.069	0.089
σ_p	Inverse Gamma	0.01	0.125	0.1	0.14
σ_d	Inverse Gamma	0.01	0.13	0.11	0.14
σ_m	Inverse Gamma	0.01	0.189	0.165	0.21
σ_l	Inverse Gamma	0.01	0.025	0.022	0.028
σ_{y^*}	Inverse Gamma	0.01	0.052	0.045	0.058
σ_a	Inverse Gamma	0.01	0.13	0.11	0.14
σ_π	Inverse Gamma	0.01	0.07	0.062	0.079

Source: Research Findings.

Impulse response function diagrams obtained from the estimated model, which are important tools of economic analysis, are used to study the dynamics of economic variables concerning different shocks.

Figure: 1
Impulse Responses of Some Variables to Consumption Tax Shock
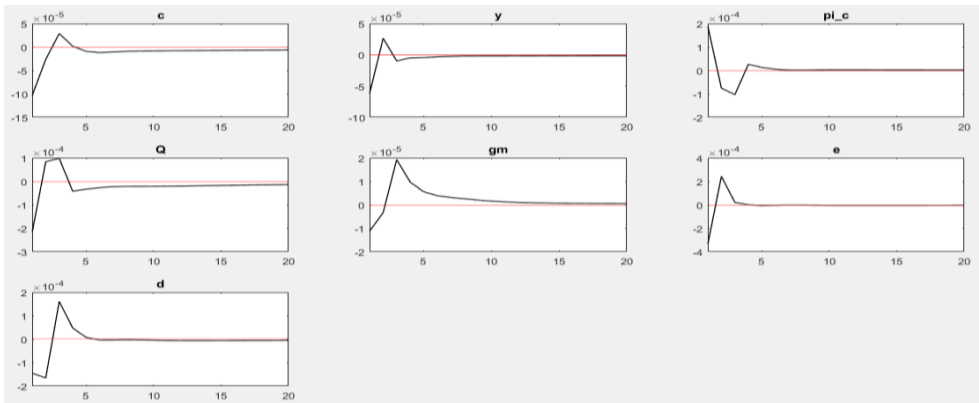
c = Consumption; y =GDP; pi_c = Inflation; Q = Stocks Revenue; gm = Money Growth; e = Real Exchange Rate; d = Exchange Rate Policy

GDP decreases by 0.006% with a shock based on consumption tax equal to one standard deviation. The consumption rate also drops to 0.01% with the consumption tax shock, and the shock effect of GDP disappears after four annual periods. In the short run, inflation increases by 0.018 per cent and then decreases and returns to a stable value in less than one year.

Figure: 2
Impulse Responses of Some Variables to Import Tax Shock
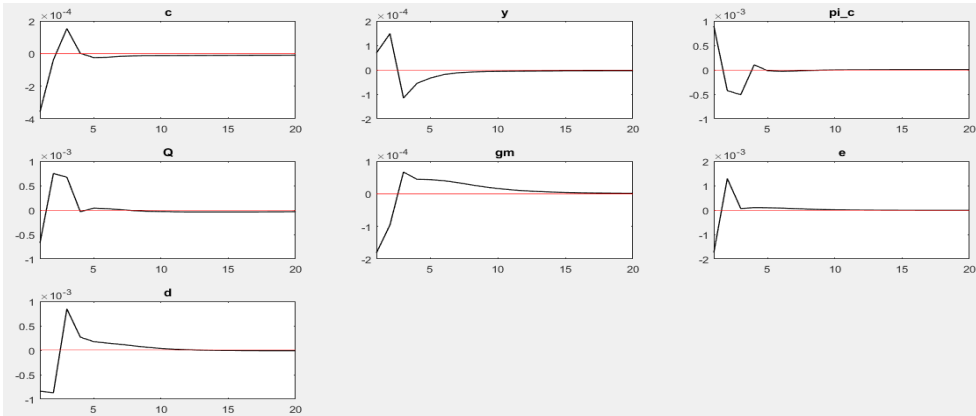
c = Consumption; y =GDP; pi_c = Inflation; Q = Stocks Revenue; gm = Money Growth; e = Real Exchange Rate; d = Exchange Rate Policy

As can be seen in Figure 2 for the impulse responses, we examine the effect of a shock by a standard deviation on this tax base to examine the impact of the import tax. Such a shock will cause a decrease of 0.089 per cent in GDP and a decrease of 0.89 percentage points in inflation. Increasing the import tax will reduce the consumption of imported goods by 0.4% by affecting consumption.

5. Conclusion

According to this study, tax bases, including consumption and import taxes, have small but significant effects on GDP and inflation. However, in the first phase, inflation increases, but this increase adjusts over time. This confirms the low share of taxes in Iran's economy. Among the tax bases examined, import taxes have the most significant impact on changes in GDP. Considering the results, the lowest share of differences in GDP between the tax bases is related to consumption tax. Moreover, the largest share in inflation changes is related to import taxes, while the lowest percentage is related to consumption tax. Based on the results of this study, considering consumption tax and import tax under indirect taxes, the effect of such taxes on changes in GDP and inflation is significant. Therefore, the implementation of a possible reform by policymakers in the form of indirect taxes should be considered carefully due to their effect on inflation.

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Kâr Amacı Gütmeyen Sektörün Büyüklüğünü Etkileyen Faktörler: Ampirik Bir Çalışma

Ayşe Nil TOSUN (https://orcid.org/0000-0001-5161-1037), Hacettepe University, Türkiye; nilt@hacettepe.edu.tr

Ayfer Ezgi YILMAZ (https://orcid.org/0000-0002-6214-8014), Hacettepe University, Türkiye; ezgiyilmaz@hacettepe.edu.tr

Factors Influencing the Size of Non-Profit Sector: An Empirical Study

Abstract

This study aims to empirically examine the relationship between non-profit sector size and population heterogeneity from a multinational perspective. Panel pooled, fixed effects, random effects, generalised method of moments, fully modified ordinary least squares (FMOLS), and dynamic ordinary least squares (DOLS) methods were used to evaluate the economic and social factors affecting the size of non-profit sector organisations in 20 OECD countries between 1995 and 2019. As a result of the study, it was found that an increase in GDP per capita income and urban population growth rate positively affected the size of the non-profit sector, while the age dependency ratio did not affect the size of the non-profit sector.

Keywords : Non-Profit Sector, Population Heterogeneity, Age Dependency Ratio.

JEL Classification Codes : L30.

Öz

Bu çalışmanın amacı kâr amacı gütmeyen sektör büyüklüğü ile nüfus heterojenliği arasındaki ilişkiyi çok uluslu bir bakış açısıyla ampirik olarak incelemektir. 1995-2019 yılları arasında OECD ye üye 20 ülkedeki kâr amacı gütmeyen sektör kuruluşlarının büyüklüğünü etkileyen ekonomik ve sosyal faktörleri değerlendirmek için havuzlanmış en küçük kareler, sabit etkiler, rastgele etkiler, genelleştirilmiş momentler, tamamen değiştirilmiş en küçük kareler ve dinamik en küçük kareler yöntemleri kullanılmıştır. Çalışmanın sonucunda kişi başına GSYİH'deki artışın ve artan kentleşme oranlarının kâr amacı gütmeyen sektör büyüklüğünü olumlu etkilediği, yaş bağımlılık oranının ise kâr amacı gütmeyen sektör büyüklüğünü etkilemediği tespit edilmiştir.

Anahtar Sözcükler : Kâr Amacı Gütmeyen Sektör, Nüfus Heterojenitesi, Yaş Bağımlılık Oranı.

1. Giriş

Bu çalışmanın amacı kamusal malların üretiminde devlete yardımcı bir rol oynayan kâr amacı gütmeyen sektörün büyüklüğünü etkileyen faktörleri çok uluslu bir bakış açısıyla ampirik olarak incelemektir. Kâr amacı gütmeyen kuruluşlar yapı itibariyle kâr elde etmeyi amaçlamadan topluma fayda sağlayan kuruluşlardır. Bununla birlikte zaman içerisinde kâr amacı gütmeyen sektör ile kâr amacı ile çalışan özel sektör arasındaki sınırlar belirsizleşmeye başlamıştır. Aynı zamanda bu kuruluşların aşırı kârlar elde ettikleri de gözlemlenmektedir (Park et al., 2021; Skelcher & Smith, 2015). Söz konusu kuruluşlar ile iş birliği yapan devletler bu kuruluşlara destek sağlayarak giderek büyümelerine izin vermektedirler. Kâr amacı gütmeyen sektör kuruluşlarının sayısının devlet finansmanı sağlandıkça daha çok arttığı gözlemlenmektedir (Luksetich, 2008). Zaman içerisinde kâr amacı gütmeyen sektör ile kâr amacı ile çalışan özel sektör arasındaki sınırlar da belirsizleşmeye başlamıştır. (Park et al., 2002). Devletin kârsız sektör kuruluşlarına destek olması bu kuruluşların güvenilirliklerini ve olası ticari gelirlerini de artırmaktadır. Bu durum ticari kazanç elde eden kârsız sektör kuruluşlarını diğer ticari kuruluşlara göre avantajlı bir duruma da getirmektedir (Dewit & Bekkers, 2017). Kâr amacı gütmeyen sektör kuruluşlarının gerek öz yapılarının gerekse ticari gelirlerinin giderek büyümesi akademik çalışmalarda bu alana olan ilgiyi artırmıştır (Matsunaga et al., 2010; Saxton & Benson, 2005; Kim & Kim, 2018; Kanaya et al., 2015; Marchesini de Costa, 2016). Çalışmalar sektörün büyüklüğünün birçok farklı faktörden etkilendiğini ortaya koymaktadır. Ülkeden ülkeye sektörün büyüklüğü değişmektedir. Aynı zamanda söz konusu büyüklüğün nasıl en doğru şekilde ölçüleceği de bu konuda kabul edilmiş tek bir ölçüt bulunmamakla birlikte ayrı bir araştırma konusudur. Organizasyon sayısı, sektörde çalışan kişi sayısı, sektöre üye sayısı, sektöre yapılan bağışlar, kâr amacı gütmeyen sektör kuruluşlarının tüketim harcamaları kâr amacı gütmeyen sektör kuruluşlarının büyüklüğünü ölçmede kullanılan göstergelerden bazılarıdır (Pennerstorfer & Rutherford, 2019).

Kâr amacı gütmeyen sektörün ortaya çıkışını ve büyüklüğünü etkileyen faktörler ile ilgili teoriler çok çeşitlidir. Arz yönlü teoriler sektörün sahip olduğu kaynaklara ve toplumların zenginliğine odaklanmaktadırlar. Hükümetlerin sektöre karşı uyguladıkları politikaların destekleyici ya da engelleyici olması sektörün büyüklüğü konusunda belirleyici olabilmektedir. Sektöre tanınan çalışma izinleri, vergi muafiyetleri ya da doğrudan destekler sektörün gelişmesinde rol oynamaktadır. Salamon (1987); hükümetin kâr amacı gütmeyen sektöre kaynak sağlayarak, çeşitli mal ve hizmetlerin sağlanmasında hükümetin yerini almasına neden olduğunu göstermektedir. Kapur & Weisbrod (2000), Lecy & Slkye (2013) ve Lu & Xu (2018) kâr amacı gütmeyen sektörün finansal avantajlar, vergi avantajları ve sübvansiyonlar yardımıyla büyüdüğünü göstermiştir. Bu şekilde devletler kâr amacı gütmeyen sektörün hangi alanlarda daha fazla büyüme göstereceğini belirlemede etkilidir. Talep yönlü teoriler genellikle kâr amacı gütmeyen sektörün özel sektör ya da devlet tarafından karşılanmayan mal ve hizmetlerin sağlanmasında oynadığı rol üzerinde yoğunlaşmaktadır. En çok tanınan talep yanlı teori Burton Weisbrod'un (1977) talep heterojenitesi teorisidir. Weisbrod'un talep heterojenitesi teorisinde, toplumdaki talep heterojenliği ile kâr amacı gütmeyen sektörün büyüklüğü arasında pozitif bir ilişki

kurulmuştur. Yazar, kâr amacı gütmeyen sektör kuruluşlarının devlete ek, özel sektöre alternatif olarak, devletin ve özel sektörün yeterli kalitede üretemediği kamu mallarını topluma sağladığını iddia etmektedir. Diğer bir değişle, bu organizasyonlar devlet ve özel sektörün yetersiz kaldığı durumlarda ortaya çıkmaktadırlar. Toplumda yaşayan bireyler gelir, yaş, din, eğitim, ırk, yaşadıkları kent gibi faktörler açısından farklılaştıkça bu kişilerin talepleri de farklılaşmaktadır. Söz konusu değişkenler kâr amacı gütmeyen sektörün büyüklüğünü etkilemektedir.

Bu çalışma Weisbrod'un talep heterojenitesi teorisinden yola çıkarak nüfus heterojenliği ve kâr amacı gütmeyen sektör büyüklüğü arasındaki ilişkiyi çok uluslu bir bakış açısıyla ampirik olarak incelemektedir. Çalışmada ülkeler arası ortak faktörleri kullanabilmek amacıyla sınırlı sayıda gösterge seçilebilmiştir. Sektörün büyüklüğünü etkileyen faktörlerin hepsinin çalışmada veri eksiklikleri nedeniyle kullanılamaması bu çalışmanın kısıtını oluşturmaktadır. Kâr amacı gütmeyen sektörün büyüklüğünün bir göstergesi olarak OECD (2021) veri tabanından elde edilen özel gönüllü kuruluşlar ve sivil toplum kuruluşları tarafından sağlanan hibeler (grants by private voluntary agencies and NGOs) seçilmiştir. Çalışmada kâr amacı gütmeyen sektörün büyüklüğüne etki eden faktörlerden kişi başına GSYİH, yaş bağımlılık oranı, kentsel nüfus artışı oranı test edilmiştir.

Çalışmanın aşağıda belirttiğimiz üç hipotezi mevcuttur:

H1: Ülkelerdeki, Kişi başına GSYİH arttıkça kâr amacı gütmeyen sektör büyüklüğü artmaktadır.

H2: Ülkelerdeki, yaş bağımlılık oranı arttıkça kâr amacı gütmeyen sektör büyüklüğü artmaktadır.

H3: Ülkelerdeki, kentsel nüfus artışı oranı arttıkça kâr amacı gütmeyen sektörün büyüklüğü artmaktadır.

Çalışmada yöntem olarak 1995-2019 yılları arasında OECD'ye üye 20 ülkedeki kâr amacı gütmeyen sektör kuruluşlarının büyüklüğünü etkileyen ekonomik ve sosyal fakörleri değerlendirmek için havuzlanmış en küçük kareler, sabit etkiler, rastgele etkiler, genelleştirilmiş momentler, tamamen değiştirilmiş en küçük kareler ve dinamik en küçük kareler yöntemleri kullanılmıştır.

2. Genel Olarak Kâr Amacı Gütmeyen Kuruluşlar ve Literatürdeki Çalışmalar

Kâr amacı gütmeyen sektör bir cok ülkede aynı zamanda üçüncü sektör (third sector), sivil toplum kuruluşları (non-governmental organizations), hayır kurumları (charities), gönüllü organizasyonlar (voluntary organizations), vakıflar (foundations) gibi kelimeler ile de ifade edilmektedir. Bu kuruluşların ortak bazı özellikleri mevcuttur. Bu özelliklerin hepsini aynı ölçüde olmasa da genel olarak taşırlar. Söz konusu özelliklere göre kâr amacı

gütmeyen kuruluşlar kurumsal ve örgütlüdürler, yöneticilerine kâr dağıtmazlar, kâr elde ettiklerinde söz konusu gelir kurumun temel misyonuna yönlendirirler, kendi kendilerini yönetirler, iç işleyiş mekanizmaları vardır ve dışarıdan kontrol edilmezler. Bu kuruluşların tüm gelirlerinin gönüllü olması şart olmamakla birlikte, sadece yöneticilerinin gönüllü çalışması bile gönüllülük kriterinin yerine getirilmesinde yeterlidir (Salamon & Anheier, 1998).

Birçok sosyal sorunun çözümünde rol alan söz konusu kuruluşların uzun bir tarihi geçmişi mevcuttur. Tarih boyunca içinde bulundukları toplumun refahı için önemli roller oynamışlardır. Örneğin savunmasız ya da fakir insanlara sağlık, eğitim, maddi destek gibi hizmetler vermiş, sosyal eşitliğin sağlanmasında etki yapmışlar, demokrasiye katkı getirmişlerdir (Habib & Taylor, 1999), Hemen hemen her toplumda kârsız amacı gütmeyen sektör kuruluşları görülmekte ise de her ülkede bu kuruluşların ortaya çıkış nedenleri, gelişimleri farklı olmuştur. Örneğin Amerika Birleşik Devletleri'nde Amerika ve İngiltere arasındaki bağımsızlık savaşı öncesinde Amerikalılar hayatlarının birçok alanına devlet müdahalesinde bulunulmasına güvenmemişlerdir. Amerikalılar topluluk ihtiyaçlarının en iyi topluluk içerisinde yer alan kişiler tarafından karşılaşacağına daha çok inanmışlar, ihtiyacı olan insanlar için çalışmayı görev olarak benimsemişlerdir. Bu anlayış ülkede kârsız sektör kuruluşlarının gelişiminde rol oynamıştır (Holland & Ritvo, 2008). Osmanlı İmparatorluğu döneminde ise fetihler sonucu elde edilen topraklar, vakıflardan oluşan kârsız sektör kuruluşları çatısı altında yönetilmişlerdir. Vakıf hizmetleri bir tür kamu hizmeti olarak yürütülmüştür (Hatemi, 1997). Günümüzde de kâr amacı gütmeyen kuruluşlar birçok ülkede kamu hizmetlerinde çok sık kullanılmaktadırlar. Varlıklarını devam ettirdikleri gibi giderek büyüyen bir yapıya da sahiptirler. Devlet açısından bazı hizmetlerin sağlanmasında kâr amaçlı çalışmayan sektör kuruluşlarını kullanmak kâr amaçlı çalışan sektör kuruluşlarını kullanmaya göre daha güvenilir bulunmaktadır. Özellikle sağlık, yaşlı bakımı gibi güvene dayalı hizmet alanlarında kâr amacının birincil planda olmaması önem taşımaktadır (Bryson et al., 2006).

Kâr amacı gütmeyen kuruluşlar literatürde farklı yönleriyle incelenmiştir. Örneğin, Gibelman & Gelman (2001); sektördeki yolsuzluklarla ilgili olarak çalışmışlardır. Steinberg (1991); kâr amacı gütmeyen sektörün özel sektöre karşı oluşturduğu haksız rekabeti ele almıştır. Lipsky & Smith (1989); devlet kontrolü nedeniyle kâr amacı gütmeyen sektörün bozulan yapısına dikkat çekmişlerdir. Salamon vd. (2000); sektörün topluma getirdiği yeniliğe dikkat çekmiştir. Lipsky & Smith (1989), Boris & Mosher-Williams (1998) ve Habib & Taylor (1999); sektörün demokrasiye katkısını incelemişlerdir. Roberts vd. (2021); kâr amacı gütmeyen kuruluşların felaket durumlarında toplumun direncini artırmadaki rolünü incelemişlerdir. Basu vd. (2022); sektörün kârlılığını incelemiş ve kârlılığın büyük ölçüde kamu desteği ile ilgili olduğunu ortaya koymuşlardır. Altamura vd. (2022); ABD'de dini kimliğe sahip kâr amacı gütmeyen sektörlerin diğerlerine göre daha çok bağış topladıklarını tespit etmişlerdir. Clohesy (2000); kâr amacı gütmeyen sektör kuruluşlarının ortaya çıkmasında alturistik davranışların önemine dikkat çekmiştir. Glaeser & Shleifer (1998); sektörün ortaya çıkmasında bireylerin kalite arayışlarına vurgu yapmıştır.

Weisbrod (1977) ve onu izleyen bir çok araştırmacı kâr amacı gütmeyen sektör ile toplumun heterojenitesi arasındaki bağı sorgulamıştır. Toplumun heterojenitesini etkileyen birçok faktör mevcuttur. Örneğin kişi başına gelir; toplumdaki heterojenliğin göstergelerinden birisidir aynı zamanda alturistik davranışları etkileyen önemli bir faktördür. Genel yaklaşım olarak toplumda kişi başına gelir arttıkça alturistik davranışların da artacağı varsayımından hareketle, kâr amacı gütmeyen sektörün büyüyeceği düşünülmektedir (Corbin, 1999; Pevcin, 2012; Spicka, 2017; Kim, 2015). Başka bir faktör, ülkelerdeki yaş bağımlılık oranıdır. Yaşlı ve çocuk bakımı hizmetleri güvene dayalı hizmet talebini oluşturmaktadır. Devletin bu alanlarda yeterli hizmet üretememesi, özel sektörün de kâr motifi ile hareket etmesi, sektörü söz konusu hizmetler açısından öne çıkarmaktadır. Bu nedenle, yaş bağımlılık oranı arttıkça ülkelerdeki kâr amacı gütmeyen sektörün büyüklüğünün artacağı beklenebilir (Spicka et al., 2017; Puyvelde & Brown, 2016). Diğer bir faktör, ülkelerin kentsel nüfus artışıdır. Sivil toplumun ortaya çıkışının, ekonomik gelişmişliğin bir göstergesi olan kentleşme ile ilgili olduğu kabul edilmektedir. Kentleşme hızına ilişkin ekonomik göstergeler çeşitli çalışmalarda kâr amacı gütmeyen sektörün ortaya çıkması ve gelişmesi için bir gösterge olarak kullanılmıştır. Ülkelerin kentsel nüfusu arttıkça devletin kamu hizmetlerine yetişemeyeceği ve bu durumun kâr amacı gütmeyen sektörü büyüteceği düşünülmektedir (Matsunaga & Yamauchi, 200; Liu, 2017; Lu & Dong, 2018). Diğer bir faktör, ülkelerdeki istihdam oranlarıdır. İstihdamın nüfusa oranı toplumdaki heterojenliğin göstergelerinden biridir ve bu oranın kâr amacı gütmeyen sektörün büyüklüğünü etkileyebileceği düşünülmektedir (Abzug & Turheim, 1998; Kim, 2015; Liu, 2017; Van Puyveldeand & Brown, 2016). Başka bir faktör, devletin genel tüketim harcamalarının GDP'ye oranıdır. Kâr amacı gütmeyen sektör kuruluşlarının devletin hizmetlerindeki yetersizlik nedeniyle ortaya çıktığı varsayıldığında, devletin genel tüketim harcamalarında ortaya çıkacak bir artışın, kâr amacı gütmeyen sektörün büyüklüğünü küçültebileceği beklenebilmektedir (Beaton & Hwang, 2017; Paarlberg & Yoshioka 2016; Lecy & Van Slyke, 2013). Bir diğer faktör, ülkelerdeki eğitim oranlarıdır. Eğitim oranı, toplumdaki heterojenliğin, dolayısıyla kâr amacı gütmeyen sektörün büyüklüğünü etkileyebilecek göstergelerinden birisidir (Liu, 2017; Polson, 2017; Van Pulvelde & Brown, 2016). Başka bir faktör ülkelerdeki gini katsayısıdır. Toplumdaki heterojenliğin önemli göstergelerinden birisi olarak gelir eşitsizliği ile ilgili Gini katsayısı kâr amacı gütmeyen sektörün büyüklüğünü etkileyen bir gösterge olarak birçok çalışmada kullanılmıştır. Gini katsayısı arttıkça kâr amacı gütmeyen sektörün büyüklüğünün artması genel beklentiyi oluşturmaktadır (Kim, 2015; Liu, 2016; Bielefeld et al., 1997). Diğer bir faktör ülkede yaşayan yabancı nüfus sayıdır. Toplumdaki heterojenliğin önemli göstergelerinden birisi toplumdaki yabancı nüfus oranıdır. Bu oran ihtiyaç duyulan kâr amacı gütmeyen sektör sayısını artırabilir (Matsunaga & Yamauchi, 2004; Okten & Osili, 2004; Onder, 2011; Liu, 2017; Polson, 2017; Van Puyvelde & Brown, 2016). Başka bir faktör dini inanışlar ile ilgilidir. Toplumdaki heterojenliğin önemli göstergelerinden birisi toplumdaki bireylerin dini inanışlarındaki farklılıklardır (Liu, 2017; Polson, 2017).

Tablo: 1'de kâr amacı gütmeyen sektörün büyüklüğünü etkileyen faktörleri ampirik olarak analiz eden bazı yazarların yaptığı çalışmaların başlıcaları kronolojik olarak ve kullandıkları değişkenler ile birlikte gösterilmiştir.

Tablo: 1
Kâr Amacı Gütmeyen Sektörün Büyüklüğü ile İlgili Yapılan Bazı Çalışmalar ve Kullanılan Değişkenler

Yayın Yılı	Yazarlar	Kapsanan Yıllar	Ülke	Göstergeler*	Bağımsız Değişkenler
1991	Ben-Ner & Van Hoomissen	1982-1987	ABD (New York)	İstihdam büyüklüğü	Yaş, Eğitim, Etnik, Yerleşim
1997	Bielefeld vd.	1994	ABD (Dallas, TX)	Finansal büyüklük	Yaş, Etnik, Gelir
1998	Abzug & Turheim	1987-1989	ABD	Organizasyonel yoğunluk	İstihdam, Etnik
1999	Corbin	1992	ABD	Organizasyonel yoğunluk	Etnik, Din
2004	Okten & Osili	1997-1998	Endonezya	Organizasyonların mevcudiyeti	Etnik, Gelir
2004	Matsunaga & Yamauchi	1992-1999	ABD	Organizasyonel yoğunluk	Yaş, İstihdam, Etnik, Hanehalkı, Yerleşim
2015	Kanaya vd.	2000-2007	Japonya	Pazar payı	Yaş, Eğitim
2015	Kim	2008	ABD	Organizasyonel yoğunluk	Yaş, İstihdam, Etnik, Gelir
2015	Kim & Kim	1990-2012	Güney Kore	Finansal büyüklük	Cinsiyet, Hanehalkı, Yerleşim, Gelir, Köken
2017	Liu G.	2002	ABD	Organizasyonel yoğunluk, Finansal büyüklük	Eğitim, İstihdam, Etnik, Hanehalkı, Yerleşim, Gelir, Din
2016	Van Puyvelde & Brown	2012	ABD (Teksas)	Organizasyonel yoğunluk	Yaş, Eğitim, İstihdam, Etnik, Gelir
2017	Spicka	2000-2014	Visegard Ülkeleri	Finansal büyüklük	GDP, Eğitim, Yaş, Sağlık, Hayat Beklentisi, Etnik, İstihdam
2017	Polson	2010	ABD	Organizasyonel yoğunluk	Eğitim, Etnik, Gelir, Din
2018	Lu & Dong	2017	Çin	Organizasyonel yoğunluk	Yaş, Cinsiyet, Yerleşim Yeri, İstihdam, Yoksulluk

* Kârsız sektörün büyüklüğü için kullanılan göstergeler.

Tablo: 1'de görüldüğü gibi birçok yazar kâr amacı gütmeyen sektörün büyüklüğünü etkileyen faktörleri çeşitli göstergeler üzerinden ampirik olarak test etmişlerdir. Çok sayıda ülke için karşılaştırmalı ve uzun yıllar için bir çalışma yapılmak istenildiğinde ülkelerin ortak verilerini bulmak bu alanda yapılacak çalışmalar için bir kısıt oluşturmaktadır. Bu nedenle birçok çalışmada faktörlerin hepsi bir arada alınamamaktadır. Kâr amacı gütmeyen sektörün büyüklüğünü gösteren gösterge de çalışmalarda farklı şekillerde seçilmektedir. Kâr amacı gütmeyen sektörün büyüklüğünü etkileyen faktörler ile ilgili en dikkat çekici çalışmalardan biri bu çalışmanın da dayandığı Weisbrod'un talep Heterojenitesi teorisi ile ilgili çalışmasıdır. Çalışmaya geçmeden önce üçüncü bölümde Weisbod'un Talep Heterojenitesi Teorisi daha detaylı olarak incelenecektir.

3. Weisbrod'un Talep Heterojenitesi Teorisi

Weisbrod kamu, kâr amacı gütmeyen ve özel sektörün bulunduğu üç sektörlü bir ekonomide, tüketicilerin kamusal mal taleplerinin karşılanmasında genel bir denge sürecini tanımlamaya çalışmıştır. Model çeşitli varsayımlar içermektedir: "modelde ele alınan toplumda bireyler faydalarını maksimize etmek temelinde rasyoneldirler"; "veri bir teknoloji ve üretim olanakları ile bazı kamusal ve bazı kişisel mallar üretilmektedir"; "her bireyin faydası kamusal ve kişisel malların bir fonksiyonudur, fayda fonksiyonları her birey için aynı değildir"; "devlet belli bir harcama programını finanse etmek için herhangi bir vergi

sistemini kullanabilir". Buradaki tek kısıt şudur; "sistem her tüketicinin ödediği vergiyi malın kendisine sağladığı marjinal faydaya eşitlemesine izin vermemelidir, başka bir deyişle yarar ilkesine dayalı bir vergi sistemi olmamalıdır". Weisbrod'un teorisine göre; devlet politik oylama süreci sonucunda belirlenen miktarda ve kalitede mal arz edecektir. Böyle bir süreç çoğunluk oylamasını[1] içermektedir. Çoğunluk oylamasına göre çıktıyı ortanca seçmenin[2] talebi belirlemektedir. Bu politik süreç önemli sayıda seçmeni devletin üretimi ve vergi seviyesi konularında mutsuz bırakır."

Şekil 1 kamusal mallar için hayali bireysel talep eğrilerini göstermektedir. Şekilde öncelikle belli bir malın kamusal üretimi için, seçmenlerin talebinin yedi kişi arasında farklılaştığı bir durum irdelenmektedir. Ayrıca, devlet tarafından sağlanan her birim çıktı için; her vergi yükümlüsünün P kadar ödeme yaptığı ve maliyetlerin herkes tarafından eşit olarak üstlenildiği kabul edilmektedir.

Şekil: 1
Kamusal Mal İçin Hipotetik Bireysel Talep Eğrileri
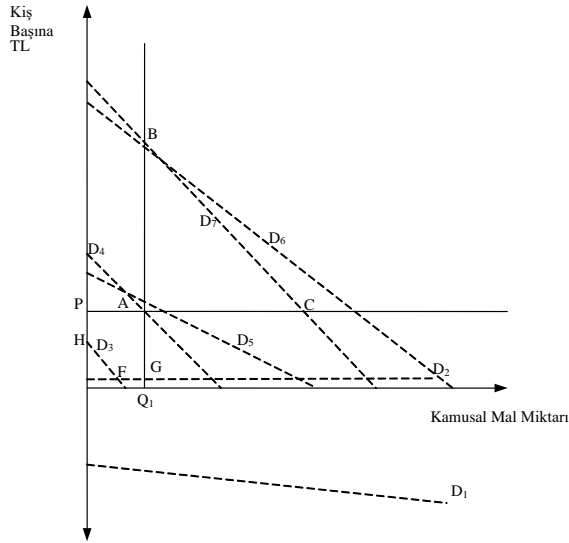
Kaynak: Weisbrod (1977: 51-76).

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[1] *Çoğunluk oylamasında herhangi bir önerinin kabulü için, oy verenlerin yarısından bir fazlasının onaylaması gerekir. Çoğunluk oyu (N/2)+1 olarak formüle edilebilir (Rosen, 1985).*

[2] *Ortanca seçmen (medyan seçmen) kendisi dışında daha yüksek harcama düzeylerini tercih eden birey sayısı, daha düşük harcama düzeylerini tercih eden birey sayısına tam eşit olan kişidir (Stiglitz, 1994). Ortanca seçmen teoremine göre bir toplulukta seçmenlerin tercihleri tek zirveli olduğu sürece (eğer A büyük B ve B büyük C ise A büyük C) çoğunluk oylamasının sonucu ortanca seçmenin tercihlerini yansıtır (Cullis & Jones, 1992).*

Şekil 1'de görülebileceği gibi, her çıktı birimi başına bütün tüketiciler aynı vergiyi ödemekte iken tüketicilerin çoğunluğu (4. 5. 6 ve 7. tüketiciler) devletin en az Q_1 seviyesinde çıktı sağlamasını tercih ederler. Bu çıktı düzeyinde 1. 2. ve 3. tüketiciler toplam vergi ve çıktı miktarını düşürmeyi tercih ederlerken, 5. 6. ve 7. tüketiciler toplam vergi ve çıktı miktarını artırmak isteyeceklerdir. Ancak çıktının artırılmasını ya da azaltılmasını isteyen her iki grup da azınlıktadır. Çoğunluk oylaması kuralına göre sonuçta ortanca seçmenin (4. kişi) isteği olacaktır. Bununla birlikte genelde ister çoğunluk oylaması olsun ister herhangi başka bir kural uygulansın, fayda vergilemesi, yani kamusal mal tüketiminden elde edilen marjinal fayda kadar vergi alınmadığı sürece; bazı tüketiciler mutlaka mutsuz olacaktır. Çünkü bazıları istediğinden fazla vergi ödeyecek, bazıları ise bedelini ödemeye razı olsa bile istediğinden daha az mal elde edecektir. Devletin sağladığı çıktıdan hoşnut olmayan bu iki grubun nispi oranı siyasi karar alma sürecine ve vergileme sistemine bağlıdır. Örneğin basit çoğunluk oylaması kuralı sadece ortanca tüketicinin istediği miktarın sağlanmasına olanak tanıyacaktır. Böylece nüfus daha çok kamu malı isteyenler ve daha az kamu malı isteyenler arasında ikiye bölünecektir. Şekilden de anlaşıldığı gibi, devlet farklı kamusal mal taleplerinin hepsini birden karşılayamamaktadır. Bu noktada talebin karşılanamayan kısmı için kâr amacı gütmeyen sektör ve/veya özel sektör devreye girmektedir. Diğer bir deyişle, toplumlarda artan heterojenlik vatandaşların ihtiyaç ve tercihlerinin giderek farklılaşmasına neden olmaktadır. Genel kabul görmüş kamu mal ve hizmetlerine olan talep düşmekte, daha bireysel ve çoğulcu bir karaktere sahip yarı kamusal mallara olan talebi artırmaktadır.

Weisbrod'un heterojenite teorisi birçok araştırmacı tarafından tartışılmıştır. Corbin (1999), Lu (2016) ve Matsunaga vd. (2010); Weisbrod'un hipotezini desteklemişlerdir. Abzug & Turnheim (1998) ve Salamon & Anheier (1998); nüfus heterojenitesinin sivil toplum kuruluşları üzerinde etkisi olmadığını söylemişlerdir. Kanaya vd. (2015), Kim & Kim (2016) ve Van Puyvelde & Brown (2016); nüfus heterojenitesi ve kâr amacı gütmeyen sektör kuruluşları arasında negatif bir ilişki bulmuşlardır.

Bu çalışma da Weisbrod'un teorisinden hareketle nüfus heterojenliği ve kâr amacı gütmeyen sektör büyüklüğü arasındaki ilişkiyi çok uluslu bir bakış açısıyla ampirik olarak incelemek amacıyla yapılmıştır.

4. Yöntem

Hipotezlerde kullanılan değişkenlerin kâr amacı gütmeyen sektörün büyüklüğü üzerindeki etkisi havuzlanmış en küçük kareler (pooled OLS), sabit etkiler (fixed effects), rastgele etkiler (random effects), genelleştirilmiş momentler (generalized method of moments), tamamen değiştirilmiş en küçük kareler (fully modified ordinary least squares-FMOLS) ve dinamik en küçük kareler (dynamic ordinary least squares-DOLS) yöntemleri kullanılarak test edilmiştir.

4.1. Kullanılan Veriler

Bu çalışmada kâr amacı gütmeyen sektörün büyüklüğünü ölçmek için OECD (2021) veri tabanından elde edilen özel gönüllü kuruluşlar ve sivil toplum kuruluşları tarafından sağlanan hibelere (grants by private voluntary agencies and NGOs) ilişkin bir gösterge kullanılmıştır. Bağımsız değişken olarak Dünya Bankası veri tabanından (2021), kişi başı GSYİH (sabit kur), yaş bağımlılık oranı (çalışma çağındaki nüfusun yüzdesi), ve kentsel nüfus artışı (yıllık yüzde) verileri kullanılmıştır. 1995-2019 yıllarına ait veriler analize dahil edilmiştir.

Özel gönüllü kuruluşlar ve sivil toplum kuruluşları tarafından sağlanan hibeler (ÖSH), 2018 taban yılı alınarak milyon USD cinsinden alınmıştır. Dünya Bankası veri tabanında GSYİH ve kişi başına GSYİH verileri güncel yerel kur cinsinden verilmiştir. ÖSH ile uyumlu olması amacıyla, veriler 2018 yılı ortalama dolar kuruna bölünmüş ve 2018 taban yılı olarak dönüştürülmüştür. ÖSH değerleri GSYİH'ya bölünerek özel gönüllü kuruluşlar ve sivil toplum kuruluşları tarafından sağlanan hibelerin GSYİH'ye katkısına ilişkin veriler (ÖSH-GSYİH ‰) hesaplanmıştır.

Tüm OECD ülkelerinin ÖSH verisi olmadığı için, yalnızca 20 OECD ülkesi çalışmaya dahil edilmiştir. Çalışmada Almanya, Amerika Birleşik Devletleri, Avusturalya, Avusturya, Belçika, Birleşik Krallık, Danimarka, Finlandiya, Hollanda, İrlanda, İsveç, İsviçre, İtalya, Japonya, Kanada, Güney Kore Lüksemburg, Portekiz, Türkiye ve Yeni Zelanda'ya ait veriler kullanılmıştır.

Tanımlayıcı istatistikler (ortalama, standart sapma, ortanca, en küçük ve en büyük değerler) Tablo: 2'de özetlenmiştir.

Tablo: 2
Değişkenlere İlişkin Tanımlayıcı İstatistikler

Değişkenler	Ort±SS	En Küçük	Ortanca	En Büyük
ÖSH (milyon USD)	1364,53±5031,89	1,28	183,82	36939,19
GSYİH (milyar USD)	1819,92±3228,66	1,61	577,28	21433,23
ÖSH-GSYİH (‰)	0,403±0,378	0,004	0,292	1,985
Kişi başı GSYİH (bin USD)	49,29±28,07	0,03	45,98	185,57
Yaş bağımlılık oranı (%)	50,83±4,86	36,21	50,79	68,28
Kentsel nüfus artışı (%)	1,03±0,70	-1,60	0,96	3,22

Ort±SS: Ortalama ± Standart Sapma.

OECD ülkelerine ait ÖSH-GSYİH (‰) değerleri Şekil 2'de özetlenmiştir. En yüksek ÖSH-GSYİH (‰) 1,15 ± 0,57 ortalama ile ABD'de gözlenmiştir. Bunu Avusturalya (0,97 ± 0,35) ve İrlanda (0,79 ± 0,35) izlemektedir. En düşük değer ise İtalya (0,03 ± 0,01)'da gözlenmiştir. İtalya'yı sırasıyla Portekiz (0,03 ± 0,02) ve Finlandiya (0,08 ± 0,07) izlemektedir.

Şekil: 2
OECD Ülkelerine Göre ÖSH-GSYİH (‰) Değerleri
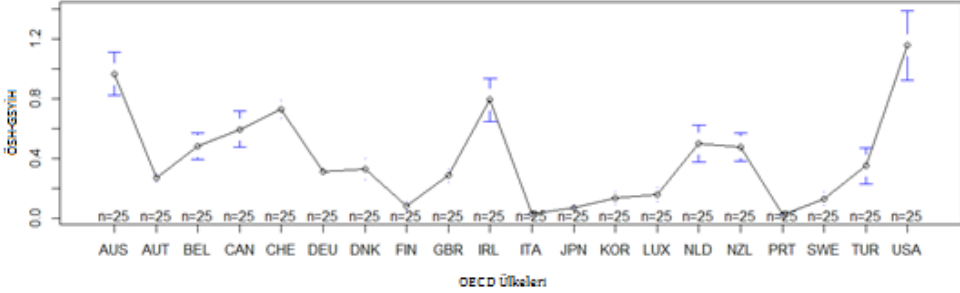
4.2. İstatistiksel Analizler

İstatistiksel analizlerde (i) panel birim kök testleri, (ii) panel eşbütünleşme testleri, (iii) panel nedensellik testleri ve (iv) panel regresyon modelleri kullanılmıştır.

Panel veri analizi varsayımları olan otokorelasyon, değişen varyans ve yatay kesit bağımlılığı test edilmiştir. Otokorelasyon ve değişen varyans olup olmadığını değerlendirmek için sırasıyla Durbin-Watson ve Breusch-Pagan testleri yapılmıştır. Ayrıca, yatay kesit bağımlılığını değerlendirmek için Breusch-Pagan Lagrange çarpanı (LM) testi yapılmıştır. Test sonuçları önemli derecede değişen varyans, otokorelasyon ve yatay kesit bağımlılığı olduğunu güstermiştir (p < 0,001).

Panel birim kök testleri: Maddala & Wu (1999) ve Pesaran (2007); CIPS testleri kullanılarak değişkenlerin durağan olup olmadığı araştırılmıştır. Testler sonucunda, tüm değişkenlerin en az bir testte durağan olduğu sonucuna varılmıştır (p < 0,05; Tablo: 3). Bu nedenle eşbütünleşme testlerinin uygulanması gerekliliği ortaya çıkmıştır.

Tablo: 3
Birim Kök Testi Sonuçları [istatistik (*p*)]

Değişkenler	Maddala-Wu		CIPS	
	Trendsiz	Trendli	Trendsiz	Trendli
ÖSH-GSYİH	135,062(<0,001)*	175,078(<0,001)*	-6,559(<0,001)*	-6,179(<0,001)*
lnGSYİH	137,807(<0,001)*	38,513(0,537)	-0,179(0,429)	0,230(0,591)
lnYaş	86,960(<0,001)*	51,590(0,104)	2,344(0,990)	7,151(0,999)
Kentsel	42,201(0,376)	68,050(0,004)*	0,902(0,817)	-1,201(0,885)

Kısaltmalar: ÖSH-GSYİH: özel gönüllü kuruluşlar ve sivil toplum kuruluşları tarafından sağlanan hibelerin GSYİH'ye katkısı; GSYİH: Kişi başına GSYİH; Yaş: Yaş bağımlılık oranı; Kentsel: Kentsel nüfus artışı.
* p < 0,010; ** p < 0,050; *** p < 0,100.

Panel eşbütünleşme testleri: Kao (1999), Pedroni (1999, 2004) ve Westerlund (2005, 2008); tarafından önerilen eşbütünleşme testleri kullanılarak düzeyde durağan olmayan değişkenlerin uzun dönemde eşbütünleşik olup olmadıkları araştırılmıştır. Test sonuçları incelendiğinde, Ga istatistiği hariç, kullanılan tüm testlerde panellerin eşbütünleşik

olduğu söylenebilir (p < 0,05; Tablo: 4). ÖSH-GSYİH ile diğer değişkenler arasında uzun dönemli bir ilişki olduğu söylenebilir.

Tablo: 4
Panel Eşbütünleşme Testi Sonuçları

Testler	İstatistik	*p*
Kao esbütünleşme testi		
Modified Dickey-Fuller t	-3,781	<0,001*
Dickey-Fuller t	-4,267	<0,001*
Augmented Dickey-Fuller t	-1,791	0,036**
Unadjusted modified Dickey	-10,668	<0,001*
Unadjusted Dickey-Fuller t	-6,858	<0,001*
Pedroni esbütünleşme testi		
Modified Phillips-Perron t	-1,682	0,046**
Phillips-Perron t	-9,850	<0,001*
Augmented Phillips-Perron t	-10,102	<0,001*
Westerlund esbütünleşme testi		
Variance Ratio	-3,317	0,001*
Westerlund ECM		
Gt	-8,025	<0,001*
Ga	1,232	0,891

* p < 0,010; ** p < 0,050; *** p < 0,100.

Panel nedensellik testi: Dumitrescu & Hurlin (2012); nedensellik testi kullanılarak değişkenler arası nedensel ilişkiler incelenmiştir. Test sonucunda, ÖSH-GSYİH ile yaş bağımlılık oranı arasında ve ÖSH-GSYİH ile kentsel nüfus artışı arasında çift yönlü nedensellik ilişkisi bulunmuştur (p < 0,050; Tablo: 5). ÖSH-GSYİH ile kişi başına GSYİH arasında ise tek yönlü nedensellik ilişkisi bulunmuştur (p < 0,001; Tablo: 5).

Tablo: 5
Panel Nedensellik Testi Sonuçları

Değikenler	Ztilde	*p*
Ho: Değişken, ÖSH-GSYİH üzerinde Granger etkisi yaratmaz.		
lnGSYİH	10,411	<0,001*
lnYaş	5,635	<0,001*
Kentsel	2,105	0,035**
Ho: ÖSH-GSYİH, değişken üzerinde Granger etkisi yaratmaz.		
lnGSYİH	1,008	0,313
lnYaş	26,210	<0,001*
Kentsel	2,195	0,028**

Kısaltmalar: ÖSH-GSYİH: özel gönüllü kuruluşlar ve sivil toplum kuruluşları tarafından sağlanan hibelerin GSYİH'ye katkısı; GSYİH: Kişi başına GSYİH; Yaş: Yaş bağımlılık oranı; Kentsel: Kentsel nüfus artışı.
* p < 0,010; ** p < 0,050; *** p < 0,100.

Panel regresyon sonuçları: Havuzlanmış en küçük kareler (pooled OLS), sabit etkiler (fixed effects), rastgele etkiler (random effects) modelleri ile Arellano & Bond (1991) tarafından önerilen genelleştirilmiş momentler yöntemi (generalized method of moments-GMM) modelleri kullanışmıştır. Yatay kesit bağımlılığı, otokorelasyon ve değişen varyans problemleri tespit edildiği için, Driscoll & Kraay (1998) tarafından tanımlanan sağlam standart hatalar tekniği kullanılmıştır. Bu yöntemlere ek olarak, Phillips & Hansen (1990) tarafından önerilen tamamen değiştirilmiş en küçük kareler yöntemi (fully modified ordinary least squares-FMOLS) ve Phillips & Loretan (1991) tarafından önerilen dinamik en küçük kareler yöntemi (dynamic ordinary least squares-DOLS) yöntemleri kullanılmıştır. Sonuçlar Tablo 6'da özetlenmiştir.

Tablo: 6
Panel Regresyon Sonuçları

Model		Sabit	lnGSYİH	lnYaş	Kentsel
Havuzlanmış OLS	Tahmin	-0,490	0,085	0,114	0,119
	Std.Hata	1,304	0,040	0,355	0,076
	p	0,707	0,035**	0,746	0,119
Sabit etkiler	Tahmin		0,127	0,126	-0,039
	Std.Hata		0,045	0,228	0,047
	p		0,005*	0,578	0,411
Rastgele etkiler	Tahmin	-0,505	0,122	0,124	-0,303
	Std.Hata	0,975	0,042	0,225	0,045
	p	0,604	0,004*	0,583	0,502
GMM	Tahmin		0,116	0,394	-0,005
	Std.Hata		0,063	0,270	0,020
	p		0,066***	0,145	0,791
FMOLS	Tahmin		0,145	-0,032	0,138
	Std.Hata		0,0022	0,050	0,064
	p		<0,023**	0,512	0,031**
DOLS	Tahmin		0,107	-0,035	0,123
	Std.Hata		0,050	0,055	0,069
	p		0,034**	0,528	0,077***

Kısaltmalar: GSYİH: Kişi başına GSYİH; Yaş: Yaş bağımlılık oranı; Kentsel: Kentsel nüfus artışı.
* p < 0,010; ** p < 0,050; *** p < 0,100.

Tablo: 6'da yer alan sonuçlar incelendiğinde, yaş bağımlılık oranının hiçbir modelde istatistiksel olarak anlamlı olmadığı söylenebilir (p > 0,050; Tablo: 5). Ancak kentsel nüfus artışı, FMOLS ve DOLS modellerinde %10 anlamlılık düzeyinde önemli bulunmuştur. Kentsel nüfus artışındaki %1'lik bir artış ÖSH-GSYİH'yi yaklaşık olarak ‰1,3 artırmaktadır.

Kişi başına düşen GSYİH, en az %10 anlamlılık düzeyinde önemli bulunmuştur. Kişi başına düşen GSYİH'de 10.000$'lık bir artış, ÖSH-GSYİH'yi havuzlanmış OLS'de ‰0,008 artırmaktadır. Sabit etkiler, rastgele etkiler ve GMM modellerinde ise yaklaşık ‰0,012 artırmaktadır. Uzun dönemli ilişkiyi dikkate alan modeller için kişi başına düşen GSYİH'daki 10.000$'lık artış ÖSH-GSYİH'yi yaklaşık ‰0,01 artırmıştır.

Sonuç olarak, tüm paneller eşbütünleşik olduğu için FMOLS ve DOLS sonuçları yorumlama için daha uygundur.

5. Sonuç

Toplumsal ihtiyaçların giderilmesinde devlete yardımcı bir rol oynayan kâr amacı gütmeyen sektörün büyüklüğünü etkileyen faktörler, birçok araştırmacının dikkatini çekmektedir. Bu konuda pek çok teori mevcut olmakla birlikte Weisbrod'un teorisi en dikkat çekici teorilerden birisi olmuştur. Bununla birlikte Weisbrod'un teorisini test eden ampirik çalışmalar birbirlerinden farklı sonuçlar da vermiştir. Bu çalışma da Weisbrod'un hipotezini test etmek üzere kurgulanmıştır. Çalışmanın amacı uluslararası düzeyde kâr amacı gütmeyen sektörün büyüklüğünü etkileyen bazı faktörleri analiz etmektir. Bu kapsamda teorik literatüre dayanılarak kâr amacı gütmeyen sektörün büyüklüğünü etkileyebilecek üç temel faktör olarak, kişi başına GSYİH, çalışan nüfusa bağımlılık oranı ve kentsel nüfus artışı oranı seçilerek, 20 OECD ülkesinde, 1995 ve 2019 yılları arasında regresyon analizleri yapılmış, panel verileri tahmin edilmiştir. OECD ülkelerindeki kâr amacı gütmeyen sektör

kuruluşlarına ilişkin verilerin azlığı bu çalışma için bir kısıt oluşturmuştur. Verilerdeki eksik bilgiler nedeniyle 29 ülkeden sadece 20 tanesi çalışmada kullanılabilmiştir. Ayrıca talep heterojenitesini etkileyen tüm faktörler çalışmaya dahil edilememiştir. Çalışmada ülkelere ait uzun vadeli verilere ihtiyaç duyulduğu için sadece üç değişken (Kişi Başına GSYİH, yaş bağımlılık oranı, ülkelerin kentsel nüfus artışı oranları) kullanılabilmiştir. Bu sınırlamanın sadece bu çalışma için geçerli olmadığı, literatürde yapılan aynı konudaki birçok çalışma içinde geçerli olduğu görülmektedir.

Çalışmanın ilk hipotezi ülkelerde kişi başına GSYİH'nın artması ile kâr amacı gütmeyen sektörün büyüklüğü arasında pozitif bir ilişki olduğudur. Çalışmanın bulguları söz konusu hipotezi doğrulamıştır. Başka bir deyişle ülkelerde kişi başına gelir arttıkça kâr amacı gütmeyen sektör büyümektedir. Çalışmanın ikinci hipotezi ülkelerdeki yaş bağımlılık oranının artmasıyla kâr amacı gütmeyen sektörün büyüklüğü arasında pozitif bir ilişki olduğudur. Çalışmanın bulguları bu hipotezi doğrulamamıştır. Diğer bir deyişle yaş bağımlılık oranındaki artışlar kâr amacı gütmeyen sektör büyüklüğünde bir etki göstermemektedir. Çalışmanın üçüncü hipotezi ülkelerdeki kentsel nüfus artışının kâr amacı gütmeyen sektörün büyüklüğü ile pozitif bir ilişkisi olduğuna ilişkindir. Çalışmanın bulguları ülkelerdeki kentsel nüfus artışı oranı ile kâr amacı gütmeyen sektör büyüklüğü arasında pozitif bir ilişki göstermektedir. Başka bir deyişle ülkelerde kent nüfusu arttıkça kâr amacı gütmeyen sektör büyümektedir.

Çalışma kapsamında incelenen tüm literatürden de anlaşılabileceği üzere toplumların kâr amacı gütmeyen sektöre ihtiyaç duydukları ortadadır. Bu çalışmanın sonuçlarından kentleşme arttıkça devletlerin bireylerin ihtiyaçlarına yeteri kadar karşılık vermediği, bu alandaki boşluğu kâr amacı gütmeyen sektörün doldurduğu, bireylerin gelirleri arttıkça da sektörü geliştirmeye yönelik çabalar gösterdikleri anlaşılmaktadır. Devletlerin bu kuruluşlara olan ihtiyacın nedenlerini iyi analiz etmeleri, kamu hizmetlerini hangi yönde geliştirmelerini anlamaları noktasında faydalı olacaktır. Çalışmanın bulguların ışığında ileride yapılacak araştırmalarda toplumdaki heterojeniteyi değiştiren diğer faktörlerin kârsız sektörün büyüklüğünü ne şekilde etkilediği incelenmelidir.

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Döviz Kuru Oynaklığı ve Hane Halkı Tüketim Harcamaları: Türkiye'den Kanıtlar

Sinem KOÇAK *(https://orcid.org/0000-0002-2313-0161), Türkiye; sinemakcay@hotmail.com.tr*

Çiğdem KARIŞ *(https://orcid.org/0000-0002-7534-0494), Trabzon University, Türkiye; cigdemkaris@trabzon.edu.tr*

Exchange Rate Volatility and Domestic Consumption: A Time Series Evidence of Turkey

Abstract

This study examines the short-run and long-run effects of exchange rate volatility on real consumption expenditures in the Turkish economy for 2003:Q1-2021:Q2 by using the Autoregressive Distributed Lag (ARDL) bounds testing approach. The analysis uses conditional variance values estimated from the Autoregressive Conditional Heteroskedastic (ARCH) model for the exchange rate volatility series. The ARDL bounds test results revealed that real exchange rate volatility has no effect on real consumption expenditures in the short run but affects real consumption expenditures negatively in the long run. This finding suggests that the exchange rate volatility may be an important component of consumption expenditures, which is another critical component of GDP.

Keywords : Exchange Rate Volatility, Domestic Consumption, ARDL Bounds Test, Turkey.

JEL Classification Codes : C32, E21, F31.

Öz

Bu çalışmanın amacı 2003:Q1-2021:Q2 dönemi için Türkiye ekonomisinde döviz kuru oynaklığının reel tüketim harcamaları üzerine olan kısa ve uzun dönem etkilerini Gecikmesi Dağıtılmış Otoregresif (ARDL) sınır testi yaklaşımı kullanarak araştırmaktır. Çalışmada döviz kuru oynaklığı serisi için Otoregresif Koşullu Değişen Varyans (ARCH) modelinden elde edilen koşullu varyans değerleri kullanılmıştır. ARDL sınır testinden elde edilen sonuçlar, kısa dönemde reel kur oynaklığının reel tüketim harcamaları üzerinde bir etkisinin olmadığını, uzun dönemde reel kur oynaklığının reel tüketim harcamalarını negatif etkilediğini ortaya koymuştur. Bu bulgu, döviz kuru oynaklığının gayri safi yurt içi hasılanın bir diğer önemli kalemi olan tüketim harcamaları için de önemli bir bileşen olabileceğini göstermiştir.

Anahtar Sözcükler : Döviz Kuru Oynaklığı, Tüketim Harcamaları, ARDL Sınır Testi, Türkiye.

1. Giriş

Gayri Safi Yurtiçi Hasıla (GSYİH)'nın temel belirleyicilerinden biri olan tüketim harcamaları ekonominin itici gücü olarak ekonomik büyümede önemli bir rol oynamaktadır (Kim, 2017; Radulescu et al., 2019). Tüketim harcamalarının toplam harcamalar içindeki payı hem gelişmiş hem de gelişmekte olan her ülkede yüksektir ve tüketim harcamalarının toplam harcamalardan aldığı pay istikrarlı olmakla birlikte gün geçtikçe de artış eğilimi sergilemektedir. Bu oran, özellikle gelişmekte olan ülkelerde %75 düzeyine ulaşmaktadır (Mishra, 2011). Toplam talebin ana belirleyicilerinden bir olarak tüketim harcamalarındaki artış, gelir düzeyi üzerinde çarpan etkisi meydana getirmek suretiyle ülkelerin ekonomik refah düzeyini etkilemektedir. Ekonomik refah düzeyi üzerindeki bu etkisi nedeniyle tüketim harcamaları ekonominin genel durumu hakkında öncü bir gösterge olma özelliği taşımaktadır.

Tüketim harcamalarında meydana gelen değişiklikler makroekonomik açıdan ekonomiler için büyük önem arz etmektedir. Bunun nedenlerinden ilki toplam tüketimin, üretim sürecinde ihtiyaç duyulan sermaye mallarının finansına kaynaklık eden toplam tasarruf düzeyini belirleyen en önemli faktörlerden biri olmasıdır. Bu bağlamda, tüketim ve tasarruf düzeyi uzun dönemde ülkenin üretim seviyesi üzerinde önemli bir etkiye sahiptir. Bir diğer neden ise, tüketim harcamalarının toplam üretimdeki yüksek payından dolayı, toplam tüketim harcamalarındaki değişiklikleri takip etmenin makroekonomik döngüsel dalgalanmaların analiz edilmesine yardımcı olmasıdır (Ezeji & Ajadua, 2015: 164). Tüketimin belirleyicileri olarak temelde gelir, enflasyon ve faiz oranı dikkate alınırken, Bahmani-Oskooee & Xi (2012), tüketim fonksiyonuna reel gelir, faiz oranı yanında döviz kuru ve döviz kuru oynaklığını dahil ederek, bu değişkenlerin tümünün tüketim üzerindeki rolünü incelemiştir. Bu bağlamda, tüketimin ekonomi üzerinde meydana getirdiği etkiler nedeniyle, tüketimin belirleyicilerini anlamak ve bu makroekonomik değişkenlerde meydana gelen değişimleri incelemek önemlidir.

Dalgalı kur rejimi altında döviz kurları yabancı piyasalardaki arz ve taleple etkileşim altındadır. Bununla birlikte döviz kurları mevcut gelişmelerden ve geleceğe yönelik beklentilerden önemli ölçüde etkilenerek, ekonomik ve politik gelişmelere tepki verebilmektedir. Bu özellikler diğer finansal varlıkların fiyatlarında olduğu gibi döviz kurunda da büyük ölçüde yüksek oynaklığa neden olabilmektedir. Döviz kurundaki oynaklık, ekonomideki göreli fiyatlardaki öngörülemeyen hareketlerle ilişkilidir. Döviz kuru oynaklığı, genel olarak üretim maliyetlerini artıcı, ticaret hacmini azaltıcı, işsizlik oranını, yoksulluk oranını ve tüketimi azaltıcı etkilerinin yanında, yatırım kararlarında belirsizliğe neden olan olumsuz ekonomik etkiler meydana getirebilir. Özellikle üretimin önemli ölçüde hammadde ithalatına bağlı olduğu ülkelerde bu olumsuz etkilerin ekonomik maliyeti daha yüksek riskler içerebilmektedir. Birçok ülkenin maruz kaldığı döviz kuru oynaklığı, ekonomik ve finansal riski artırdığından, bu oynaklığa yönelik olarak ülkeler hassasiyet ve yaygın bir ilgi göstermektedir (Oseni, 2016: 103).

Ekonomilerin dışa açık hale gelmesi, piyasaların küreselleşmesi ile aralarındaki etkileşimin artması, dış ticaretin serbestleşmesi ve tüm ülkelerin uluslararası ticaretten daha fazla gelir elde etme isteklerinin bir sonucu olarak döviz kuru, bir ülkenin dış ticareti yanında, tüketim harcamaları gibi diğer makroekonomik değişkenleri etkileyen önemli bir faktör olmuştur (Bahmani-Oskooee et al., 2015). Dolayısıyla tüketim harcamalarını etkileyen gelir, faiz ve enflasyon oranı gibi değişkenlere zamanla döviz kuru değişkeni de eklenmiştir. Bu bağlamda, döviz kurundaki belirsizliğin ve istikrarsızlığın bir göstergesi olan döviz kuru oynaklığı tüketimi etkileyen olası faktörlerden biri olarak literatürdeki çalışmalara konu olmuştur. Döviz kurunun tüketimi etkileme kanalı ise Alexander (1952)'ye göre, döviz kurunun enflasyon üzerindeki geçişkenliği yoluyla tüketim seviyesini belirleyebilme kabiliyetidir. Bu bağlamda döviz kurundaki değişimin yanı sıra enflasyon belirsizliğine kaynaklık eden döviz kuru oynaklığı da hane halkının tüketim kararlarını etkileyerek tüketim harcamaları üzerinde belirleyici bir etkiye sahip olabilir. Döviz kurunun ve döviz kurundaki oynaklığın toplam tüketimi doğrudan etkileyebileceğini belirten Bahmani-Oskooee & Xi (2012: 328)'e göre, döviz kuru oynaklığı enflasyon dalgalanmasına katkıda bulunarak, tüketim üzerinde doğrudan bir etki meydana getirir. Enflasyondaki dalgalanma ise, daha fazla tasarruf ederek ve daha az tüketerek geleceğe karşı önlem almaya çalışan tüketicilerin satın alma gücünde belirsizlik yaratmaktadır. Öte yandan, tüketiciler gelecekte fiyatların yükselmeye devam edeceği yönünde bir beklentiye sahipse cari dönemde daha fazla tüketebilir ve daha az tasarruf edebilirler. Dolayısıyla, döviz kuru oynaklığı enflasyon dalgalanmasına katkıda bulunduğundan, tüketimin üzerinde benzer etkiler yaratması beklenmektedir.

Tüketim harcamaları toplam talebin önemli ve en istikrarlı bileşenlerinden biridir. Hane halkı tüketim davranışlarının altında yatan faktörlerin belirlenmesi para politikası kararlarının aktif olarak uygulanabilmesi açısından elzem bir öneme sahiptir. Öte yandan son yıllarda döviz kurunda meydana gelen yüksek oynaklık, özellikle gelişmekte olan Türkiye ekonomisinin hem ekonomik büyüme hem de enflasyon oranı tartışmalarının merkezinde yer almıştır. Tüm bunlarla birlikte enflasyon belirsizliğine kaynaklık etme potansiyeli çok yüksek olan kur oynaklığı, hane halkının tüketim kararlarının alınmasında da önemli bir role sahiptir. Dolayısıyla döviz kuru oynaklığının hane halkı tüketim kararlarını nasıl etkilediğinin belirlenmesi ekonomi politikası kararlarının belirlenmesi ve uygulanması açısından önemli olmaktadır. Mevcut çalışmanın gerçekleştirilmesi ile tüketim harcaması literatürüne önemli bir katkı yapılması amaçlanmıştır. Şöyle ki, Türkiye özelinde yapılan çalışmalar incelendiğinde sadece Demirgil & Çelikkaya (2019)'un çalışmalarına rastlanmaktadır. Yazarlar çalışmalarında Hacker & Hatemi-J (2006) simetrik ve Hatemi-J (2012) asimetrik nedensellik testlerinden faydalanarak reel tüketim harcamaları ve döviz kuru belirsizliği arasındaki nedensellik ilişkilerini ortaya koymayı amaçlamıştır. Dolayısıyla mevcut çalışma reel kur oynaklığının reel tüketim harcaması üzerindeki kısa ve uzun dönem dinamiklerini ilk kez belirlemesi açısından literatüre önemli ölçüde ışık tutmaktadır.

Bu bağlamda, çalışmada Türkiye ekonomisi için 2003:Q1-2021:Q2 dönemi itibariyle döviz kuru oynaklığının reel tüketim harcamaları üzerine olan kısa ve uzun dönem etkileri Gecikmesi Dağıtılmış Otoregresif (ARDL) sınır testi yaklaşımı kullanılarak araştırılmıştır.

Serilerin birim kök özelliklerinin belirlenmesi için bir ön test gerektirmeyen ARDL sınır testi yaklaşımı, küçük örneklemlerde etkin tahminciler vermesinin yanı sıra modeldeki uzun ve kısa dönem katsayılarının eşanlı olarak tahminine imkân tanır.

Çalışmanın giriş kısmında tüketim ve döviz kuru oynaklığı arasındaki ilişki teorik çerçevede ele alınmış, ikinci bölümde konuya ilişkin yapılmış çalışmaları içeren ampirik literatüre yer verilmiştir. Üçüncü bölümde veri seti ve ekonometrik yönteme değinilerek dördüncü bölümde elde edilen ampirik bulgular raporlanmıştır. Sonuç bölümünde ise elde edilen bulgular doğrultusunda değerlendirmelerde bulunulmuştur.

2. Literatür

Literatürde tüketimin belirleyicilerine yönelik olarak çoğu çalışmada gelir, faiz oranı ve enflasyon oranı değişkenlerine odaklanılmıştır (Kugler, 1985; Campbell & Mankiw, 1991; Jin, 1995; Hall et al., 1997; Saad, 2011, Apere, 2014; Yamak vd., 2019; Sarı & Yıldırım, 2021). Ekonomilerin dışa açık hale gelmesiyle beraber önem kazanan döviz kuru oynaklığının tüketim üzerindeki etkisini inceleyen çalışma sayısı oldukça azdır. Döviz kurunun, tüketim üzerindeki etkisini ilk ortaya koyanlardan biri olan Alexander (1952), devalüasyonun yani para birimindeki değer kaybının enflasyonist etkilerinden hareketle, döviz kurunu iç tüketimin belirleyicilerinden biri olarak göstermiştir. Reel döviz kuru oynaklığı, enflasyon belirsizliğine neden olarak hane halkının tüketim kararlarını şekillendirmektedir ve kur oynaklığının hane halkının karar alma sürecindeki bu etkin rolü döviz kuru oynaklığına tüketimin önemli bir belirleyicisi olma özelliği kazandırmaktadır.

Döviz kuru oynaklığının mal ve hizmet fiyatlarında meydana getirdiği dalgalanma tüketim harcamalarını hem olumlu hem de olumsuz yönde etkileyebilmektedir. Örneğin Obstfeld & Rogoff (1998), döviz kuru oynaklığının firmalar ve hane halkının tüketim ve boş zaman kararlarını olumsuz etkileyebileceğinden hareketle, döviz kuru dalgalanmalarının, ekonominin en önemli ve en aktif iki oyuncusu olan hane halkı ve firmalarca istenmeyen bir durum olduğuna dikkat çekmiştir. Döviz kuru oynaklığı dış ticaret hacmini azaltabilir ve beraberinde üretim ve/veya gelirde düşeşe neden olarak tüketimde düşüşle sonuçlanabilir. Bununla birlikte, firmalar döviz kurunun oynaklığından kaynaklanan risklere karşı korunmak için daha yüksek risk primi ve daha yüksek fiyatlama gerçekleştirebilirler. Mal ve hizmetlerin bu şekilde fiyatlarının yükselmesi ise toplam tüketimi azaltıcı yönde etki yaratabilir.

Döviz kuru oynaklığı, tüketim üzerindeki potansiyel ve bu denli önemli etkisine rağmen literatürde bu konuda yapılan çalışmalar sınırlı sayıdadır. Ancak, son zamanlarda döviz kuru oynaklığı ve tüketim arasındaki ilişkiyi çeşitli ampirik yöntemler kullanarak farklı ülke veya ülke grupları için inceleyen çalışmaların sayısı gittikçe artmaktadır.

Bu çalışmalardan biri olan Bahmani-Oskooee & Hajilee (2010), para birimindeki değer kaybının vasıflı ve vasıfsız işgücü ücretleri üzerindeki etkisini 18 ülke için ücret denklemlerini tahmin ederek araştırmışlardır. Çalışmadan elde edilen bulgular, para

birimindeki değer kaybının 6 ülkede vasıfsız işçi ücretlerini düşürdüğünü, 7 ülkede ise vasıflı işgücü ücretlerini artırdığını göstermiştir. Yazarlar, elde edilen bu bulgunun Alexander (1952)'nin devalüasyonun veya para birimindeki değer kaybının toplam tüketimi düşüreceği beklentisini destekler nitelikte olduğunu belirtmişlerdir. Yazarlar yaptıkları bir diğer çalışma olan Bahmani-Oskooee & Xi (2011)'de ise 17 ülke için aynı yöntemle bu sefer yıllık veriler üzerinden analiz gerçekleştirmişlerdir. Analizden elde edilen bulgular 12 ülkede kısa dönemde döviz kuru oynaklığının tüketimi etkilediğini, buna karşın 9 ülkede ise bu etkinin uzun dönemde devam ettiğini raporlamışlardır.

2012 yılında yaptıkları bir diğer çalışmada Bahmani-Oskooee & Hajilee (2012a), tüketim fonksiyonuna döviz kurunu dahil etmişlerdir. Böylece para birimindeki değer kaybının tüketim üzerindeki etkisini sınır testi yaklaşımını kullanarak 1975-2006 döneminde 50 ülke için incelemişlerdir. Çalışma sonucunda kısa dönemde 37 ülkede para birimindeki değer kaybının tüketimi etkilediği sonucuna ulaşılmıştır. Bununla birlikte uzun dönemde ise 24 ülkede para birimindeki değer kayıplarının tüketimi etkilediği görülmüştür. Elde edilen bu bulgular, Bahmani-Oskooee & Hajilee (2010)'da olduğu gibi Alexander (1952)'nin görüşünü desteklemektedir.

Yine aynı yılda gerçekleştirilmiş başka bir çalışmada Bahmani-Oskooee & Xi (2012b), döviz kuru oynaklığının enflasyonda dalgalanmaya neden olacağını, bu dalgalanmanın da tüketim üzerinde doğrudan bir etki yaratacağını savunmuşlardır. Bu nedenle döviz kurunun yanında döviz kurundaki oynaklığında bir ülkenin toplam tüketimini doğrudan etkileyebileceği belirtilmiştir. Çalışmada gelir, döviz kuru, faiz oranı ve döviz kuru oynaklığının tüketim üzerindeki etkisi, Japonya, ABD ve Kanada ekonomileri için 1970:Q1-2018:Q4 dönemi itibarıyla sınır testi yaklaşımı kullanılarak araştırılmıştır. Kısa dönemde Japonya'da toplam tüketim üzerinde dört değişkenin de beklendiği gibi önemli etkileri olduğu, döviz kuru dışındaki tüm değişkenlerin kısa dönem etkilerinin uzun dönemde de söz konusu olduğu tespit edilmiştir. Çalışmada ABD ve Kanada için de benzer sonuçlar elde edilmekle birlikte ampirik bulgular, Kanada'da döviz kuru oynaklığının tüketimi negatif etkilediğini, buna karşın ABD ve Japonya'da ise pozitif yönde etkilediğini göstermiştir.

Oseni (2016), Afrika'daki çoğu ülkede yerel endüstrilerin hammadde gereksiniminin ithalat yoluyla temin edildiğini ve mal ithalatının da doğal olarak döviz kurundaki değişimlerden etkileneceğini belirtmiştir. Bu ekonomik çerçeve altında, döviz kurundaki dalgalanmaların iç piyasada üretilen malların fiyatını etkileyeceğini ve bu malların üretiminin döviz kurundaki oynaklığın neden olduğu maliyetlerden doğrudan etkilenebileceği için bireylerin tüketim düzeyini belirleyeceğini vurgulamıştır. Bu gerekçe altında döviz kuru oynaklığı ve tüketim arasındaki ilişkinin incelenmesi zorunluluğu ve önemi dikkate alınarak bu çalışmada 1999-2014 dönemi için 19 Sahra Altı Afrika ülkesinde döviz kuru oynaklığı ve tüketim değişkenleri arasındaki ilişki GMM yöntemi kullanılarak analiz edilmiştir. Çalışmadan elde edilen bulgular, Sahra Altı Afrika ülkelerinde döviz kuru oynaklığının özel tüketimi negatif etkilediğini göstermiştir.

Iyke & Ho (2018), 1980-2015 dönemi için bir Sahra Altı Afrika ülkesi olan ve sürekli bir şekilde döviz kurundaki dalgalanmaya maruz kalan Gana için döviz kuru oynaklığının tüketim üzerindeki etkisini ARDL yaklaşımını kullanarak incelemişlerdir. Elde edilen bulgular, kısa dönemde döviz kuru oynaklığının tüketimi negatif etkilediğini, bu olumsuz etkinin uzun dönemde de sürdüğünü ortaya koymuştur.

Kumar vd. (2019), 1980-2014 dönemine ait yıllık verilerle Pakistan için döviz kuru oynaklığının iç tüketim üzerindeki etkisini ARDL sınır testi yaklaşımını kullanarak incelemişlerdir. Çalışmanın bulguları döviz kuru ve döviz kuru oynaklığının iç tüketimle uzun dönemde ilişkili olduğunu göstermiştir. Bununla birlikte, kısa ve uzun dönemde döviz kuru oynaklığının iç tüketim üzerindeki etkisi negatif olmakla birlikte, döviz kurunun iç tüketim üzerindeki etkisi ise pozitif olarak tespit edilmiştir.

Demirgil & Çelikkaya (2019), özellikle son yıllarda döviz kurunda yüksek oynaklığa maruz kalan Türkiye ekonomisi için, hane halkı tüketim harcamaları ve döviz kuru oynaklığı arasındaki nedensellik ilişkisini Hacker-Hatemi-J simetrik ve Hatemi-J asimetrik nedensellik testlerini kullanarak incelemişlerdir. 1991:Q1-2016:Q2 dönemi için elde edilen ampirik bulgular, tüketim harcamaları ve dolar kurundaki oynaklık arasında bir ilişki bulunmadığını, buna karşın tüketim harcamaları ile euro kurundaki oynaklığın ilişkili olduğunu göstermiştir. Bununla birlikte, asimetrik nedensellik test sonuçlarına göre, dolar kurunda yaşanan oynaklığın harcamalar üzerindeki nedensellik etkisinin euro kuruna göre asimetrik olarak daha belirgin olduğu ve negatif şokların harcamalar üzerindeki nedensellik etkisinin daha fazla olduğu gösterilmiştir.

Literatürde döviz kuru oynaklığı ve tüketim arasındaki ilişkiye yönelik amprik çalışmaların ele aldıkları ülke veya ülke gruplarının Oseni (2016), Iyke & Ho (2018) ve Kumar vd. (2019)'un çalışmaları dışında genel olarak gelişmiş ülkeler üzerine olduğu söylenebilir. Bu çerçevede incelen literatür kapsamında, Türkiye özelinde döviz kuru oynaklığı ve tüketim arasındaki nedensellik ilişkisini inceleyen çalışma olarak sadece Demirgil & Çelikkaya (2019)'un çalışmasına ulaşılmıştır. Dolayısıyla ilgili literatürdeki boşluğa katkı sağlamak amacıyla bu çalışmada Türkiye ekonomisi özelinde 2003:Q1-2021:Q2 dönemine ait üçer aylık veriler itibariyle döviz kuru oynaklığının reel tüketim harcamaları üzerindeki kısa ve uzun dönem etkileri ARDL sınır testi yaklaşımı yardımıyla araştırılmıştır.

3. Veri Seti ve Ekonometrik Yöntem

Hane halkı tüketim davranışlarının altında yatan faktörlerin belirlenmesi, para politikası kararlarının aktif olarak uygulanabilmesi açısından elzem bir öneme sahiptir. Ampirik literatürde tüketimin belirleyicileri üzerine odaklanmış birçok çalışma mevcuttur. Bu çalışmalar teorik perspektifte ele alındığında reel gelir ve faiz oranı tüketim kararlarının tartışmasız iki ana belirleyicisi olarak tüketim fonksiyonunda karşımıza çıkmaktadır. Bununla birlikte döviz kurunun, tüketim üzerindeki etkisini ilk defa ele alanlardan biri Alexander (1952)'dir. Döviz kurunun, enflasyon üzerindeki geçiş etkisi (pass-through

effect) yoluyla tüketim seviyesini belirleyebileceğini savunan Alexander (1952)'nin hemen ardından hem reel döviz kurunun hem de enflasyon belirsizliği yaratabilme potansiyeli nedeniyle döviz kuru oynaklığının tüketim fonksiyonunda bir belirleyici olarak yer alıp alamayacağı konusu yukarıda da bahsi geçtiği üzere analizlerde sıkça sorgulanmıştır. Ancak literatürde bu ilişkinin varlığını Türkiye örneği için araştıran çalışma sayısı yok denecek kadar azdır. Bu bağlamda mevcut çalışmanın amacı 2003:Q1-2021:Q2 dönemi itibariyle Türkiye ekonomisi için döviz kuru oynaklığının reel tüketim harcamaları üzerine olan kısa ve uzun dönem etkilerini Gecikmesi Dağıtılmış Otoregresif (ARDL) sınır testi yaklaşımından yararlanarak bahsi geçen fonksiyonel ilişki çerçevesinde belirlemektir. Döviz kuru oynaklığı değişkeninin dahil edilmesiyle oluşan uzun dönem tüketim modeli aşağıdaki gibi ifade edilirse (1) numaralı denkleme ulaşılır (Alexander, 1952; Bahmani-Oskooee & Xi, 2012b; Bahmani-Oskooee et al., 2015).

$$LC_t = \alpha_0 + \beta_1 LGSYH_t + \beta_2 LFA\dot{I}Z_t + \beta_3 LKUR_t + \beta_4 OYN_t + \mu_t \qquad (1)$$

Burada C, yerleşik hane halklarının reel tüketim harcamalarını; GSYH, reel gayri safi yurtiçi hasılayı; FAİZ, 3 aylık vadeli mevduat faiz oranı; RER, reel efektif döviz kuru ve son olarak OYN, reel efektif döviz kurunun (2) numaralı ARCH(1) modelinden elde edilen koşullu varyans değerleri ile ölçülen kur oynaklığı serisini temsil etmektedir. Census X-12 yöntemiyle mevsimsellikten arındırılmış serilerin sonrasında logaritmik dönüşümü (L) gerçekleştirilmiştir. Serilerin durağanlık özelliklerinin belirlenmesinde Genişletilmiş Dickey-Fuller (ADF) ve Philips-Perron (PP) birim kök testleri kullanılmıştır.

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 \qquad (2)$$

(2) numaralı denklemde, h_t, reel efektif döviz kuru serisinin koşullu varyansını göstermektedir.

(1) numaralı denklemin tahmininden elde edilen gelir katsayısının pozitif, faiz oranı katsayısının ise negatif olması beklenmektedir. Döviz kurunun, gelir ve faiz oranına ek olarak tüketimin bir başka belirleyicisi olabileceği vurgusunu ilk defa 1952 yılında yapan Alexander, ücretlerin enflasyona göre ayarlanması eğer gecikmeyle gerçekleşirse döviz kurundaki değer kaybının işçilerden üreticilere doğru kayacağını savunmaktadır. Çünkü işçiler üreticilere kıyasla daha yüksek bir marjinal tüketim eğilimine sahiptir ve yukarıdaki durumun gerçekleşmesi durumunda işçiler tüketimlerini, daha düşük marjinal tüketim eğilimine sahip olan üreticilerin artan tüketimlerinden daha fazla azaltacaklardır. Bu da toplam tüketimde bir azalışa sebep olacaktır. Bu varsayım altında reel döviz kuruna ait tahmin edilen katsayının pozitif olması beklenmektedir (Bahmani-Oskooee & Hajilee, 2010). Döviz kuru oynaklığının ise, döviz kuru oynaklığının neden olduğu enflasyon belirsizliğine, tüketicilerin vereceği tepkiye bağlı olarak tüketimi artırıp azaltabilme potansiyeline sahip olduğu vurgusu yapılmaktadır. Enflasyon belirsizliğindeki tepkiye göre döviz kuru oynaklığı katsayısının pozitif ve negatif değerlerden birine sahip olması teorik beklentiler içerisindedir (Obstfeld & Rogoff, 1998; Bahmani-Oskooee et al., 2015).

(1) numaralı denklem ile ifade edilen uzun dönem tüketim modeli, sadece döviz kuru oynaklığının reel tüketim harcamaları üzerindeki uzun dönemli etkisinin incelenmesine olanak tanımakla birlikte, döviz kuru oynaklığının reel tüketim harcamaları üzerindeki kısa dönemli etkisinin analizine imkân tanımamaktadır. Kısa dönemli etkilerin incelenebilmesi içinse literatürde sıklıkla hata düzeltme modelinden faydalanılmaktadır. Bu bağlamda çalışmada hem kısa hem de uzun dönemli ilişkilerin koşullu hata düzeltme modeli altında araştırılmasına imkân tanıyan ARDL sınır testi yaklaşımından faydalanılmıştır. Diğer eş-bütünleşme testlerinin aksine Pesaran & Shin (1999) ile Pesaran vd. (2001) tarafından geliştirilen ARDL sınır testi yaklaşımı, serilerin birim kök özelliklerinin belirlenmesi için bir ön test gerektirmemektedir. Ancak tüm değişkenlerin I(0) ile I(1) ya da her ikisinin bir kombinasyonu olduğu birim kök testleriyle garanti altına alınmalıdır. İki aşamadan oluşan sınır testinin ilk aşamasında değişkenler arasındaki uzun dönemli ilişkinin varlığı F-sınır test istatistiği ile sınanmaktadır. Sınır testi için kısıtsız hata düzeltme modeli altında test edilecek olan tüketim modeli (3) numaralı regresyon denkleminde ifade edildiği gibidir;

$$\Delta LC_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \Delta LC_{t-i} + \sum_{i=0}^{q} \varphi_i \Delta LGSYH_{t-i} + \sum_{i=0}^{m} \gamma_i \Delta LFA\dot{I}Z_{t-i} +$$
$$\sum_{i=0}^{n} \theta_i \Delta LRER_{t-i} + \sum_{i=0}^{s} \vartheta_i \Delta OYN_{t-i} + \delta_1 LC_{t-1} + \delta_2 LGSYH_{t-1} + \delta_3 LFA\dot{I}Z_{t-1} +$$
$$\delta_4 LRER_{t-1} + \delta_5 OYN + \varepsilon_{1t} \tag{3}$$

(3) numaralı denklemde kısa dönemli ilişkiler için $\beta_i, \varphi_i, \gamma_i, \theta_i, \vartheta_i$ katsayıları; uzun dönemli ilişkiler içinse $\delta_1, \delta_2, \delta_3, \delta_4, \delta_5$ katsayıları dikkate alınır. Çalışmada optimal gecikme uzunluklarını ifade eden p, q, m, n ve son olarak s, Akaike bilgi kriteri (AIC)'e göre belirlenmiştir. (3) numaralı model için, seriler arasında uzun dönemli ilişkinin olmadığını ifade eden sıfır hipotezi F-istatistiği ile test edilmektedir. Hesaplanan F-istatistiği Pesaran, Shin ve Smith (2001) tarafından belirlenmiş alt kritik sınırın altında kalırsa seriler arasında uzun dönem ilişkisinin olmadığı, hesaplanan F-istatistiğinin üst sınır değerini aşması durumunda ise seriler arasında uzun dönemli bir ilişkinin olduğu sonucuna ulaşılır (Yamak & Erdem, 2017). İkinci aşamada ise uzun dönemli bir ilişkiye sahip oldukları belirlenen seriler arasında uzun ve kısa dönem katsayılar elde edilir. ARDL(p,q) modeli (4) numaralı denklemde ifade edildiği gibidir;

$$LC_t = \alpha_0 + \sum_{i=1}^{p} \beta_i LC_{t-i} + \sum_{i=0}^{q} \varphi_i LGSYH_{t-i} + \sum_{i=0}^{m} \gamma_i LFA\dot{I}Z_{t-i} + \sum_{i=0}^{n} \theta_i LRER_{t-i} +$$
$$\sum_{i=0}^{s} \vartheta_i OYN_{t-i} + \mu_t \tag{4}$$

Kısa dönem katsayılarının elde edilmesi amacıyla oluşturulan hata düzeltme modeli (ECM), (5) numaralı denklem aracılığıyla tahmin edilir;

$$\Delta LC_t = \alpha_0 + \tau EC_{t-1} + \sum_{i=1}^{p} \beta_i \Delta LC_{t-i} + \sum_{i=0}^{q} \varphi_i \Delta LGSYH_{t-i} + \sum_{i=0}^{m} \gamma_i \Delta LFA\dot{I}Z_{t-i} +$$
$$\sum_{i=0}^{n} \theta_i \Delta LRER_{t-i} + \sum_{i=0}^{s} \vartheta_i \Delta OYN_{t-i} + \mu_t \tag{5}$$

(5) numaralı denklemde yer alan $\beta_i, \varphi_i, \gamma_i, \theta_i, \vartheta_i$ katsayıları; p, q, m, n ve s optimal gecikme uzunluklarını, Ec_{t-1} değişkeni ise katsayısının, negatif ve istatistiksel olarak anlamlı olması beklenen hata düzeltme terimini temsil eder.

4. Ampirik Bulgular

Döviz kuru oynaklığı serisinin elde edilmesi için öncelikle farklı gecikme uzunluklarına sahip birçok ARMA modeli tahmin edilmiş ve bu modeller içerisinde en iyi modelin AR(1) olduğu sonucuna ulaşılmıştır. Tahmin edilen AR(1) modeline ait sonuçlar Tablo 1'de raporlanmıştır. Tablodan da görüleceği üzere AR(1) modeli için istatistiksel olarak %1 düzeyinde anlamlı elde edilen parametre tahmini │AR│< 1 koşulunu sağlamaktadır.

Tablo: 1
AR Modeli Tahmin Sonuçları

Değişken	Katsayı
C	4,481***
AR(1)	0,958***
R2 : 0,87 AIC: -2,471 SIC: -2,378	

*Not: ***, %1 düzeyinde anlamlılık düzeyini göstermektedir. AIC: Akaike Bilgi Kriterini; SC: Schwarz Bilgi Kriterini ifade etmektedir.*

ARCH koşullu varyans modellerinin tahmininin hemen öncesinde AR(1) modelinde 1. dereceden ARCH etkisinin mevcut olup olmadığı ARCH LM testi ile incelenmiştir. 8.22 olarak hesaplanan ve %1 düzeyinde istatistiksel olarak anlamlı olan ARCH LM test istatistik değeri serinin hata terimlerinin 1. dereceden ARCH etkisine sahip olduğunu doğrulamaktadır. ARCH etkisinin belirlenmesinin hemen akabinde döviz kuru serisindeki oynaklığı açıklamak için ARCH(1) modeli ile literatürde sıklıkla tercih edilen GARCH(1,1) modeli tahminleri gerçekleştirilmiştir. GARCH(1,1) modeli için elde edilen parametre tahminleri istatistiksel olarak anlamlı olmadığından döviz kuru oynaklığı için hem parametre tahminleri istatistiksel olarak anlamlı olan hem de parametre koşullarını yerine getiren ARCH(1) modelinden elde edilen koşullu varyans değerleri kullanılmıştır. ARCH(1) modeline ait sonuçlar Tablo 2'de sunulmuştur. 0.096 olarak elde edilen ARCH LM test istatistik değeri serinin hata terimlerinde mevcut olan ARCH etkisinin ortadan kalktığını göstermektedir.

Tablo: 2
ARCH(1) Modeli Tahmin Sonuçları

Katsayı	ARCH(1)
Ortalama Denklemi	
C	3,669
θ_1	0,992***
Varyans Denklemi	
α_0	0,003***
α_1	0,316*
Düzeltilmiş R^2	0,87
AIC	-2,565
SIC	-2,440
Q_1	0,119
Q_2	1,04
ARCH-LM (1)	0,096

*Not: *** ve * sırasıyla %1 ve %10 düzeyinde anlamlılık düzeyini göstermektedir.*

Değişkenlerin durağanlık özelliklerinin belirlenmesine olanak tanıyan ADF ve PP birim kök testleri sonuçları Tablo 3'te özetlenmiştir. Her iki birim kök testine ait test

istatistikleri, reel tüketim harcaması, gelir, faiz oranı ve reel döviz kuru serilerinin birinci farkında (I(1)), döviz kuru oynaklığı serisinin ise seviyesinde (I(0)) durağan olduğu sonucunu ortaya koymuştur.

Tablo: 3
ADF ve PP Birim Kök Test Sonuçları

	ADF		PP	
	Sabitli	Sabitli-Trendli	Sabitli	Sabitli-Trendli
LC	-0,994	-3,536**	-0,982	-3,563**
ΔLC	-11,470***	-11,424***	-11,488***	-11,442***
LGSYH	-1,141	-3,307*	-1,152	-3,180*
ΔLGSYH	-11,080***	-11,064***	-11,099***	-11,143***
LFAİZ	-3,288***	-2,918	-3,002**	-2,349
ΔLFAİZ	-5,719***	-6,062***	-4,814***	-5,057***
LRER	-0,353	-2,555	-0,143	-2,379
ΔLRER	-9,906***	-10,206***	-10,074***	-13,229***
OYN	-5,575***	-5,716***	-5,554***	-5,495***

*Not: ***, ** ve * sırasıyla %1, %5 ve %10 düzeyinde anlamlılık düzeyini göstermektedir. ADF birim kök testi için optimal gecikme uzunlukları Schwarz Bilgi Kriterine göre belirlenmiştir.*

Döviz kuru oynaklığının reel tüketim harcamaları üzerindeki etkisinin kısa ve uzun dönem itibariyle incelenmesi için ampirik analizde yararlanılan ARDL sınır testi yaklaşımı sonuçları Tablo 4'te özetlenmiştir. (2) numaralı ARDL modeli için elde edilen kısa ve uzun dönem katsayı tahminleri tablonun A panelinden, değişkenler arasındaki uzun dönemli ilişkinin varlığının sınandığı sınır testi ile tanısal test sonuçları ise Tablo 4'ün B panelinden izlenebilmektedir. ARDL yaklaşımının ilk aşamasında değişkenler arasındaki uzun dönemli ilişkinin varlığı sınır testi ile sınanmıştır. Tablonun B panelinden de görüldüğü üzere ARDL sınır testi için 6.936 olarak hesaplanan F istatistiği %1 seviyesinde istatistiksel olarak anlamlıdır. Elde edilen istatistik değeri reel tüketim harcamaları ile gelir, faiz oranı, reel döviz kuru ve döviz kuru oynaklığı arasında uzun dönemli bir ilişkinin varlığını ortaya koymuştur.

Reel tüketim harcamaları ile gelir, faiz oranı, reel döviz kuru ve döviz kuru oynaklık serileri arasındaki kısa ve uzun dönemli dinamikler incelendiğinde özellikle döviz kuru oynaklığının kısa dönemde reel tüketim harcaması üzerinde herhangi bir etkiye sahip olmadığı sonucu dikkati çekmektedir. Çalışmada döviz kuru oynaklığı ile birlikte yine faiz oranı ve reel döviz kuru serilerinin kısa dönemde reel tüketim harcaması üzerinde herhangi bir etkisinin mevcudiyetine rastlanamamıştır. Elde edilen bulgular kısa dönemde reel tüketim harcamalarının sadece gelir değişkeni tarafından belirlendiğini göstermektedir. Gelir değişkeninin reel tüketim harcamaları üzerindeki cari dönem etkisi diğer dönemlere kıyasla oldukça yüksektir. Gelir değişkeninin 0.891 olarak tahmin edilen cari dönem katsayısı %1 seviyesinde istatistiksel olarak anlamlıdır. Teorik beklentilerle paralel olan bu sonuç, gelirde meydana gelen %10'luk bir artışın (azalışın) reel tüketim harcamalarını yaklaşık olarak %9 oranında artırdığını (azalttığını) ortaya koymaktadır. Gelir değişkeninin bir dönemlik gecikme katsayısı pozitif olarak tahmin edilmiş ancak istatistiksel olarak anlamlı bulunmamıştır. Değişkenin istatistiksel olarak anlamlı olan iki ve daha sonraki dönemlik gecikme katsayıları ise cari dönem katsayısına göre oldukça düşüktür. Kısa dönemde meydana gelebilecek sapmaların uzun dönemde giderebileceğini gösteren hata

düzeltme terimi katsayısı beklentilere paralel olarak negatif ve istatistiksel olarak %1 seviyesinde anlamlı tahmin edilmiştir. -0.529 olarak hesaplanan hata düzeltme terimi kısa dönemde meydana gelen dengeden sapmaların yaklaşık olarak altıncı ay itibariyle düzelerek uzun dönem dengesine geleceğini göstermiştir. Tüketim modeline ait tanısal istatistikler modelde hem otokorelasyon hem de değişen varyans problemi olmadığını ortaya koymaktadır.

Uzun dönem katsayı tahminleri incelendiğinde ise döviz kuru oynaklığının reel tüketim harcaması üzerinde negatif bir etkiye sahip olduğu bulgusuna ulaşılmıştır. Döviz kuru oynaklığına ait katsayının -1.969 olarak tahmin edildiği ve bu katsayının %1 seviyesinde istatistiksel olarak anlamlı olduğu Tablo 4'den açıkça görülmektedir. Elde edilen bu sonuç, döviz kuru oynaklığının uzun dönemde reel tüketim harcamaları üzerinde bir etkisi olduğunu göstermesinin yanı sıra reel döviz kurundaki oynaklığın reel tüketim harcamalarını azaltacağı görüşünün bir kanıtıdır. Gelir değişkeninin 0.548 olarak tahmin edilen uzun dönem katsayısı istatistiksel olarak %1 seviyesinde anlamlıdır. Faiz oranı değişkenine ait uzun dönem katsayısı pozitif olarak tahmin edilmiştir. Ancak bu katsayı istatistiksel olarak anlamlı değildir. Reel döviz kuru uzun dönemde reel tüketim harcamalarını pozitif etkilemektedir. İstatistiksel olarak %5 seviyesinde anlamlı olarak tahmin edilen 0.063 uzun dönem katsayı değeri Alexander (1952)'inin savını destekler niteliktedir.

Tablo: 4
ARDL(1,5,0,0,0) Tahmin Sonuçları

Panel A				
	Kısa Dönem Katsayı Tahminleri			Uzun Dönem Katsayı Tahminleri
ΔLC_t	-0,529***		$LGSYH_t$	0,548***
$\Delta LGSYH_t$	0,891***		$LFAİZ_t$	0,003
$\Delta LGSYH_{t-1}$	0,087		$LRER_t$	0,063**
$\Delta LGSYH_{t-2}$	0,141***		OYN_t	-1,969***
$\Delta LGSYH_{t-3}$	0,248***			
$\Delta LGSYH_{t-4}$	0,170**			
$\Delta LFAİZ_t$	0,001			
$\Delta LRER_t$	0,033			
$\Delta LOYN_t$	-1.043			
ECT_{t-1}	-0,529***			
Panel B				
	Sınır Testi Sonucu		Tanısal Test Sonuçları	
	F-istatistiği		BPG LM R² CUSUM CUSUMQ	
	6,936***		2,165 0,364 0,99 İstikrarlı	

*Not: ***, ** sırasıyla %1, %5 düzeyinde anlamlılık düzeyini göstermektedir. BPG, Breusch-Pagan-Godfrey testini; LM, Breusch-Godfrey LM testini; ifade etmektedir.*

Modeldeki parametrelerin istikrarlılığının incelenmesine olanak tanıyan CUSUM ve CUSUMSQ grafiklerine Grafik 1'de yer verilmiştir. Grafiklerden görüleceği üzere %5 anlamlılık düzeyinde kritik sınırlar içerisinde yer alan CUSUM ve CUSUM-Q istatistikleri parametrelerin istikrarlı olduğunu ve tüketim modelinin uzun dönemde istikrarlı olduğunu göstermiştir.

Grafik: 1
CUSUM ve CUSUM-Q Testi Sonuçları
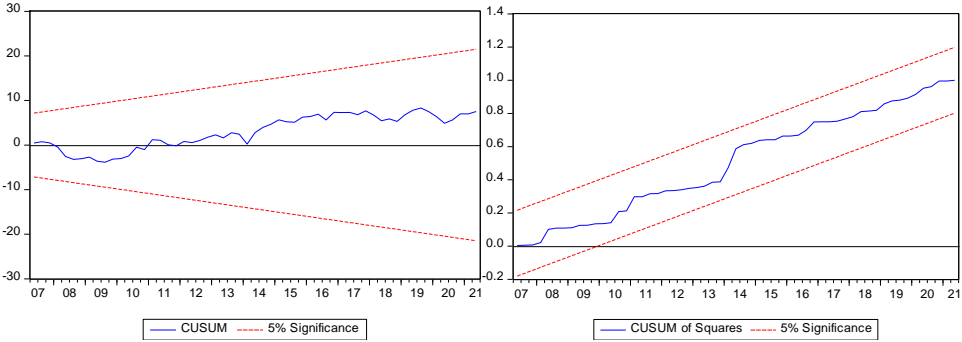
5. Sonuç

Gayri safi yurt içi hasılanın dört temel belirleyicisi içerisinde en çok istikrara sahip olan tüketim harcamaları bu özelliğiyle hem para hem de maliye politikalarının şekillenmesindeki en önemli faktörlerden biri olma özelliği kazanmaktadır. Ayrıca bu özellik literatürdeki çok sayıda çalışmada tüketim harcamalarının ana belirleyicilerinin ne olduğu sorusuna yoğun bir şekilde yanıt aranmasına sebebiyet vermektedir. Tüm bunlarla birlikte gelir ve faiz oranı tüketim harcamalarının tartışmasız iki temel belirleyicisi olarak tüketim literatüründe kabul görmektedir. Ancak döviz kuru oynaklığı, enflasyon belirsizliğine neden olarak hane halkının tüketim kararlarının şekillenmesinde önemli bir rol oynayabilmektedir. Kur oynaklığının hane halkının karar alma sürecindeki bu etkin rolü döviz kuru oynaklığının gelir ve faiz oranıyla birlikte tüketimin bir başka belirleyicisi olabileceği savını akıllara getirmektedir.

Bu bağlamda çalışmada reel kur oynaklığının reel tüketim harcamaları üzerine olan kısa ve uzun dönem etkileri Türkiye ekonomisinin 2003Q1-2021Q2 dönemi için bahsi geçen fonksiyonel ilişki çerçevesinde araştırılmıştır. ARDL sınır testi sonuçları, kısa dönemde reel kur oynaklığının reel tüketim üzerinde herhangi bir etkisinin olmadığını; ancak uzun dönemde reel kur oynaklığının reel tüketim harcamalarının önemli bir belirleyicisi olduğunu ortaya koymuştur. Reel döviz kuru oynaklığı uzun dönemde reel tüketim harcamalarına negatif yani azaltıcı yönde etki yapmaktadır. Elde edilen bulgular Obstfeld & Rogoff (1998) ile Bahmani-Oskooee vd. (2015)'i destekler niteliktedir. Bu bağlamda döviz kuru oynaklığının enflasyon belirsizliğine neden olarak tüketicilerin karar alma süreçlerinde etkili bir rol oynadığını söylemek hiç de yanlış olmayacaktır. Bu bağlamda Türkiye ekonomisi üretiminin büyük ölçüde hammadde ve ara malı ithalatına bağlı yapısını zayıflatıcı yönde önlemlerin alınması hem kur oynaklığının hem de kur geçişkenliğinin ekonomide yarattığı tahribatın önüne geçilmesi açısından çok önemli bir rol oynamaktadır.

Bununla birlikte reel gayri safi yurt içi hasıla değişkeni kısa ve uzun dönemde reel tüketim harcamalarının önemli bir belirleyicisi konumundadır. Ancak aynı bulguyu faiz

oranı için söylemek Türkiye ekonomisi için pek de gerçekçi değildir. Çünkü ARDL sınır
testi yaklaşımından elde edilen sonuçlar faiz oranının kısa ve uzun dönemde reel tüketim
harcamaları üzerinde bir etkisi olmadığını göstermiştir. Çalışmadan elde edilen bir diğer
önemli sonuç ise reel döviz kuru değişkenin, gelir ve reel kur oynaklığı değişkenleri ile
birlikte reel tüketim harcamalarının uzun dönemde önemli bir belirleyicisi olduğu
yönündedir. Reel döviz kuru için elde edilen bu sonuç Alexander (1952)'nin savını destekler
niteliktedir. Ayrıca reel kur oynaklığı, gayri safi yurt içi hasılanın önemli diğer bileşenleri
olan ihracat ve ithalata olan etkileri itibariyle literatürde sıklıkla bu iki değişken ile birlikte
ele alınmıştır. Ancak mevcut çalışmadan elde edilen bulgular, döviz kuru oynaklığının gayri
safi yurt içi hasılanın bir diğer önemli kalemi olan tüketim harcamaları için de önemli bir
bileşen olabileceğini ortaya koyarak kur oynaklığının öneminin bir kez daha altının
çizilmesinde fayda olduğunu göstermiştir.

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Stratejik Farkındalık ve Stratejik Çeviklik Arasındaki İlişkide Stratejik Yeteneğin Aracılık Rolü

Yunus Emre TAŞGİT *(https://orcid.org/0000-0003-2176-1733), Düzce University, Türkiye; yunusemretasgit@duzce.edu.tr*

İrem HORUZ *(https://orcid.org/0000-0002-6048-4452), Düzce University, Türkiye; iremhoruz@duzce.edu.tr*

Taner KÖMÜR *(https://orcid.org/0000-0001-8348-540X), Düzce University, Türkiye; tanerkomur@duzce.edu.tr*

Aslınur YAVUZ *(https://orcid.org/0000-0002-5646-8468), Düzce University, Türkiye; aslinuryavuz@duzce.edu.tr*

The Mediating Role of Strategic Capability in the Relationship between Strategic Awareness and Strategic Agility

Abstract

In today's business world, strategic agility is a critical feature for businesses to tackle successfully. Therefore, determining the variables that affect strategic agility is crucial in strategic management literature. This research examines the mediating effect of strategic capability in the relationship between strategic awareness and strategic agility. The relational model, one of the quantitative research methods, was used in the research, and the data were obtained from 391 managers by questionnaire technique. SPSS and LISREL programs were used to analyse the data. According to the research results, although strategic awareness significantly affects strategic agility, strategic capability has a significant mediating role in the relationship between strategic awareness and strategic agility.

Öz

Günümüz iş dünyasında işletmelerin başarılı bir şekilde mücadele etmeleri için stratejik çeviklik, kritik bir özellik olarak kabul edilmektedir. Dolayısıyla stratejik çeviklik üzerinde etkisi olan değişkenlerin belirlenmesi stratejik yönetim literatürü açısından oldukça önemlidir. Bu araştırmanın amacı stratejik farkındalık ve stratejik çeviklik arasındaki ilişkide stratejik yeteneğin aracılık etkisini incelemektir. Araştırmada nicel araştırma yöntemi olan ilişkisel tarama modeli kullanılmış, veriler 391 yöneticiden anket tekniğiyle elde edilmiştir. Veriler analiz edilirken SPSS ve LİSREL programlarından yararlanılmıştır. Araştırma sonuçlarına göre stratejik farkındalığın, stratejik çeviklik üzerinde anlamlı bir etkisi vardır. Bununla birlikte stratejik yetenek, stratejik farkındalık ve stratejik çeviklik arasındaki ilişkide önemli düzeyde anlamlı bir aracılık rolüne sahiptir.

1. Giriş

Hızla değişen piyasa koşulları, dinamik çevre unsurlarına uyum sağlama, rekabet avantajı elde etme ve sürdürme konuları işletmeler için stratejik çevikliği kritik bir özellik haline getirmektedir. İşletmelerin bu özelliği kazanabilmeleri için taklit edilmesi zor rekabetçi stratejik yeteneklere ihtiyaçları gittikçe artarken aynı zamanda çevresel fırsat ve tehditleri doğru algılamalarına imkân tanıyacak stratejik farkındalıklarını da geliştirmeleri gerekmektedir.

Stratejik çeviklik hem fırsatları ve tehditleri algılama hem de çevresel sürprizlere gerektiği gibi yanıt verme ile ilgilidir (Weber & Tarba, 2014: 7). Etkili bir yanıt verme çevresel koşullarda yaşanan değişimleri zamanında fark etme, algılama ve başarılı bir şekilde analiz etmeye bağlıdır. Ayrıca yanıtın türü ve etkililiği birçok örgütsel dinamiğin başarılı bir şekilde kullanılmasını gerektirmektedir. Bu dinamikler arasında en fazla dikkati çeken unsurlardan birisi de işletmenin sahip olduğu yeteneklerdir. Özellikle dışsal ve içsel çevrede yaşanan değişimler bağlamında ele alındığında stratejik yetenek daha önemli bir yetenek türü olarak değerlendirilebilir (Vagnoni & Khoddami, 2016: 628). Bununla birlikte diğer bir unsur olarak yöneticilerin, işletmenin çevresindeki fırsatları tanımasını ve belirsiz ortamdaki risklerden kaçınmasını sağlayan stratejik farkındalık özelliği dikkati çekmektedir (Ibrahim & Al-Nuaimi, 2020: 101).

Alanyazındaki çalışmalar incelendiğinde, stratejik çeviklik üzerinde yenilikçi örgüt iklimi, örgütsel iletişim, iş özerkliği, örgütsel bağlılık, sosyal sermaye ve stratejik öğrenme gibi kavramların etkilerinin araştırıldığı görülmektedir (Idris & AL-Rubaie, 2013; Bozgül, 2018; Işık, 2020). Fakat bu araştırmaya konu edinilen, stratejik farkındalık, stratejik yetenek ve stratejik çeviklik değişkenlerini birlikte inceleyen kapsamlı çalışmalara rastlanılmamıştır. Dolayısıyla yürütülen araştırmanın literatüre keşifsel bilgi sağlama yönlü katkı yapabileceği savunulabilir. Araştırmada genel olarak; stratejik farkındalığın işletmelerin stratejik çevikliğine katkısı var mıdır? var ise bu katkı ne düzeydedir? Stratejik yeteneğin, stratejik çeviklik ve stratejik farkındalık arasındaki ilişkide bir aracılık etkisi var mıdır? sorularına cevap aranmıştır. Nicel bakış açısıyla ve ilişkisel tarama modeli olarak incelenen bu çalışmada öncelikle stratejik çeviklik, stratejik farkındalık ve stratejik yetenek ile ilgili literatür taramasına yer verilmiş ardından bir alan araştırması kapsamında elde edilen bulgular istatistiki olarak değerlendirilmiştir.

2. Literatür

2.1. Stratejik Farkındalık

Hambrick'e (1981: 264) göre stratejik farkındalık, üst yönetim takımının, işletmenin stratejik öncelikleri hakkında bir farkındalığa sahip olma düzeyidir. Berry (1996: 489) ve Moyeen (1997: 185) kavramı, yöneticilerin organizasyonun konumu, değişim fırsatları, iç ve dış çevresel faktörlere ilişkin farkındalıklarının derecesi olarak ifade etmişlerdir. Bowman'a (2017) göre, işletmenin gelecekteki olası eğilimler konusundaki farkındalığı ile ilgilidir. Ibrahim & Al-Nuaimi (2020: 101)'ye göre ise işletmenin çevresindeki fırsatları

tanıma ve risklerden kaçınma yönlü eğilimidir. Stratejik farkındalık; organizasyonun güçlü ve zayıf yönlerini belirleyerek fırsatları yakalayıp tehditlerden kaçınmasına yardımcı olduğu için önemlidir. Bununla birlikte çevresel faktörlerin analiziyle rakipler, kaynaklar, müşteriler ve aracılar hakkında gerekli bilgi edinmeyi sağlamaktadır (Kamariotou & Kitsios, 2018: 506). Aynı zamanda modernite ve girişimcilik ile karakterize edilen entelektüel bir yaklaşımı ve işletme performansını geliştirme becerisini temsil etmektedir (Al-Badayneh, 2021: 47). Literatürde stratejik farkındalığı farklı yönleri ile inceleyen araştırmalara rastlamak mümkündür. Örneğin; Çiçek (2019) çalışmasında işletmelerin stratejik farkındalığı ve performansı arasındaki ilişkiyi incelemiştir. Pencarelli vd. (2009), girişimcilerin stratejik farkındalık algılarını; Salih & Al-Khatib (2018), stratejik farkındalığın stratejik risk üzerindeki etkisini; Ibrahim & Al-Nuaimi (2020), stratejik farkındalığın amaçlara ulaşmada engelleri azaltmadaki rolünü; Faesil & Ali (2021), stratejik farkındalığın işletmelerin girişimci pazarlama yaklaşımına etkisini; Al-Badayneh (2021), stratejik farkındalığın bir işletmenin savunma sisteminin gücünü artırması üzerindeki etkisini incelemişlerdir. Diğer taraftan içerik bağlamında stratejik farkındalığın kendi içerisinde içsel ve dışsal farkındalık olmak üzere iki farklı boyutta ve zaman bağlamında (şimdi ve gelecek) değerlendirildiği görülmektedir (Gibb & Scott, 1985: 601; Pencarelli et al., 2009: 82; Faesil & Ali, 2021: 267; Al-Badayneh, 2021: 54). Kavramın daha iyi anlaşılması ve açıklanması bağlamında mevcut yaklaşımların temel özellikleri dikkate alınarak bu araştırmada stratejik farkındalık fırsat ve tehdit farkındalığı şeklinde ele alınmaktadır.

2.1.1. Fırsat Farkındalığı

Fırsat farkındalığı, işletmenin proaktif risk alma tutumuyla ilişkilidir. Bu tutum, başarı olasılığı yüksek faaliyetlerden fayda sağlamak için önemli kaynakların yatırımında yönetimsel perspektifi içerir (Cai et al., 2015: 57). Aynı zamanda bütünleştirici yeni fikir üretimi kapasitesi ve pazar liderliği yönelimi bu farkındalığı açığa çıkarmak noktasında işletmeye önemli fırsatlar sunmaktadır (Sriboonlue, 2019: 655). Yeni fikir üretimi, bir işletmenin potansiyelini, etkinliğini ve verimliliğini artırmak için yeni operasyonel süreçler tasarlama ile ilgiliyken (Grandi & Grimaldi, 2005: 826), pazar liderliği yönelimi, yeni fırsatlara ve yeniliklere öncelik verme, zorlu durumlarda risk alarak iş yöntemlerini değişen koşullara hızla adapte edebilmekle ilgilidir (Tsai et al., 2008: 885).

2.1.2. Tehdit Farkındalığı

Çevredeki olası tehditlerin zayıf sinyallerini anlama ve bunları fırsata çevirme konusunda işletmenin sürekli stratejik farkındalığa sahip olması gerekir (Ireland et al., 2011: 33). İşletmenin çevresel faktörleri göz ardı etmesi veya karşılık vermemesi işletmeyi rekabet açısından dezavantajlı bir konuma getirebilir (Wang et al., 2012: 120). Bu sebeple dış çevrenin tehditleriyle yüzleşmek ve esnek çözümler üretmek için sektörle ilgili gerekli tahmin mekanizmaların oluşturulması gerekmektedir (Al-Badayneh, 2020: 51). Sektördeki rekabeti etkileyen faktörlerin farkında olmak, bir firmanın sektörünün yapısını anlamasını, rekabete karşı kendini savunmasını ve bu tehdit unsurlarını işletme lehine

şekillendirmelerini sağlar (Porter, 2008: 79). Literatürde işletme için tehdit oluşturabilecek faktörler, 5 temel alanda ortaya çıkmaktadır: yeni rakiplerin pazara girişi, ikame malların tehdidi, alıcıların pazarlık gücü, tedarikçilerin pazarlık gücü, rakipler arasındaki rekabetin şiddeti (Porter, 1980: 31). Rakipler arasındaki yüksek rekabet, sektörün karlılığını sınırlandırırken (Porter, 2008: 85; Pringle & Huisman, 2011: 39) alıcıların, kaliteli ürünler ve iyi hizmet gibi maliyeti artırıcı beklentilerinin olması ve fiyatların olduğundan daha aşağı çekilmesi yönünde birlikte hareket etmeleri rekabet yönünden tehlike arz edebilir (Porter, 1980: 39; Karagiannopoulos et al., 2005: 66). Tedarikçiler, ürün fiyatlarını yükselterek ya da ürünün kalitesini düşürerek işletmeyi tehdit edebilirler (Porter, 2000: 35; Goyal, 2020: 149). Bir işletmenin sunduğu ürün veya hizmete ikame olan ürünler ise daha ucuz maliyetli veya cazip olursa bir tehdit unsuru oluştururlar (Porter, 1985: 5; Mathooko & Ogutu, 2015: 337). Son olarak pazara yeni girişlerin kolaylığı, sektördeki dengeyi sürekli bozucu bir nitelik taşıdığı için işletmeyi tehdit altında bırakabilir (Porter, 2008: 80; Rajasekar & Raee, 2013: 240).

2.2. Stratejik Yetenek

İş ortamında karmaşıklığın artmasıyla birlikte firmalar yetenek profillerini geliştirmeye odaklanmışlardır (Mcgovern, 2006: 302). Özellikle stratejik yetenek bu bağlamda oldukça dikkat çekicidir. Rekabetin giderek dinamikleştiği bir iş ortamında, diğer işletmeler tarafından kolayca taklit edilebilirliğin önüne geçmenin stratejik yetenek ile ilgili olduğu belirtilmektedir (Collis, 1994: 144). Genellikle pazarlama ve yönetim literatürü kapsamında değerlendirilen stratejik yetenek (Benedetto et al., 2008: 420), firmaların faaliyetlerini koordine etmelerini ve varlıklarını kullanmalarını sağlayan karmaşık becerilerini ve birikimlerini ifade etmektedir (Day, 1990: 38). Stratejik yetenek, işletmelerin performansını artırabilmek amacıyla somut veya soyut varlıklarını etkili bir şekilde kullanması ile ilgilidir (Amit & Schoemaker, 1993: 33). Rekabet avantajı elde etmek için stratejik seviyede önemli bir içsel özellik olarak da tanımlanmaktadır (Barney, 1991: 99; Wernerfelt, 1984: 171). Ayrıca stratejik örgütsel kaynakları, rekabet avantajı sağlayacak şekilde sürdürülebilir kılma yönüyle dikkat çekmektedir (Ambrosini & Bowman, 2009).

Literatürde stratejik yeteneğin firmaların yönetiminde önemli bir unsur olduğuna (Johannesson, 2010: 9) yönelik çeşitli araştırmalar bulunmaktadır. Şöyle ki stratejik yeteneğin; firmalar arasında bulunan sosyal sermayeyi içerdiğine (Chen et al., 2008: 119), yenilikçi faaliyetlerin verimliliğini ve etkinliğini artırmada firmalar arası iş birliğini olumlu yönde etkilediğine (Benedetto et al., 2008: 420) işletme performansını açıklama ve öğrenme yeteneğini ortaya çıkarmada (Ulrich & Smallwood, 2004) kritik bir rol oynadığına dair bulgular bulunmaktadır. Ayrıca kavramsal anlamda stratejik yeteneği farklı boyutlarda değerlendiren çeşitli çalışmalarda bulunmaktadır (Sussan & Johnson, 2003; Parnell, 2019; Vishnu et al., 2020). Bu araştırmada stratejik yetenek; rekabet üstünlüğü sağlama ve özgünlük/taklit edilemezlik özellikleri bağlamında değerlendirilmektedir.

2.2.1. Rekabet Üstünlüğü Sağlama

Rekabet üstünlüğü, kaynak kullanım modelleri ile rakipler karşısında elde edilen eşsiz konum şeklinde tanımlanmaktadır (Bamberger, 1989: 85; Hofer & Schendel, 1978). Fahey (1989: 20) rekabet üstünlüğünü, bir firmanın ürün veya hizmetleriyle müşterilerin gözünde rakiplerinden farklılaşmasıyla ilişkilendirmektedir. İşletmelerde, rekabet üstünlüğünün sağlanması rakiplere kıyasla birtakım uygulamaların daha iyi yönetilmesi ya da daha verimli gerçekleştirilmesi ile ilgilidir (Lado et al., 1992: 80). Bakış açısı itibariyle rekabet sadece mevcut rakipleri değil, gelecekte sektöre girmeye hazır potansiyel rakipleri de kapsamaktadır (Baumol et al., 1982). Literatürde işletmelerin rekabet üstünlüğünü nasıl elde edeceğine ilişkin birçok faktör tartışılmaktadır. Örneğin; yeni pazarlar keşfetme, finansal açıdan istikrarlı olma (Ross, 2010: 2), organizasyonel zayıflıkların etkisini azaltma (Schermerhorn, 2004), rakiplerini çaresiz bırakacak yetenek çeşitliliğine sahip olma (Orr et al., 2014: 534), rakiplerine karşı fikir liderliği sağlayarak rakiplerin tutum ve davranışlarını biçimsel olmayan bir şekilde etkileyebilme (Stern & Gould, 1988: 44), başarılı deneyimleri ile rakiplerini hamle yapmaktan vazgeçirebilme (Goldsmith & Flynn, 1992: 42) gibi özellikler bu kapsamda rekabet üstünlüğü sağlama açısından önemli konular arasında yer almaktadır.

2.2.2. Taklit Edilemezlik

Bir firmanın, mevcut veya potansiyel rakipleri tarafından kopyalanması çok zor taklit edilemeyen bir yeteneğinin olması gerekmektedir (Barney, 1991:102). Değişim hızının arttığı ve niteliğinin değiştiği piyasada sadece mükemmel ürün ve hizmete değil, aynı zamanda denenmemiş veya fark oluşturan çözümler sunmaya ihtiyaç vardır (Power, 1999: 59). Firmalar belirli bir konuda eşsiz/üstün bir yetenek oluşturarak rakiplerinden ayrılabilmektedirler (Treacy & Wiersama, 2001: 20-24). Firmalara özgü bu yetenekler, işletmelerin yinelenen iş akışlarından ve uygulamalarından ortaya çıkmadığı için rakiplerince genellikle taklit edilememektedir (Dierckx & Cool, 1989: 1504). Rakipler, bu yetenekleri taklit etmeye çalışsa yahut hayata geçirse dahi firmaya özgü özel sinerjiye bağlı olduğundan devamlılığı için yine sahip firmaya ihtiyaç duyulmaktadır (DeSarbo et al., 2006: 909).

2.3. Stratejik Çeviklik

Günümüz iş dünyasında işletmeler, rekabeti sürdürmek ve farklı koşullara adapte olmak için çevikliğe gereksinim duymaktadır (Salih & Alnaji, 2014: 1872). Stratejik çeviklik, hem ani değişikliklere cevap verme (proaktif/reaktif) hem de kaynakları ve bilgiyi kullanarak, yalnızca kısa vadede rekabet avantajı sağlamakla kalmayıp, aynı zamanda sürekli iş modeli yenilemesi yoluyla uzun vadeli hayatta kalmayı sağlayan yenilikçi çözümler üretmeyle ilişkili bir kavramdır (Sampath & Krishnamoorthy, 2017: 163). Beltrame (2008: 1-6) stratejik çevikliği, değişen çevresel koşullara cevap vererek işletmenin stratejik yönelimlerini uyarlama süreci olarak tanımlamıştır. Stratejik çeviklik, işletmelerin karmaşık ve dinamik ortamlara esnek bir şekilde cevap vermelerini sağlamaktadır (Lewis et

al., 2014: 60). Stratejik çeviklik birçok araştırmacı tarafından farklı şekillerde ele alınmıştır. Weber & Tarba (2014) stratejik çevikliğin iki temel boyuttan oluştuğunu belirtmişlerdir. Boyutlardan ilki liderlikle ilişkili olarak, gereksinim duyulan değişimin yönünü hissetmek ve doğru stratejiyi yürütmek adına doğru kaynakları bir araya getirmekle ilgilidir. İkincisi ise, eylem sürecini gerçekleştirmek için gerekli yapısal uyarlamayı ve mekanizmaları içeren örgütsel tasarım ile ilişkilidir (Weber & Tarba, 2014: 7). Doz & Kosonen (2008) stratejik çevikliği stratejik duyarlılık, kaynak akışkanlığı ve liderlik birliği yoluyla oluşturulan bir sonuç olarak ele almışlardır. Hemmati et al., (2016) ise stratejik çevikliği, stratejik hedeflerin seçimi, doğru yeteneğin kavranması ve harekete geçme olarak incelemişlerdir. Shin et al. (2015) de stratejik çevikliği "teknoloji kapasitesi, işbirlikçi inovasyon, örgütsel öğrenme ve içsel uyum" dan oluşan bir yapı olarak ele almışlardır.

İlgili alan yazın tarandığında stratejik çevikliğin yukarıda sayılan boyutlar üzerinden açıklandığı ve yerli literatürde de ilgili kavramın yine bu boyutlar üzerinden uyarlama ölçekler kullanılarak ölçülmeye çalışıldığı tespit edilmiştir. Bu araştırmada ise gerek literatürdeki tartışılma şekli gerekse kavramın çok boyutlu yapısı düşünülerek stratejik çeviklik "güçlü bilgi akışı ve hızlı yapısal uyarlanma" boyutları üzerinden incelenmiştir.

2.3.1. Güçlü Bilgi Akışı

Çevik işletmelerde kararlar hızlı alınmakta ve stratejiler hızla eyleme geçirilmektedir (Bozgül, 2018: 17-19). Değişimin ve belirsizliğin hâkim olduğu çevre koşullarında seçenekler arasında en doğru kararı vermede ve stratejiyi uygulama sürecinin başarısında ise işletme içerisindeki bilgi akışının sağlıklı kurgulanması kritik rol oynamaktadır (Teece et al., 2016: 21; Neilson et al., 2008: 63-66). Forsythe'e göre (1997: 4) işletmelerde insan ya da teknik nedenlerden dolayı bilgi akışı durduğunda çeviklik ortadan kalkmaktadır. Bu kapsamda çalışmada "güçlü bilgi akışı"nın iki temel özelliği vurgulanmıştır: (1) rekabetçi ortamda ortaya çıkan değişikliklere uyum sağlamak adına dış çevreden önemli bilgilerin işletmeye aktarılması, (2) işletme içinde önemli bilgilerin ilgili taraflara dağıtılması. Dolayısıyla "güçlü bilgi akışı" boyutu; iş çevresinde yaşanan değişimler hakkında bilgilerin sürekli toplanması (Idris & Al-Rubaie, 2013: 74), rekabetçi çevreye uyum sağlamak adına önemli verilerin genel merkeze hızlı şekilde ulaştırılması, işletme bünyesinde önemli bilgilere ilgililerin kolayca ve hızlıca erişebilmesi ve ilgili departmanlar arasında aktif olarak paylaşılması (Tippins & Sohi, 2003: 749-761; Bontis et al., 2002: 761-762; Neilson et al., 2008: 63-66) ve paydaşlarla ile ilgili bilgi alışverişini kolaylaştıracak güçlü iletişim ağlarına sahip olunması (Kuleelung & Ussahawanitchakit, 2015) gibi özellikler bağlamında değerlendirilmiştir.

2.3.2. Hızlı Yapısal Uyarlanma

Stratejik çevikliğin bir özelliği de başarılı eylem süreçleri için gerekli yapısal uyarlamayı ve mekanizmaları içeren örgütsel tasarım ile ilgilidir (Weber & Tarba, 2014: 7). Worley & Lawler (2010) da çevikliği örgüt tasarımı üzerinden değerlendirmiş, örgütteki her bir tasarım öğesinin esneklik/uyarlanabilirlik göz önünde bulundurularak inşa edilmesi

gerektiğini belirten çeviklik modeli önerisini yapmışlardır. Bunun yanında dinamik bir ortamda faaliyet gösteren işletmeler için hız temel bir niteliktir (Phuong et al., 2012: 181). Çevik örgüt, insan ve diğer fiziksel kaynakların hızlı bir şekilde yeniden yapılandırılmasına olanak sağlayan esnek bir yapıdadır (Aktaş, 2021: 86). Bu kapsamda çalışmada hız ve esneklik olmak üzere iki temel özellik üzerinden "hızlı yapısal uyarlanma" boyutu kurgulanmıştır. Söz konusu boyut; işletmenin ortaya çıkan ani değişimler karşısında; farklı iletişim kanallarını inşa edilebilmesi (Kocabaş, 2005: 251; Forsythe, 1997), iş yapma modelini kolayca değiştirebilmesi (Sampath & Krishnamoorthy, 2017: 161-163), insan kaynağını koordine edilebilmesi (Seo & La Paz, 2008: 139; Sherehiy et al., 2007: 446-448); karar verme mekanizmasını düzenleyebilmesi (Sekman & Utku, 2009: 43-44); hızla uyarlanabilir teknolojiye sahip olması (Sekman & Utku, 2009: 43-44; Zaheer & Zaheer, 1997: 1505; Bakan vd., 2017: 132-133); kaynaklarını alternatif alanlara kolayca tahsis edebilmesi (Sherehiy et al., 2007: 446-448; Ganguly et al., 2009: 411-412) ve örgütsel öğrenmeyi en kısa zamanda gerçekleştirilmesi (Araza, 2015: 179) gibi özellikler üzerinden incelenmiştir.

3. Yöntem

3.1. Araştırmanın Yöntemi

Bu araştırmada, stratejik farkındalık, stratejik yetenekler ve stratejik çeviklik arasındaki ilişkileri incelemek amaçlanmaktadır. Bu bağlamda araştırmada, nicel araştırma yöntemlerinden ilişkisel tarama modeli kullanılmıştır. İlişkisel tarama modelinde, ilişki analizinde değişkenler arasında birlikte değişimin varlığı ve değişim varsa bunun nasıl gerçekleştiği belirlenmeye çalışılmaktadır (Karasar, 2011). Kullanılan veriler, kesitsel (anlık) ve birincil verilere dayanmaktadır. Araştırma denek sayısı bakımından çok denekli, ölçme ve deneme koşullarına göre ise karışık desenlidir.

3.2. Araştırmanın Evren ve Örneklemi

Araştırma evrenini, çeşitli sektörlerde ve işletmelerin farklı departmanlarında görev yapmakta olan orta ve üst düzey yöneticiler oluşturmaktadır. 2020 yılının Mart Ayı'ndan bu yana devam eden küresel COVID-19 salgını sebebiyle veri toplama süreçlerinde yaşanan hedef kitleye ulaşım yönlü zorluklar göz önünde bulundurularak örnekleme yönteminde kolayda örnekleme yöntemi seçilmiştir. Bu yöntem sayesinde ihtiyaç duyulan evreni temsil edebilen örneklem sayısına daha etkili bir şekilde ulaşılmıştır. Literatürde sayısı tam olarak bilinmeyen evrenlerden örneklem grubu oluşturulabilmesi için bazı formülasyonlar üzerinde tartışılmaktadır. Her bir formülasyonun, geliştirildiği alan bazlı birtakım özellikler taşıdığı varsayılarak bu araştırmada örneklem büyüklüğünün tespit edilmesinde Sekaran (2003: 294) örneklem büyüklüğü hesaplanması formülünden yararlanılmıştır. Bu formülasyona göre evren büyüklüğü 1.000.000 kişi için %95 güven aralığı ve %5 hata payı ile olması gereken örneklem alt limiti 384 olarak belirlenmiştir.

3.3. Araştırmanın Veri Toplama Tekniği ve Süreci

Araştırmada veri toplama aracı olarak anket tekniği kullanılmıştır. Literatüre dayalı olarak oluşturulan anket formu, 4 bölüm olarak tasarlanmıştır. İlk bölümde yöneticilerin stratejik farkındalığa ilişkin görüşlerini içeren 11 madde, ikinci bölümde yöneticilerin stratejik yetenek ilgili görüşlerinden oluşan 10 madde, üçüncü bölümde yöneticilerin stratejik çeviklik ile ilgili görüşlerinden oluşan 13 madde ve dördüncü bölümde ise demografik özelliklerini gösteren 10 madde bulunmaktadır. Demografik özellikleri içeren sorular çoktan seçmeli şekilde hazırlanmıştır. Stratejik farkındalık, stratejik yetenek ve stratejik çeviklik ile ilgili yönetici algılarını ölçmek için 5'li likert tipi ölçek kullanılmıştır (1-Kesinlikle Katılmıyorum, 2-Katılmıyorum, 3-Kararsızım, 4-Katılıyorum, 5-Tamamen Katılıyorum). Anketin hazırlanması için literatür taraması yapılmış, model çalışmalar bulunmuş, anketteki ölçeklerin oluşturulmasına esas teşkil eden madde havuzu literatüre dayalı olarak şekillendirilmiştir. Kapsam geçerliliği için hazırlanan anket formu, alanında uzman akademisyenler tarafından değerlendirilmiştir. Değerlendirme sonucunda uzmanların görüşleri dikkate alınarak gerekli düzenlemeler yapılmıştır. Düzenlenen anket formu bilimsel araştırma ve yayın etiğine uygunluğu açısından Düzce Üniversitesi Etik Kurul onayına sunulmuş ve karar sonrasında uygulama aşamasına geçilmiştir.

Anket uygulamasının büyük çoğunluğu yüz yüze anket yöntemi gerçekleştirilmiştir. Bununla birlikte yöneticilerin tamamına birebir ulaşmanın mümkün olmadığı durumlar için <https://tr.surveymonkey.com/> internet sitesi kullanılarak anket uygulanmıştır. Anketin genel uygulamasına başlanmadan önce anketin katılımcılar açısından anlaşılabilirliğini ve zorluk derecesini görebilmek için 60 kişi üzerinde bir pilot çalışma yapılmıştır. Pilot çalışmanın ardından, işletmeler ziyaret edilerek işletme yöneticileriyle yüz yüze görüşmeler yapılmıştır. Araştırma verileri, 30 Aralık 2021 - 15 Ocak 2022 tarihleri arasında toplanmıştır.

3.4. Araştırmanın Modeli ve Hipotezleri

Stratejik farkındalık ile stratejik çeviklik arasındaki ilişkide stratejik yeteneğin aracılık rolünü ortaya koyan araştırma modeli, literatür taramasıyla birlikte araştırmacıların konuya kişisel gözlemlerine dayanarak tasarlanmıştır. Araştırma modelinin şematik hali ve değişkenler arasındaki ilişkileri gösteren detaylar Şekil 1'de sunulmaktadır.

Şekil: 1
Araştırma Modeli
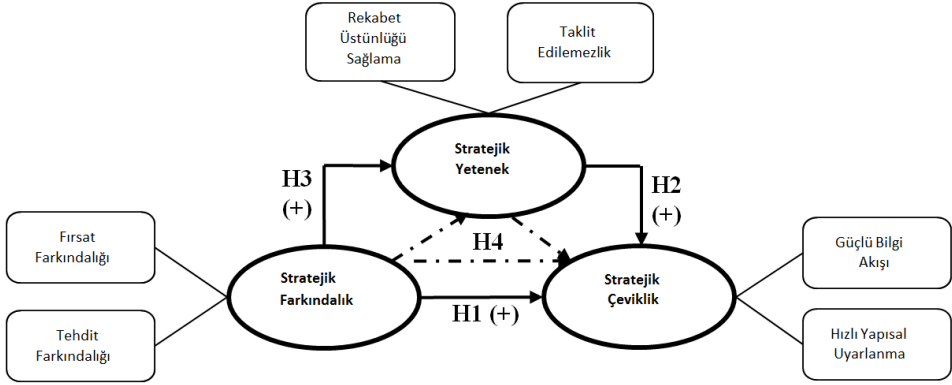
Şekil 1 incelendiğinde modelde 3 temel değişken görülmektedir: bağımsız değişken olarak stratejik farkındalık, aracı değişken olarak stratejik yetenek ve bağımlı değişken olarak stratejik çeviklik. Stratejik farkındalık, tehdit farkındalığı ve fırsat farkındalığı olmak üzere iki boyutla açıklanmaktadır. Stratejik yetenek, rekabet üstünlüğü ve taklit edilemezlik (özgünlük) özelliklerini içermektedir. Stratejik çeviklik ise güçlü bilgi akışı ve hızlı yapısal uyarlanma boyutlarından oluşmaktadır. Ayrıca araştırma modelinde, iki tür ilişki tanımlanmıştır. Bunlar; doğrudan ve dolaylı (aracılık) ilişkiler şeklindedir. Doğrudan ilişkiler, değişkenler arası ikili ilişkileri ifade ederken, dolaylı (aracılık) ilişkiler, değişkenler arası üçlü ilişkiyi ifade etmektedir. Araştırma modeli dikkate alınarak araştırmanın hipotezleri aşağıdaki gibi oluşturulmuştur.

Bir işletmede stratejik çeviklik için stratejik gelişmelere yönelik farkındalık gerekmektedir (Doz & Kosonen, 2008: 96). Dış çevredeki fırsat ve tehditlerin farkındalığını içeren stratejik farkındalık; işletmeye hem bulunduğu sektörde oluşabilecek avantajları rakiplerinden önce tespit etmesini hem de rakiplerin, müşterilerin, ikame ürünlerin vb. ortaya çıkarabileceği tehditleri algılamasını sağlamaktadır. Ayrıca stratejik farkındalık, işletmenin gelecekteki olası eğilimler konusundaki farkındalığını veya içsel bilgiyi stratejik karar verme sürecine dâhil etmektedir (Bowman, 2017). Dolayısıyla stratejik farkındalığın işletmede güçlü bilgi akışına ve çevresel değişimler karşısında işletmenin hızlı yapısal uyarlanmasında katkı sağlayacağı öngörülebilir. Nitekim rekabet ortamında ortaya çıkan fırsat ve tehditlerin iyi algılanıp çözümlenebilmesinin işletmelerin kaynaklarını hızlı bir şekilde yeniden yapılandırarak bu fırsat ve tehditlere uygun şekilde tepki verebilmesine yardımcı olacağı muhtemeldir. Aynı zamanda stratejik farkındalığın rekabetçi ortamda ortaya çıkan değişikliklere uyum sağlamak adına dış çevreden önemli bilgilerin işletmeye aktarılması ve işletme içinde önemli bilgilerin ilgili taraflara dağıtılmasında pozitif anlamda katkı sağlayacağı olasıdır. Bu bilgiler doğrultusunda;

"*H1: Stratejik farkındalık, stratejik çevikliğin pozitif yönlü anlamlı bir yordayıcısıdır*" şeklinde oluşturulmuştur.

Stratejik çeviklikte, tehditleri veya fırsatları tespit etme ve bunlara tepki vermenin (Tan & Sia, 2006) yanında avantajların rakipler tarafından taklit edilmesinden önce işletmenin rekabet avantajını koruması da önem taşımaktadır (Mathiassen & Pries-Heje, 2006). Ancak, burada eylemlerin ne kadar hızlı gerçekleşmesi gerektiğine dair belirli bir gösterge yoktur. Hız, mevcut fırsatlar ve rakiplerin eylemlerinin zaman çerçevesi içinde anlaşılmalıdır (Phuong et al., 2012: 181). Nitekim rakiplerden önce harekete geçmek çeviklik kavramının temel taşlarından biridir (Sucu, 2020: 47). Bu kapsamda işletmelere taklit edilemezlik (özgünlük) ve rekabet üstünlüğü sağlama gibi yararlar sağlayan stratejik yeteneklerinin stratejik çevikliği artıracağı öngörülmektedir. Çünkü stratejik nitelikteki yetenekler işletmelere rakiplerini hamle yapmaktan vazgeçirme, aynı işi yapsalar dahi rakiplerinden ayırt edilme ve sektörde fikir liderliğini elde etme gibi katkılarda bulunmaktadır. Ayrıca rakiplerinden ayırt edici, farkına varılması zor, fark edilse de rakiplerince hayata geçirilmesi ve kendisi istemedikçe rakiplerince uygulanması mümkün olmayan yeteneklere sahip olan işletmelerin güçlü bilgi akışını daha kolay sağlayabilmesi, gerektiğinde iş yapma modelini değiştirip yapısal uyarlanmayı daha hızlı gerçekleştirmesi daha olasıdır. Bu doğrultuda;

"*H2: Stratejik yetenek, stratejik çevikliğin pozitif yönlü anlamlı bir yordayıcısıdır*" şeklinde oluşturulmuştur.

Stratejik farkındalık; çevresel faktörlerin analiziyle rakipler, kaynaklar, müşteriler ve aracılar hakkında gerekli bilgi edinmeyi sağlamaktadır (Kamariotou & Kitsios, 2018: 506). Bu kapsamda stratejik farkındalığın işletmelerin sektörel değişim ve ihtiyaçlarına cevap verecek, sektörde fikir liderliği sağlayan, rakiplerince hayata geçirilmesi mümkün olmayan özellikteki stratejik yeteneklerine katkı sağlayacağı öngörülmektedir. Bu doğrultuda;

"*H3: Stratejik farkındalık, stratejik yeteneğin pozitif yönlü anlamlı bir yordayıcısıdır*" şeklinde oluşturulmuştur.

Stratejik çeviklik hem fırsatları ve tehditleri algılama hem de çevresel sürprizlere gerektiği gibi yanıt verme ile ilgilidir (Weber & Tarba, 2014: 7). Etkili bir yanıt verme çevresel koşullarda yaşanan değişimleri zamanında fark etmeye bağlıdır. Ayrıca yanıtın türü ve etkiliği birçok örgütsel dinamiğin başarılı bir şekilde kullanılmasını gerekli kılmaktadır. Bu dinamikler arasında en fazla dikkati çeken unsurlardan birisi de işletmenin sahip olduğu yeteneklerdir. Özellikle dışsal çevre ve içsel çevrede yaşanan değişimler bağlamında ele alındığında stratejik yetenek daha önemli bir yetenek türü olarak değerlendirilebilir (Vagnoni & Khoddami, 2016: 628). Bu doğrultuda ve yukarıda verilen açıklamalar kapsamında, stratejik farkındalık stratejik yetenekleri etkileyen bir değişken olarak ele alınırken (H3); stratejik çeviklik, stratejik yeteneğin bir sonucu olarak değerlendirilmektedir (H2). Stratejik yeteneklerin işletmelerin stratejik çevikliği üzerindeki pozitif etkisi göz önüne alınacak olursa, stratejik farkındalığın stratejik çeviklik üzerindeki etkisinin belirli bir

kısmının, stratejik yetenek üzerinden ortaya çıkabileceği düşünülebilir. Bu varsayımlar ışığında, stratejik yeteneğin, stratejik farkındalık ve stratejik çeviklik arasındaki ilişkide bir aracılık etkisinin olacağı öngörülmektedir. Bu doğrultuda;

"*H4: Stratejik yetenek, stratejik farkındalık ile stratejik çeviklik arasındaki ilişkide aracılık rolüne sahiptir*" şeklinde oluşturulmuştur.

4. Bulgular

Elde edilen anket formları değerlendirilerek anketlerden eksik, işaretlenmemiş, yanlış işaretlenmiş veya gelişigüzel doldurulmuş formlar veri setinden çıkarılmış, toplamda 391 adet geçerli anket analize hazır hale getirilmiştir. Araştırma bulgularının elde edilmesinde keşifsel analizler için SPSS 18.0 programı doğrulayıcı analizler için LİSREL 8.72 programı kullanılmıştır. Öncelikle araştırmaya katılan yöneticilerin işletmedeki pozisyonları, iş hayatlarındaki toplam hizmet süreleri, eğitim düzeyi, yaş ve cinsiyet gibi demografik özelliklerine ilişkin bulgulara ulaşmak için frekans analizi gerçekleştirilmiştir. Sonrasında ölçeklere ilişkin yapı geçerliliği, keşifsel faktör analizleri ile sağlanmış, ölçek ifadelerinin güvenilirliğini tespit etmek amacıyla Cronbach's Alfa katsayıları hesaplanmıştır. İlişkisel analizlere geçmeden önce analizlerin temel varsayımları sağlama noktasında verilerin normal dağılım gösterme durumu, çarpıklık ve basıklık katsayıları aracılığıyla değerlendirilmiştir. Sonrasında değişkenler arasındaki ilişki ve etki ölçümleri için korelasyon analizi, model testi için regresyon analizi ve Sobel testi gerçekleştirilmiştir. Son olarak aracılık ilişkisine ilişkin uyum iyiliği endeks sonuçlarını incelemek için Path analizi uygulanmıştır. Analizler sonucunda işletme yöneticilerinin stratejik farkındalık, stratejik yetenek ve stratejik çeviklik ilgili algılarına yönelik bulgular ortaya konulmuş ve yorumlanmıştır.

Araştırmaya toplamda 391 yönetici katılım sağlamıştır. Demografik özellikleri incelendiğinde katılımcıların çoğunlukla turizm (%31,7), kamu (%17,1) ve tekstil sektöründe (%11,5); pazarlama (%34,4), üretim planlama (%17,6) ve insan kaynakları (%14,3) departmanlarında; orta kademe (%39,6) ve üst kademe (%24,6) yöneticilik pozisyonunda görev yaptıkları görülmektedir. Katılımcı yönetici grubu çoğunlukla 20-30 yaş grubunda (%37,9) yer alan bekâr durumdaki (%51,2) erkek yöneticilerden oluşmaktadır (%62,4). Katılımcılar öğrenim durumuna göre lisans öğrenim düzeyinde bir profile (%61,9) ve iş hayatındaki çalışma süresi açısından 5 ile 8 yıl arasında bir deneyime (%28,4) sahiptirler.

Araştırma modelinin testi için öncelikle yöneticilerin; stratejik farkındalık, stratejik yetenek ve stratejik çeviklik algılarına ilişkin keşifsel faktör analizi uygulanmıştır. Bulgulara dair ayrıntılar Tablo 1'de paylaşılmaktadır.

Tablo: 1
Keşifsel Faktör Analizleri

Değişkenler	Faktörler	Madde	KMO	Bartlett's Test	Çıkarım Metodu	Rotasyon Metodu	Açıklanan Varyans	Özdeğer
Stratejik Farkındalık	Fırsat Farkındalığı	5	,906	,000	Principal Component Analysis	Varimax	44,195	4,420
	Tehdit Farkındalığı	5					23,349	2,335
Stratejik Yetenek	Rekabet Üstünlüğü Sağlama	5	,900				37,269	3,727
	Taklit Edilemezlik	5					30,506	3,051
Stratejik Çeviklik	Hızlı Yapısal Uyarlanma	7	,948				41,390	4,967
	Güçlü Bilgi Akışı	5					33,941	4,073

Tablo 1 incelendiğinde, faktör analizine tabi tutulan stratejik farkındalık, stratejik yetenek ve stratejik çeviklik değişkenlerinin tamamının KMO ve Bartlett testi değerlerinin (KMO değeri 0,60'ın üzerinde ve Bartlett's Test sonucu <0,05) oldukça iyi düzeyde olduğu görülmektedir. Stratejik farkındalık değişkeni için analize dâhil edilen 11 madde 2 faktör altında toplanmıştır. Bunlar; Fırsat farkındalığı ve Tehdit farkındalığı. Analiz sürecinde birden fazla faktörde yüksek faktör yükü olan (çakışan) 1 madde yapıdan çıkarıldıktan sonra faktörlerin ölçeğe ilişkin toplam varyansı %67,545'tir. Fırsat farkındalığının stratejik farkındalık değişkenini açıklama düzeyi (%44) tehdit farkındalığına nispeten (%23) daha yüksektir. Bununla birlikte analiz sonuçlarına göre her bir faktördeki maddelerin faktör yüküne ait değer aralıkları kabul edilebilir düzeyde çıkmıştır (Fırsat Farkındalığı: 0.880 ile 0.814 arasında, Tehdit Farkındalığı: 0,742 ile 0,515 arasında). Bu aralıklar faktörlerin içsel tutarlılığının iyi olduğunu göstermektedir. Stratejik yetenek değişkeni incelendiğinde ise faktör analizine dâhil edilen 10 maddenin, hiçbir madde çıkarımına gerek kalmaksızın, 2 faktör altında toplandığı görülmektedir. Bunlar; Rekabet Üstünlüğü Sağlama ve Taklit Edilemezlik. Bu faktörler ölçeğe ilişkin varyansın çoğunu açıklamaktadır (%67,776). Stratejik yetenek değişkenini açıklama düzeyi itibariyle rekabet üstünlüğü sağlama boyutu (%37) taklit edilemezlik boyutuna (%30) kıyasla daha yüksektir. Bununla birlikte analiz sonuçlarında her bir faktörde bulunan maddelerin faktör yükü değer aralıklarının birbirine yakın olduğu görülmüştür. Dolayısıyla faktörlerin içsel tutarlılığının iyi olduğu söylenebilir. Son olarak stratejik çeviklik değişkenini incelemek için faktör analizine 13 madde dâhil edilmiştir. Analiz sonucunda birden fazla faktörde yüksek faktör yüküne sahip olan (çakışan) 1 madde yapıdan çıkarılmış ve geriye kalan 12 madde 2 faktör altında toplanmıştır. Bunlar; Hızlı Yapısal Uyarlanma ve Güçlü Bilgi Akışı. Bu faktörlerin ölçeğe ilişkin açıkladıkları toplam varyans %75,330'dur. Yani ortaya çıkan 2 faktör birlikte, varyansın büyük kısmını açıklamaktadır. Bunun yanı sıra analiz sonuçlarında her bir faktörde bulunan maddelerin faktör yükü değer aralıklarının birbirine yakın olduğu belirlenmiştir. Söz konusu aralıklar faktörlerin içsel tutarlılığının iyi olduğunu göstermektedir.

Keşifsel faktör analizi sonrasında değişkenlerle ilgili betimleyici istatistikler (ortalama, standart sapma, çarpıklık ve basıklık skorları, güvenilirlik katsayıları) incelenmiş ve korelasyon analizi gerçekleştirilmiştir. İlgili sonuçlar Tablo 2'de sunulmaktadır.

Tablo: 2
Betimleyici İstatistikler ve Korelasyon Analizi

Değişkenler	Ort.	Std. Sap.	Skew.	Kurto.	α	SF	SY	SÇ
Stratejik Farkındalık (SF)	3,7230	,73501	-,848	,501	,752	1		
Stratejik Yetenek (SY)	3,6606	,81321	-,583	-,170	,816	,693**	1	
Stratejik Çeviklik (SÇ)	3,8027	,81862	-,844	,227	,867	,776**	,824**	1
**. Korelasyon 0,01 düzeyinde anlamlı (2-tailed).								

Tablo 2 incelendiğinde yöneticilerin örgütlerine yönelik stratejik farkındalık, stratejik yetenek ve stratejik çeviklik algılarının orta düzeyde ve iyiye yakın olduğu görülmektedir. Özellikle stratejik çevikliğe ilişkin algının daha olumlu olduğu söylenebilir. Diğer taraftan literatürde çarpıklık ve basıklık katsayılarının -3 ile +3 arasında (Kalaycı, 2009), -2 ile +2 arasında olması (Pallant, 2007) normal dağılım için kabul edilebilirlik sınırları olarak tartışılmaktadır. Bu doğrultuda tüm değişkenlerin çarpıklık ve basıklık skorlarının -1 ile +1 arasında olduğundan dolayı verilerin normal dağılım gösterdiği söylenebilir. Ayrıca güvenirlik katsayıları açısından değişkenler, literatürde eşik değer olarak kabul edilen sınırın (α: 0.60) üzerinde yer almaktadır. Değişkenler arasındaki ilişki incelendiğinde ise stratejik farkındalık ile stratejik yetenek arasında orta düzeyde pozitif yönlü istatistiki olarak anlamlı bir ilişki görülürken (,693), stratejik farkındalık ile stratejik çeviklik arasında yüksek düzeyde pozitif yönlü bir ilişki olduğu belirlenmiştir (,776). En yüksek düzeyde ilişkinin ise stratejik yetenek ile stratejik çeviklik arasında çıktığı görülmektedir (,824). Elde edilen ilişkisel yönlü bu bulgular, araştırmanın model kurgusunun doğrulanacağına yönelik işaretler barındırmaktadır. Bu kapsamda araştırma modelinde yer alan değişkenler arasındaki etkiyi ve aracılık rolünü ortaya koymak için regresyon analizleri uygulanmıştır. Analizlere ilişkin detaylar Tablo 3'te sunulmuştur.

Tablo: 3
Regresyon ve Aracılık Analizleri

Model Değişkenleri		Standardize Edilmemiş Katsayılar		Standardize Edilmiş Katsayılar	t	p
		B	Std. Hata	Beta		
M1	(Constant)	,585	,135		4,328	,000
	Stratejik Farkındalık	,864	,036	,776	24,266	,000
	Bağımlı Değişken: Stratejik Çeviklik r: ,776 r²: ,602 F(1-389): 588,829 p: ,000 VIF: 1.000 Durbin-Watson: 1.924					
M2	(Constant)	,768	,109		7,073	,000
	Stratejik Yetenek	,829	,029	,824	28,643	,000
	Bağımlı Değişken: Stratejik Çeviklik r: ,824 r²: ,678 F(1-389): 820,438 p: ,000 VIF: 1.000 Durbin-Watson: 1.891					
M3	(Constant)	,807	,154		5,258	,000
	Stratejik Farkındalık	,766	,040	,693	18,945	,000
	Bağımlı Değişken: Stratejik Yetenek r: ,693 r²: ,480 F(1-389): 358,907 p: ,000 VIF: 1.000 Durbin-Watson: 1.850					
M4	(Constant)	,138	,109		1,269	,205
	Stratejik Farkındalık	,440	,038	,395	11,442	,000
	Stratejik Yetenek	,554	,035	,550	15,932	,000
	Bağımlı Değişken: Stratejik Çeviklik r: ,872 r²: ,760 F(2-388): 612,701 p: ,000 VIF: 1.923 Durbin-Watson: 2.004					

Tablo 3 incelendiğinde araştırma modelinin, aracılık ilişkisinin temel varsayımları bağlamında, 4 spesifik hipotez/model üzerinden (M1-M2-M3-M4) test edildiği görülmektedir. M1 basit doğrusal regresyon modeli sonuçlarına göre stratejik farkındalık, stratejik çevikliğin anlamlı bir yordayıcısıdır (p<0.05 ve t değeri: 24,266) ve stratejik

çeviklikteki değişimin %60'ını açıklama düzeyine sahiptir. Bu bulgular doğrultusunda aracılık ilişkisinin birinci varsayımı sağlanmış ve H1: "Stratejik farkındalık, stratejik çevikliğin pozitif yönlü anlamlı bir yordayıcısıdır" hipotezi kabul edilmiştir. M2 modelindeki skorlar dikkate alındığında, stratejik yetenek değişkeninin de stratejik çevikliğin anlamlı bir yordayıcısı olduğu (p<0,05 ve t değeri: 28,643) ve stratejik çeviklikteki değişimin %67'sini açıkladığı görülmektedir. Bu kapsamda aracılık ilişkisinin ikinci varsayımı sağlanmış ve H2: "Stratejik yetenek, stratejik çevikliğin pozitif yönlü anlamlı bir yordayıcısıdır" hipotezi kabul edilmiştir. Dolayısıyla stratejik farkındalık ve stratejik yetenek, işletmelerde stratejik çevikliğin anlamlı bir öncülü olarak kabul edilebilir. M3 modelindeki bulgular ise stratejik farkındalığın, stratejik yeteneğin anlamlı bir yordayıcısı olduğunu (p<0.05 ve t değeri: 18,945) ve stratejik yeteneğe ilişkin varyansın %48'ini açıkladığı göstermektedir. Bu bulgulara göre aracılık ilişkisinin üçüncü varsayımı sağlanmış ve H3: "Stratejik farkındalık, stratejik yeteneğin pozitif yönlü anlamlı bir yordayıcısıdır" hipotezi kabul edilmiştir.

Son olarak araştırma sorunsalının çözümüne yönelik temel bulguları içeren M4 modelindeki sonuçlar incelendiğinde stratejik farkındalık ve stratejik yetenek değişkenleri birlikte modele dâhil edildiğinde, stratejik farkındalık değişkeninin stratejik çeviklik üzerindeki etkisine ilişkin β katsayısı ve t değerinde önemli bir düşüş yaşandığı görülmektedir (0,864'ten 0,440'a). Yaşanan bu düşüşün istatistiki olarak anlamlı olup olmadığını belirlemek için Sobel Testi gerçekleştirilmiştir. Sobel Testi hesaplaması için stratejik farkındalık (bağımsız değişken) ve stratejik yetenek (aracı değişken) ile stratejik yetenek (aracı değişken) ve stratejik çeviklik (bağımlı değişken) arasındaki etkiye ilişkin standart hata değerleri ve β katsayıları hesaplama aracına girilmiştir. Hesaplama sonucunda Sobel Test değeri p<0,05 olarak bulunmuştur (Preacher & Leonardelli, 2021). Test ile ilgili ayrıntılar Tablo 4'te gösterilmektedir.

Tablo: 4
Sobel Testi Sonuçları

Girdiler			Test İstatistikleri	Std. Hata	P-Değeri
a	0,766	Sobel test:	15,90995501	0,039913	0
b	0,829	Arolan test:	15,90323993	0,03992985	0
Sa	0,040	Goodman test:	15,91667861	0,03989614	0
Sb	0,029		Hesaplama		

Elde edilen bu bulgular doğrultusunda, stratejik yeteneğin işletmelerin stratejik çevikliği üzerindeki pozitif etkisi göz önüne alınacak olursa, stratejik farkındalığın stratejik çeviklik üzerindeki etkisinin belirli bir kısmının, stratejik yetenekler üzerinden ortaya çıkabileceği söylenebilir. Bununla beraber her ne kadar stratejik farkındalığın stratejik çeviklik üzerindeki etkisi azalsa da ortadan kalkmamış, istatistiki olarak anlamlılık devam etmiştir. Sonuç olarak bu durum tam aracılık ilişkisinden ziyade kısmi aracılık ilişkisi olarak değerlendirilebilir. Bu bulgular ışığında "H4: "Stratejik yetenek, stratejik farkındalık ile stratejik çeviklik arasındaki ilişkide aracılık rolüne sahiptir" hipotezi "kısmi aracılık rolüne sahiptir" şeklinde kabul edilmiştir.

Ulaşılan sonuçları istatistiki anlamda daha güçlü analizlerle incelemek amacıyla araştırma modeli, keşifsel analizlerden sonra doğrulayıcı karakterli path analizi uygulanarak test edilmiştir. Nedensel etkiyi değerlendirmek için öncelikle değişkenler arasındaki doğrudan ilişkiyi (ikili) açıklayan modeller incelenmiş sonra dolaylı ilişkiyi (üçlü ilişki) açıklayan skorlar değerlendirmeye alınmıştır. Katsayıları yorumlamak için ise standardize edilmiş regresyon katsayıları kullanılmıştır. Uyum iyiliği ölçüt değerleri ve analiz edilen model yapıları ile ilgili detaylar Tablo 5'te sunulmuştur.

Literatürde uyum iyiliği indeksleri konusunda model-veri uyumunu en iyi tanımlayan birçok ölçüt kullanılmaktadır. Ölçütlerin fazlalığı, bir modelde bu indekslerin tamamının karşılanmasını oldukça zorlaştırmaktadır. Bununla birlikte model geçerliliği için bazı temel ölçütlerin karşılanması gerekmektedir. Daha güvenilir sonuçlar üretmek için literatürde birkaç uyum iyiliğinin birlikte kullanılması önerilmektedir. Bu araştırmada, hangi modelin en üst düzeyde uyumlu olduğunu ve modelin örnek verilere ne derece iyi uyduğunu (Hooper et al., 2008) belirlemek için beş mutlak uyum indeksi (absolute fit indices) kullanılmıştır: Ki-kare test istatistiği ($\chi 2/df$), GFI, AGFI, RMSEA ve SRMR. Modelin aynı verilere sahip diğer olası modellerle karşılaştırıldığındaki iyilik durumunu ölçmek (Maruyama, 1998) için ise göreceli uyum indekslerinden (McDonald ve Ho, 2002) Normlaştırılmamış Uyum İndeksi (NNFI) ve Karşılaştırmalı Uyum İndeksi (CFI) skorları dikkate alınmıştır.

Tablo: 5
Uyum İyiliği Endeks Sonuçları

Uyum İndeksleri	Uyum Değerleri		Araştırma Modeli Değerleri	
	İyi Uyum	Kabul Edilebilir Uyum	SF>SÇ	SF>SY>SÇ
$\chi 2/df$	$0 \leq \chi 2/sd \leq 2$	$2 \leq \chi 2/sd \leq 5$	0.34/1	26.21/6
NNFI	$0.95 \leq NNFI \leq 1$	$0.80 \leq NNFI < 0.95$	1.00	0.98
CFI	$0.95 \leq CFI \leq 1$	$0.90 \leq CFI < 0.95$	1.00	0.99
GFI	$0.95 \leq GFI \leq 1$	$0.90 \leq GFI < 0.95$	1.00	0.98
AGFI	$0.90 \leq GFI \leq 1$	$0.85 \leq GFI < 0.90$	1.00	0.92
RMSEA	$0 < RMSEA < 0.05$	$0.05 < RMSEA < 0.10$	0.00	0.09
SRMR	$0 \leq SRMR \leq 0.05$	$0.05 \leq SRMR \leq 0.08$	0.00	0.02

Stratejik Farkındalık (SF), Stratejik Yetenek (SY), Stratejik Çeviklik (SÇ)
Kaynak: Hooper et al. (2008: 53-60)'den faydalanılmıştır.

Tablo 5'te doğrudan ilişkiyi açıklayan stratejik farkındalık ve stratejik çeviklik (SF>SÇ) modeli ve dolaylı ilişkiyi temsil eden stratejik farkındalık, stratejik yetenek ve stratejik çeviklik (SF>SY>SÇ) modeline ilişkin bulgular sunulmaktadır. İlgili skorlar incelendiğinde, (SF>SÇ) modelinde tüm endekslerde iyi uyum düzeyi yakalanırken (SF>SY>SÇ) modelinde bazı endekslerde kabul edilebilir uyum iyiliği sonuçları üretildiği görülmektedir. Bununla birlikte dolaylı ilişkiyi açıklayan Stratejik Farkındalık (SF), Stratejik Yetenek (SY), Stratejik Çeviklik (SÇ) modelinin araştırmanın temel sorusunu cevaplandırabilecek nitelikte uyum iyiliği skorlarına sahip olduğu söylenebilir. Model, sadece RMSEA skorları ve ($\chi 2/df$) testi açısından kabul edilebilir uyum değerleri üretirken, NNFI, CFI, GFI, AGFI ve SRMR uyum kriterleri açısından iyi uyum düzeyinde skorlar üretmiştir. Diğer taraftan model üzerinde bazı modifikasyonlar gerçekleştirilerek daha güçlü bir model elde etme imkânı olmasına rağmen literatürdeki kabul edilebilir sınır değerleri sağlandığı için modifikasyonlara ihtiyaç duyulmamıştır.

Son olarak model değişkenleri arasındaki ilişki katsayılarını açıklayan path analizi bulgularını özet olarak yansıtan modellere ilişkin standardize edilmiş regresyon katsayıları aşağıda Şekil 2 ve Şekil 3'te sunulmuştur.

Şekil: 2
SF-SÇ Doğrudan İlişki Modeli Path Analizi Sonuçları
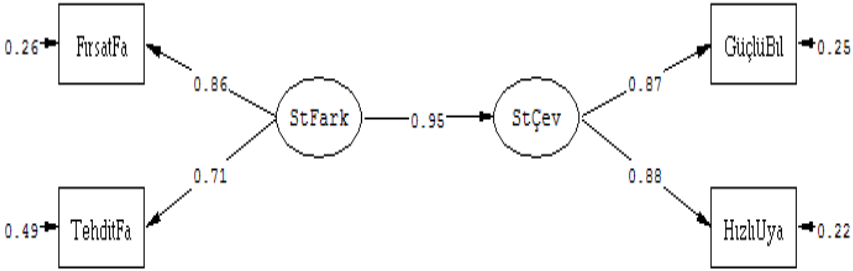
Şekil: 3
SF-SY-SÇ Dolaylı İlişki Modeli Path Analizi Sonuçları
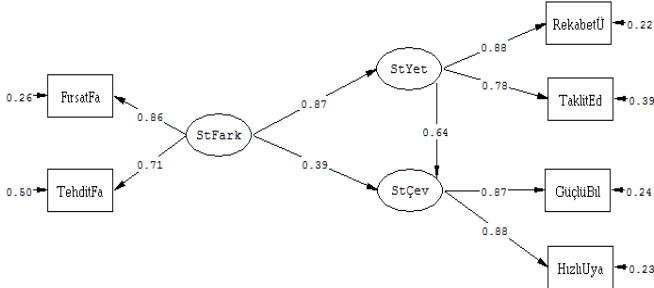
Şekil 2 ve Şekil 3'teki her iki modele ilişkin üretilen analiz dokümanlarındaki t değerleri ve standardize edilmiş regresyon katsayıları dikkate alındığında stratejik farkındalık ile stratejik çeviklik arasındaki ilişki katsayısının (0.95), stratejik yeteneğin modele eklenmesiyle birlikte (SF-SY-SÇ üçlü ilişki modelinde) önemli düzeyde düştüğü (0.39) görülmektedir. Bu bulgular ışığında; stratejik yeteneğin, stratejik farkındalık ve stratejik çeviklik arasındaki ilişkide güçlü bir aracılık rolüne sahip olduğu savunulabilir. Elde edilen bu sonuç keşifsel analizlerde ulaşılan sonucu doğrulamaktadır.

5. Sonuçlar

Bugün ve gelecek için cevaplandırılması gereken önemli sorulardan biri dinamik çevre unsurlarına uyum sağlama, rekabet avantajı elde etme ve sürdürme konularında kritik önem taşıyan stratejik çeviklik özelliğinin nasıl kazanılabileceği ile ilgilidir. Bu araştırmada stratejik farkındalık ve stratejik yetenek, stratejik çevikliğin önemli öncülleri olarak

öngörülmüş ve aralarındaki etkileşimler incelenmiştir. Literatürde bu değişkenlerin ayrı ayrı farklı kavramlarla ilişkilerinin ele alındığı çeşitli çalışmalar yapılmıştır. Fakat bu araştırma kapsamında ele alınan model kurgusundaki gibi etkinin incelendiği çalışmalara rastlanmamıştır.

Elde edilen sonuçlar çoğunlukla turizm sektöründe faaliyet gösteren işletmelerde, pazarlama departmanında çalışan, lisans düzeyinde öğrenime sahip, 20-30 yaş aralığında, bekâr, erkek, 5-8 yıl aralığında deneyimli orta kademe yöneticilerin bakış açılarını yansıtmaktadır.

Değişkenler arasındaki doğrudan etkiye yönelik değerlendirme yapılacak olursa; Stratejik farkındalık, stratejik çeviklik üzerinde önemli düzeyde pozitif yönlü anlamlı bir etkiye sahiptir. Araştırmanın H1'ini doğrulayan bu bulguya göre stratejik farkındalıkları yüksek olan işletmelerin stratejik çeviklikleri de artmaktadır. Bu nedenle işletmelerin stratejik çevikliklerini artırması için dış çevredeki fırsat ve tehditlere yönelik farkındalıklarının yüksek olması gerekmektedir. Yapılan literatür incelemesinde de fırsat farkındalığının, işletmelere risk alma konusunda pozitif eğilim sağlayarak iş yöntemlerini değişen koşullara hızla adapte edebilmelerine yardımcı olduğu görülmektedir (Tsai et al., 2008: 885). Ayrıca işletmeler dış çevredeki tehditlere esnek çözümler üretmek için sektörle ilgili tahmin mekanizmaları geliştirme konusunda yoğun bir çaba içerisine girmektedirler (Al-Badayneh, 2020: 51). Bu olgulardan hareketle fırsat ve tehdit farkındalığını içeren stratejik farkındalığın, işletmenin stratejik çevikliğini pozitif yönde etkilemesi makul bir sonuçtur. Dolayısıyla araştırma sonuçlarının literatürdeki benzer çalışmaların sonuçlarıyla örtüştüğü söylenebilir.

Stratejik farkındalığın, stratejik yetenek üzerindeki etkisine ilişkin analizde ise orta düzeyde pozitif yönlü anlamlı bir etki tespit edilmiştir. H2'yi doğrulayan bu bulguya göre işletmelerin stratejik yeteneklerini artırmak için de stratejik farkındalığa sahip olması önem arz etmektedir. Bunun yanında literatürde stratejik farkındalığın, başarı olasılığı yüksek faaliyetlerden fayda sağlamak için önemli kaynakların yatırımında yönetimsel perspektifi içerdiği yönünde düşünceler vardır (Cai et al., 2015: 57). Bu nedenle genel olarak bir işletmenin performansını artırabilmek amacıyla somut veya soyut kaynaklarını etkili bir şekilde kullanması olarak tanımlanan stratejik yeteneğin (Amit & Schoemaker, 1993: 33), stratejik farkındalık tarafından pozitif yönde etkilenmesi anlamlı bir sonuçtur.

Son olarak stratejik yeteneğin, stratejik çeviklik üzerindeki etkisine yönelik analizde de yüksek düzeyde ve pozitif yönlü anlamlı bir etki ortaya çıkmıştır. H3'ü doğrulayan bu bulguya göre de işletmelerin stratejik nitelikteki yetenekleri arttıkça stratejik çeviklikleri de artmaktadır. Yapılan literatür incelemesinde işletmenin, rakipleri tarafından taklit edilmeden önce rekabet avantajını korumasının (Mathiassen & Pries-Heje, 2006) ve rakiplerden önce harekete geçmesinin çeviklikte önemli olduğuna ilişkin sonuçlara ulaşılmıştır (Sucu, 2020: 47). Bu kapsamda işletmelere taklit edilemezlik ve rekabet üstünlüğü sağlama konusunda temel bir yetkinlik kazandıran stratejik yeteneğin stratejik çevikliği artırması oldukça anlamlı bir sonuçtur.

Bunun yanında araştırmanın temel sorusunu çözmeye yönelik gerçekleştirilen aracılık testi sonucunda ise stratejik yeteneklerin, stratejik farkındalık ve stratejik çeviklik arasında anlamlı bir aracılık etkisine sahip olduğu belirlenmiştir. H4'ü doğrulayan bu bulguya göre işletmelerin, her ne kadar stratejik farkındalığa sahip olsalar da çevresel değişikliklere etkili ve zamanında başarılı bir şekilde cevap verebilmeleri stratejik yeteneklerine bağlıdır. Nitekim literatürde stratejik yetenekler için birçok araştırmacının da belirttiği gibi işletmelerin sahip oldukları farklılıklar eğer ayırt edici stratejik yeteneklere dönüşebilirse işletme performansı üzerinde olumlu yönde bir katkı oluşturmaktadır (Karakılıç & Öcal, 2008: 88).

Elde edilen sonuçlar literatürdeki bazı araştırmaların sonuçları ile karşılaştırıldığında önemli düzeyde birbirini destekler nitelikte görünmektedir. Örneğin; Taşgit et al. (2021) tarafından stratejik farkındalık ve kurumsal evet arasındaki ilişkiyi tespit etmeye yönelik gerçekleştirilen çalışmada, stratejik farkındalığın kurumun birlikte hareket etme yeteneğine önemli ölçüde katkı yaptığı sonucuna ulaşılmıştır. Panda (2022) tarafından stratejik uyum yeteneği, çeviklik ve örgütsel performans arasındaki ilişkilerin incelediği çalışmada ise stratejik uyum yeteneğinin çeviklik üzerinde olumlu yönde bir katkısı olduğu tespit edilmiştir. Bunun yanında Djaja & Arief, (2015) dinamik bilgi teknolojisi yeteneği, stratejik çeviklik, iş modeli inovasyonu ve firma performansı arasındaki ilişkileri incelemeye yönelik gerçekleştirdikleri çalışmada, dinamik bilgi teknolojisi yeteneğinin stratejik çeviklik üzerinde pozitif yönde bir etkisinin olduğu sonucuna ulaşmışlardır. Chan & Muthuveloo (2020) stratejik çeviklik için ihtiyaç duyulan örgütsel yetenekleri ele aldıkları çalışmada, örgütsel öğrenme yeteneğinin stratejik çevikliğe önemli ölçüde katkı yaptığını tespit etmişlerdir. Saputraa et al. (2022) ise dijital yeteneğin çeviklik üzerinde stratejik bir rolü olduğu sonucuna ulaşmışlardır.

Özel Sektöre Yönelik Öneriler

Mevcut araştırma modelinin bu sonuçlarından yararlanarak işletme politika yapıcılarına bazı öneriler sıralanabilir. Şöyle ki sürekli değişimin temel kural haline geldiği günümüz rekabet ortamında, yaşanan değişikliklere uyum sağlamak adına dış çevreden önemli bilgileri işletmeye aktaran, işletme içinde de önemli bilgileri ilgili taraflara zamanında dağıtan ve bu sayede değişimlere hızla uyum sağlayıp tepki verebilen, diğer bir ifadeyle stratejik çeviklik özelliğine sahip işletmeler yaşamlarını daha başarılı bir şekilde sürdürebileceklerdir. İşletmelerin bu özelliği kazanabilmeleri için taklit edilmesi zor ve rekabet üstünlüğü sağlayan stratejik yeteneklere ihtiyacı vardır. Aynı zamanda çevresel fırsat ve tehditleri doğru algılamalarına imkân tanıyacak stratejik farkındalıklarını geliştirmeleri gerekmektedir. Kıyasıya rekabetin yaşandığı günümüzde her işletmenin amacı, ayakta kalmak ve varlığını devam ettirebilmek için gerekli stratejik çalışmaları yapmaktır. İşletmeler, stratejik farkındalıklarını ne ölçüde artırır ve stratejik yeteneklerini geliştirmeye kendilerini adarlarsa, o ölçüde stratejik çeviklik kazanabileceklerdir. İşletmeler, alacağı stratejik kararları hayata geçirmek için öncelikle stratejik konulara ilişkin bilgi seviyesini gözden geçirmeli ve bu konuda yöneticiler başta olmak üzere tüm çalışanlarını stratejik yönelim konusunda bilinçlendirme gayreti içerisine girmelidirler.

Bununla birlikte sahip oldukları stratejik yetenekler ve gerçekleştirmek istedikleri hedefleri birbiriyle uyumlu hale getirmeleri, işletmelerin doğru zamanda ve doğru stratejileri uygulayarak başarıya ulaşması bakımından büyük önem arz etmektedir. Yoksa ilerlemek istediği alanda ihtiyaç duyulan stratejik yeteneğe sahip olmayan işletmeler, stratejik bakımından çevik davranamayacak ve ani değişimler karşısında gerekli tepkileri veremeyeceklerdir.

Akademiye Yönelik Öneriler

Gelecek çalışmalar için öneriler noktasında ise araştırmacılar, değişkenlerin incelenmesinde anket tekniğini kullanmak yerine nitel veri toplama yöntemleri aracılığıyla değişkenlere yönelik daha derinlemesine bilgiler elde edebilirler. Bunun yanında daha spesifik sonuçlara ulaşma bağlamında daha homojen örneklemler üzerinde çalışılabilir. Ayrıca gerçekleştirilen analizlerden daha güçlü sonuçlar elde edilmek adına daha büyük örneklem gruplarına ihtiyaç duyulmaktadır. Bu durum araştırma sonuçlarının genellenebilirliği açısından kritik bir önem taşımaktadır.

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Türkiye'de Dolaylı Vergi Yükü ve Dolaylı Vergilerin Artan Oranlılığı

Uğur AKKOÇ *(https://orcid.org/0000-0002-9949-2097), Pamukkale University, Türkiye; uakkoc@pau.edu.tr*

Selçuk GEMİCİOĞLU *(https://orcid.org/0000-0001-7952-5456), Van Yüzüncü Yıl University, Türkiye; selcukgemici28@gmail.com*

Burça KIZILIRMAK *(https://orcid.org/0000-0003-3247-7586), Ankara University, Türkiye; abkizilirmak@gmail.com*

Indirect Tax Burden and Progressivity of Indirect Taxes in Turkey

Abstract

This study has two main aims. The first is calculating the share of indirect taxes in household income and expenditures in Turkey. The second aim is to measure the progressivity of Value Added Tax (VAT) and Special Consumption Tax (SCT) using expenditure and income methods. The analyses were carried out using the data obtained from the Household Budget Surveys for 2004-2019 by the Turkish Statistical Institute. The progressivity of VAT and SCT was measured with the Kakwani progressivity index. The findings show that VAT is progressive according to the expenditure method and regressive according to the income method. The SCT is progressive according to both methods.

Öz

Bu çalışmanın iki ana amacı vardır. Birincisi, Türkiye'de dolaylı vergilerin hanehalkı gelir ve harcamaları içindeki paylarını hesaplamaktır. Diğeri, harcama ve gelir yöntemine göre Katma Değer Vergisi (KDV) ve Özel Tüketim Vergisi (ÖTV) için artan oranlılığı ölçmektir. Analizler, Türkiye İstatistik Kurumu tarafından derlenen 2004-2019 dönemine ait Hanehalkı Bütçe Araştırmalarından elde edilen veriler kullanılarak gerçekleştirilmiştir. KDV ve ÖTV'nin artan oranlılığı Kakwani artan oranlılık endeksi ile ölçülmüştür. Elde edilen bulgular, harcama yöntemine göre KDV'nin artan oranlı olduğunu gösterirken gelir yöntemine göre azalan oranlı olduğu ortaya çıkmıştır. ÖTV'nin ise her iki yönteme göre de artan oranlı olduğu belirlenmiştir.

1. Giriş

Tüketim hem tüketici tercihleri teorisinin hem de makro iktisadi analizin kalbinde yer alan çok boyutlu bir olgudur. Bunun yanı sıra, mal ve hizmet tüketimi ekonomik refahın (well-being) birincil bileşenidir ve yaşam standardının birincil göstergesidir. Her şey eşit olsa bile daha yüksek bir tüketim düzeyine sahip bir birey, daha düşük bir tüketim düzeyine sahip bir bireye göre daha yüksek ekonomik refah düzeyinde olarak değerlendirilir (OECD, 2013). Dolayısıyla, toplam tüketimin en büyük ve önemli bileşeni olan hanehalkı tüketiminin değişimine, özelliklerine, belirleyicilerine ve ekonomik etkilerine dair daha iyi bir kavrayış geliştirme çabası iktisadi analiz için vazgeçilmezdir.

Refahın ölçümünde sıklıkla gelir ve servet dağılımı ölçü olarak kullanılsa da araştırmalar tüketimin daha iyi bir ölçüt olduğuna dair güçlü kanıtlar sunmaktadır (Modigliani & Brumberg; 1954; Blundell & Preston, 1998). Bunlardan ilki ve belki de en önemlisi tüketimin gelirden daha az oynak olmasıdır. Buna göre, gelir yıldan yıla büyük değişimler gösterebilir. Oysa tüketim, kişilerin tüketimlerini düzleştirme eğilimi nedeniyle zaman içerisinde daha az oynaktır. Bunun yanı sıra tüketimin refahın en iyi ölçütü olduğuna dair ikinci neden, gelirin refahı artıran servet, birikim gibi tüm ulaşılabilir kaynakları içermemesidir (Meyer & Sullivan, 2018).

Gelirin tüketime dönüşümünde tasarruf ve satın alma gücü yanında etkili olan diğer bir faktör, harcamalar üzerinden alınan vergilerdir ve bu faktör tüketimi azaltıcı yönde etki etmektedir. Hanehalklarının tüketimi sırasında harcama üzerinden alınan dolaylı vergilerin çeşidi ve oranı, tüketilen mal ve hizmet grubuna göre değişmektedir. Örneğin Türkiye'de harcamalardan tahsil edilen beş tür dolaylı vergi bulunmaktadır[1]: Katma Değer Vergisi, Özel Tüketim Vergisi, Özel İletişim Vergisi, Bankacılık ve Sigorta Muameleleri Vergisi, Şans Oyunları Vergisi. Bu tip dolaylı harcama vergilerinin en yaygın örneği olan Katma Değer Vergisi (KDV) oranları Türkiye'de üç kategoride uygulanmaktadır. Farklı mal ve hizmetler için KDV oranı Türkiye'de yüzde 1, 8 ya da 18 olabilmektedir. Dolayısıyla, tıpkı enflasyonda olduğu gibi her hanenin kendine özgü tüketim sepetine harcama yapmasından dolayı ödediği toplam harcama vergisi de farklı olmaktadır.

Dolaylı vergiler ile ilgili önemli bir tartışma konusu da vergilerin gelir ya da tüketim eşitsizliği üzerindeki etkisidir. Tüketim harcamalarından alınan dolaylı vergilerin, gelir dağılımına kıyasla daha adil bir tüketim dağılımı yaratıp yaratmadığı vergilerin artan oranlılığı ile kestirilebilmektedir (Slemrod, 1996). Artan oranlılık kavramı ile basitçe, daha yüksek gelir ya da tüketim düzeyine sahip bireylerin daha yüksek bir vergi yüküne maruz kalıp kalmadığı belirlenmeye çalışılmaktadır. Gelir ya da tüketim arttıkça ödenen verginin payı artıyorsa ilgili vergi artan oranlıdır ve dolayısıyla eşitsizliği azaltıcı etkiye sahiptir.

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[1] *Dolaylı vergi türleri daha fazla sayıda olmakla birlikte (Çetinkol, 2013; Buhur, 2019) bu çalışmada uluslararası literatürle karşılaştırmanın sağlanabilmesi amacıyla (Thomas, 2021) yalnızca dahilde alınan mal ve hizmetlere ilişkin dolaylı vergiler dikkate alınmıştır. Burada sayılanların dışında, uluslararası ticaret ve muamelelerden alınan dolaylı vergiler olarak gümrük vergisi de bulunmaktadır.*

Türkiye'de toplam vergi gelirleri içerisinde dolaylı vergilerin payı 2021 genel bütçesinde %65 olarak gerçekleşmiştir (TCMB, 2022). Türk vergi sisteminde dolaylı vergilerin baskınlığı vergi adaleti ve etkinliği açısından sorunlu görülmektedir. Öte yandan Türkiye'de dolaylı vergilerin tüm vergiler içerisinde hâkim payına ve çeşitliliğine rağmen, dolaylı vergileri mikro açıdan ele alan ve hanehalkı ekonomisine etkilerini inceleyen çok az sayıda çalışma bulunmaktadır. Türkiye'de ilgili literatür daha geniş bir bakışla incelendiğinde, dolaylı vergiler ile ilgili çalışmaların kısıtlı sayıda olduğu söylenebilir. Bu çalışmalar çoğunlukla dolaylı vergi miktarının gelir gruplarında nasıl değiştiğini incelemektedir (Baldemir, 2003). Bir diğer çalışma olan Zenginobuz vd. (2010) ise Türkiye'de dolaylı vergileri hanehalkı gelir grupları boyunca izlemiştir. Çalışmanın temel amacı, vergi ve demokrasi ile temsiliyet ilişkisini incelemektir. KDV'nin artan oranlılığı ile ilişkili çalışmalar arasında OECD (2014) ve Thomas (2021) gösterilebilir. Her iki çalışmanın kapsamı Katma Değer Vergisi ile sınırlıdır. Aynı zamanda, Thomas (2021) yine çok sayıda ülke ile birlikte Türkiye'de artan oranlılığı yalnızca 2010 yılı için incelemiştir. Bu durum, hem artan oranlılığın zaman içindeki seyrini izlemeyi olanaksızlaştırmakta hem de 2008 küresel krizi sonrası geçici tüketim şoklarının etkisini içermektedir. Albayrak vd. (2016) ise hanelerin doğrudan ve dolaylı vergi yüklerini hesaplamış ve bir mikrosimülasyon modeli yardımıyla vergi politikalarında 2003-2013 arasındaki değişikliklerin dağılım etkilerini incelemiştir. Bu çalışma, Türkiye'de dolaylı vergi yüküne ve artan oranlılığına daha geniş bir zaman diliminde ayrıntılı bir inceleme sunarak literatürdeki boşluğa katkı sağlamayı amaçlamaktadır.

Bu çalışmanın amacı Türkiye'de harcamalar üzerinden alınan dolaylı vergilerin tüketim dağılımı üzerindeki etkilerini ölçmektir. Bu amaçla öncelikle Türkiye'deki hanehalklarının dolaylı vergi yükleri belirlenmiş ve dağılımları incelenmiştir. Dolaylı vergi yükleri belirlenirken, mal ve hizmetlerin en detaylı sınıflandırması kullanılmış ve tüm dolaylı harcama vergileri dikkate alınmıştır. Çalışmanın beklenen katkıları şu şekilde özetlenebilir. Birincisi, Türkiye'de her hanenin vergi yükünü en ayrıntılı mal ve hizmet sınıflandırmasını ve tüm dolaylı vergi türlerini kullanarak hesaplayan ilk çalışma olmasıdır. Türkiye'nin vergi rejiminde dolaylı vergilerin hâkim payı göz önüne alındığında bu ölçümün önemli iktisadi sonuçları söz konusudur. İkinci olarak, dolaylı vergilerin artan oranlılığını ve dolayısıyla tüketim eşitsizliğine etkisini 2008 küresel krizini de içeren 2003-2019 dönemindeki yıllar boyunca analiz eden ilk çalışma olmasıdır. Bu çalışma, hesaplanan dolaylı vergi yükünün hanehalkı tüketim eşitsizliğine etkisinin yönü, büyüklüğü ve yıllar içindeki seyrinin analizi vasıtasıyla Türkiye ekonomisi için literatürdeki boşluğu doldurmayı hedeflemektedir. Son olarak, her ne kadar çalışmada kurulan ampirik çerçeve dinamik bir model içermediği için tüketicilerin ikame davranışlarını ve esneklikleri içermese de dolaylı vergilere ilişkin alternatif rejimlerde eşitsizliğin nasıl değiştiğini inceleyerek uygulanabilecek politikaların sonuçları ile ilgili önemli ipuçları ortaya koymaktadır.

Çalışmanın takip eden ikinci bölümünde ilgili literatürün bir özeti yer almaktadır. Üçüncü bölümde, Türkiye'de dolaylı vergilerin türlerine, tarihine ve oranlarına ilişkin detaylı bir inceleme sunulmuştur. Dördüncü bölümde çalışmada kullanılan niceliksel

yöntemler tanıtılırken beşinci bölümde bulgulara yer verilmiştir. Altıncı ve son bölümde ise sonuçlar ve tartışmalar bulunmaktadır.

2. Literatür

Dolaylı vergilerin azalan oranlı olduğu şeklinde genel bir kanı vardır. Başka bir ifade ile en düşük gelir diliminden en yüksek gelir dilimine doğru ilerledikçe dolaylı vergilerin gelirden aldığı payın giderek azaldığı ileri sürülmektedir. Dolaylı vergilerin ve dolaylı vergi türlerinin azalan oranlı olup olmadığının araştırıldığı çalışmalarda ise (Caspersen & Metcalf, 1994; Creedy, 1998; Decoster, 2005; Klazar, 2008; Decoster et al., 2010; Gastaldi et al., 2017; Araujo, 2019; Thomas, 2021) dolaylı vergilerin kullanılan refah ölçütlerine göre azalan, artan ya da sabit oranlı olabileceği ortaya çıkmıştır.

Caspersen ve Metcalf (1994) dolaylı vergilerin azalan oranlı olup olmadığının belirlenmesi için yıllık (cari) ve ömür boyu gelir olmak üzere iki farklı refah ölçütü kullanmıştır. Farklı refah ölçütlerinin kullanılması bazı teorik gerekçelere dayandırılmıştır. Dolaylı vergi yükünün cari gelirin payı olarak hesaplandığı durumda, cari dönemde gerçekleştirilen tasarruflar gelecek dönemlerde tüketim harcamalarına dönüştüğünde dolaylı vergilere tabi olmayacakmış gibi davranılmaktadır. Dolaylı vergi yükünün ömür boyu gelirin bir payı olarak hesaplandığı durumda ise cari dönemde yapılan tasarrufların gelecek dönemlerde tüketim harcamalarına dönüştüğünde dolaylı vergilere tabi olacağı kabul edilmektedir. Dolayısıyla ömür boyu gelire dayalı analizler ile dolaylı vergi yükünün daha doğru bir şekilde elde edileceği düşünülmektedir. Çoğu zaman cari gelire göre yaşam boyu geliri ölçmek kolay olmadığı için ömür boyu geliri temsilen cari harcamaların kullanıldığı görülmektedir (Decoster et al., 2010; IFS, 2011; Thomas, 2021). Ömür boyu geliri temsilen cari harcamaların kullanılmasının nedeni, hanehalkı gelirine göre hanehalkı tüketimin daha düz bir seyir izleme eğiliminde olması ve böylece cari harcamaların hanehalkı refahını daha iyi bir şekilde yansıtmasıdır. Diğer bir deyişle cari gelire göre gerçekleştirilen analizlerde göz ardı edilen tasarruf etkilerinin cari harcamalar ile gerçekleştirilen analizlerde ortaya çıkmaması ve ömür boyu gelirle gerçekleştirilen analizlerle benzer sonuçların elde edilmesidir.

Murphy (2010) ömür boyu geliri temsilen cari harcamaların kullanılmasının belirli koşullar altında geçerli olabileceğini belirtmiştir. Tüketim düzleştirilmesine gidilmesi için hanehalklarının tasarruf yapma ve borç alma olanaklarının olması gerektiği fakat en düşük gelir diliminde yer alan hanehalklarının tasarruf yapma ve borç alma olanaklarının olmadığı ifade edilmiştir. Sonuç olarak azalan oranlılığın belirlenmesinde odak noktası olan en düşük gelir diliminde yer alan grubun cari gelirinin tamamını tükettiği bu yüzden de analizlerde ömür boyu geliri temsilen cari harcamaların kullanılmasının uygun olmayacağı bunun yerine analizlerin cari gelirle gerçekleştirilmesi önerilmiştir.

Literatür artan oranlılığın ölçülmesinde tüketim veya gelirin temel alınması durumlarında sonuçların oldukça farklılaştığını göstermektedir. Caspersen ve Metcalf (1994)'in çalışmasında ömür boyu gelire dayalı yapılan analizlerde dolaylı vergilerin azalan

oranlılığının cari gelire göre daha düşük boyutta olduğu bulunmuştur. Decoster vd.'nin (2010) çalışmasında Belçika, İngiltere, İrlanda, Macaristan ve Yunanistan olmak üzere beş Avrupa ülkesi için harcanabilir gelir kullanılarak gerçekleştirilen analizlerde dolaylı vergilerin azalan oranlı olduğu ortaya çıkarken toplam harcamalara göre gerçekleştirilen analizlerde dolaylı vergilerin sabit veya artan oranlı olduğu görülmüştür. IFS (2011) raporunda Belçika, Fransa, Almanya, İspanya, Birleşik Krallık, Yunanistan, Macaristan, İtalya ve Polonya'da KDV'nin artan oranlığı incelenmiştir.

Vergi yükü cari gelirin yüzdesi olarak hesaplandığında, tüm ülkelerde KDV'nin azalan oranlı olduğu, vergi yükü cari harcamaların yüzdesi olarak hesaplandığında sonuçların önemli ölçüde değiştiği gözlenmiştir. Belçika, Almanya, İtalya ve Polonya'da, en alt gelir diliminden en üst gelir dilimine doğru ilerledikçe vergi yükünde oransal olarak sınırlı boyutta da olsa artışlar yaşanmaktayken, diğer ülkelerde gelir dilimleri boyunca ilerledikçe çok az değişiklikler yaşandığı görülmüştür. Başka bir ifade ile çalışmaların bulguları, harcamalar yoluyla elde edilen sonuçlar KDV'nin bazı ülkelerde sabit oranlı, bazı ülkelerde ise sınırlı düzeyde artan oranlı olduğunu göstermiştir.

Araujo'nun (2019) çalışmasında Portekiz için birden fazla hanehalkı bütçe anketinden faydalanılarak dolaylı vergilerin artan oranlılığı araştırılmıştır. Gelire dayalı olarak hesaplanan Kakwani artan oranlılık endeksi ve artan oranlılık eğrilerine göre, Portekiz'deki dolaylı vergi sisteminin azalan oranlı olduğu sonucuna ulaşılmıştır. Thomas'ın (2021) çalışmasında 27 OECD ülkesi için KDV'nin azalan oranlı olup olmadığı incelenmiştir. 27 ülkenin tamamında vergi yükü cari gelirin yüzdesi olarak ölçüldüğünde KDV'nin azalan oranlı olduğu görülürken vergi yükü cari harcamanın bir yüzdesi olarak ölçüldüğünde genellikle KDV'nin sabit oranlı veya sınırlı düzeyde de olsa artan oranlı olduğu sonucuna ulaşılmıştır. Buna ilaveten artan oranlılığın ölçümünde kullanılan Kakwani endeksine göre Şili, Macaristan, Letonya ve Yeni Zelanda'da da KDV'nin azalan oranlı olduğu, diğer tüm ülkelerde ise boyutu düşük de olsa artan oranlı olduğu ortaya çıkmıştır.

Türkiye ekonomisinde dolaylı vergiler ile ilgili çalışmalar kısıtlı sayıdadır. Bu çalışmaların önemli kısmı dolaylı vergilerin Türk vergi sistemi içerisindeki payı ve etkinliği üzerine tanımlayıcı araştırmalardır (Şen-Önal, 2006; Merter vd., 2007; Kargı & Yayğır, 2016; Nacar & Karabacak, 2022). Bazı çalışmalar Türkiye'deki dolaylı vergi yapısının ve yükünün uluslararası karşılaştırmasını sunmaktadır. Özdemir (2009) tüketim üzerinden alınan vergilerin payının yüksek olmasını Türk vergi sisteminin bir eksikliği olarak tanımlarken OECD ülkelerine kıyasla Türkiye'de dolaylı vergilerin ayrımcı ve kabul edilemez düzeyde yüksek olduğunu savunmaktadır. Çiçek ve Uğur (2019) dolaylı-dolaysız vergilerin yapısı itibariyle Avrupa Birliği ülkeleri ile Türkiye'yi karşılaştırdıkları çalışmada, Türk vergi sisteminde dolaylı vergilerin Avrupa Birliği ülkelerinin aksine çok yüksek paya sahip olmasının ve önemli bir gelir kaynağı hale gelmesinin vergilemede adalet ve eşitlik ilkesi ile bağdaşmadığını ifade etmektedir. Literatürdeki diğer bir grup çalışma ise Türkiye'de dolaylı vergilerin ekonomiye etkisini makro bir bakış açısıyla değerlendirmektedir (Akıncı & Özçelik, 2018; Soydal & Yılmaz, 2009). Bu gruptaki bazı çalışmalar yine makro iktisadi bir perspektiften dolaylı vergilerin gelir dağılımını bozucu

etkileri olduğunu tespit etmiştir (Karanfil & Özkaya, 2013; Günel, 2019; Bayar vd., 2019; Karabulut, 2020).

Bunların dışında Türkiye'de dolaylı vergileri mikro düzeyde, hanehalkı ekonomisine etkileri bakımından inceleyen çok az sayıda çalışmadan bahsetmek mümkündür. Baldemir vd. (2003) yalnızca KDV'nin gelir gruplarına göre dağılımını incelemiş ve gelir dağılımı üzerindeki etkilerini tartışmıştır. 1985 yılında KDV'nin yürürlüğe girmesi ile birlikte gelir dağılımındaki bozulmanın arttığını ifade eden Baldemir vd. (2003) bu etkinin azaltılması için KDV oranlarına dair önerilerde bulunmuştur. Vergi ve transferlerin gelir dağılımına etkileri konusunda Zenginobuz vd. (2010), 2003-2008 arasında en yüksek %5'lik grubun KDV yükünün ortalamanın %75'i kadarken en düşük %5'lik grup için ortalamanın neredeyse iki katı olduğunu ifade etmektedir. OECD (2014) ve Thomas (2021), çok sayıda ülke ile birlikte Türkiye'yi de ele alarak KDV'nin artan oranlılığını belirlemeyi amaçlayan çalışmalardır. KDV'nin harcama grupları boyunca izlendiğinde artan oranlı olduğunu tespit eden çalışmalar, KDV yükünün gelire oranla hesaplandığında azalan, vergi öncesi harcamalara oranla hesaplandığında ise yine artan oranlı olduğu sonucuna ulaşmıştır. OECD (2014) ek olarak özel tüketim vergilerini her hesaplama yönteminde azalan oranlı bulmaktadır.

Son olarak, Albayrak (2010), Albayrak (2016) ve Yılmaz vd.'nin (2019) çalışmaları bu çalışmanın kapsamı olan Türkiye'de dolaylı vergi yükünün artan oranlılığının tespit edilerek gelir dağılımına etkisinin ölçülmesi ile en uyumlu çalışmalardır. Albayrak (2010) 2003 yılı verilerini kullanarak hem nihai mallar üzerindeki hem de girdi-çıktı tabloları aracılığı ile ithal ve ara mallar üzerindeki dolaylı vergilerin etkilerinin de içerildiği efektif vergi oranlarını ve bunların gelir dağılımı üzerindeki etkilerini hesaplamıştır. Vergilerin artan oranlılığını ölçmede Kakwani endeksi, Reynolds-Smolensky endeksi ve Atkinson-Plotnick endeksi kullanılmıştır. Vergilerin refah göstergesi olarak harcamaların kullanıldığı durumda küçük de olsa düzeltici, gelirin kullanıldığı durumda ise bozucu etkisi olduğu sonucuna ulaşılmıştır. Albayrak vd. (2016), statik mikrosimülasyon modeli kullanarak 2003, 2006 ve 2013 yıllarında vergi politikalarındaki değişikliklerin birey ve hanelerin vergi yüklerinde ve gelir dağılımında ortaya çıkardığı etkileri incelemiştir. Kakwani endeksi kullanılarak yapılan hesaplamalarda dolaylı vergilerin azalan oranlı olduğu ve 2013'te bu azalan oranlılığın yükseldiği sonucuna ulaşılmıştır. Yazarlar bu yükselmenin ÖTV ve ÖİV'den kaynaklandığını bildirmektedir. Vergi öncesi ve sonrası Gini endeksi karşılaştırması da benzer şekilde, dolaylı vergilerin azalan oranlı olduğunu göstermektedir. Yılmaz vd. (2019) 2002-2013 HBA verilerini kullanarak harcamalardan alınan vergilerin gelir dağılımı üzerindeki etkilerini incelemiştir. En yoksul gelir grubundakilerin vergi içindeki payının tüketim içindeki payına oranı 1 civarında bulunmuştur. Buradan çıkarılan sonuç, harcama vergilerinin gelir dağılımını düzeltici etkisinin zayıf olduğu ve bu vergilerin azalan oranlı olduğu şeklindedir. Vergi öncesi ve sonrası Gini katsayılarının karşılaştırılması da harcama vergilerinin, 2005, 2006 ve 2008 yılları hariç, eşitsizliği azaltmadığı sonucunu vermiştir.

3. Türkiye'de Dolaylı Vergiler

Türkiye'de mevcut dolaylı vergilerin Avrupa Birliği'ne adaylık çalışmaları kapsamında mevzuat uyum çabalarına dayanan bir geçmişi bulunmaktadır. Türkiye'de 1985 yılından itibaren yürürlüğe giren ve halen uygulamada olan beş tür dolaylı vergiden bahsetmek mümkündür: i) Katma Değer Vergisi (KDV), ii) Özel Tüketim Vergisi (ÖTV), iii) Özel İletişim Vergisi (ÖİV), iv) Banka ve Sigorta Muameleleri Vergisi (BSMV), v) Şans Oyunları Vergisi (ŞOV). Yürürlükte olan beş dolaylı vergi arasında en önemlileri, toplam vergi hasılatı içerisindeki hâkim payları nedeniyle KDV ve ÖTV'dir. 2020 yılı merkezi yönetim bütçesinde KDV'den elde edilen gelirin toplam vergi gelirleri içerisindeki payı %27,6 ve ÖTV'nin payı %24,8'dir (Çiçek & Uğur, 2019).

Türkiye'de KDV 1985 yılında 3065 sayılı Katma Değer Vergisi Kanunu ile yürürlüğe girmiştir. KDV esas itibariyle satın alınan mal ve hizmetlerin harcama tutarları üzerinden belirli bir oranda vergi almayı öngörmektedir. Kanunun yapısı vergi oranları bakımından incelendiğinde, Kanunun ekli listelerinde yer alan istisnai mallar dışında tüm mal ve hizmetlere %18 oranında KDV uygulanmasının esas olduğu anlaşılmaktadır. Kanunun yürürlüğe girdiği tarih itibariyle bu genel oranın %10 olduğu ancak yıllar içerisinde yapılan değişikliklerle oranın arttığı görülmektedir. Mevcut durumda kanunda yer alan 1 sayılı ekli listede yer alan mallara %1 ve 2 sayılı ekli listede yer alan mallara %8 oranında KDV uygulanmaktadır.

KDV oranları kanunun yürürlüğe girdiği tarihten itibaren çıkarılan Bakanlar Kurulu Kararları (2018 yılındaki hükümet sistemi değişikliğinden sonra Cumhurbaşkanlığı Kararnameleri) yoluyla çok defa değiştirilmiştir. Bu değişikliklerin bazıları ise kanunda ekli listeleri tümden yenileyerek vergi rejimini değiştiren kapsamlı değişikliklerdir. Bu çalışmada incelenen örneklemin başlangıcı olan 2003 yılındaki KDV oranlarını belirleyen son kapsamlı liste değişikliğinin 2002 yılında yayınlanan 4480 sayılı Bakanlar Kurulu kararı olduğu tespit edilmiştir. İlgili kararda kanunun ekli 1 ve 2 sayılı listeleri baştan yazılmış ve böylece %1 ve %8 istisna KDV oranı uygulanan mal ve hizmetler yeniden belirlenmiştir. Ancak sonraki yıllarda ilgili mevzuat değişiklikleri ile toplamda 58 defa değişiklik yapılmıştır. Bu değişikliklerin 40 tanesi KDV kanununda oranları belirleyen 28. madde ile ilgilidir.

Buna göre KDV oranları çok defa değişmiş olmakla birlikte, ilgili dönem içerisinde bazı kapsamlı değişiklikler dikkat çekmektedir. 2004 yılında tıbbi ürünler ve tıp hizmetleri, 2006 yılında ise giyim eşyaları 2 sayılı listeye dahil edilerek KDV oranları %18'den %8'e düşürülmüştür. Bununla birlikte 2008 küresel finansal krizi sonrasında bazı mal ve hizmetler için geçici olarak (çoğunlukla üç aylık dönemler) KDV muafiyeti getirildiği ve oranın sıfıra indirildiği görülmektedir. KDV'nin toplam vergi gelirleri içerisindeki payının büyüklüğü, yapılan değişiklik sayısı ve kriz sonrası getirilen muafiyetler ile birlikte değerlendirildiğinde KDV'nin politika yapıcılar tarafından en azından bazı dönemlerde maliye politikasının bir aracı olarak dinamik biçimde kullanıldığı anlaşılmaktadır.

Türkiye'de toplam vergi hasılatında %24,8'lik paya sahip olan bir diğer önemli dolaylı vergi ÖTV'dir. ÖTV 2002 yılında 4760 sayılı kanunla bazı mal ve hizmetlerin tüketiminden ek vergi almak amacıyla yürürlüğe girmiştir. ÖTV yapı itibariyle lüks malların vergilenmesi işlevi yanında toplum sağlığı, çevresel bozulma vb. açılardan negatif tüketim dışsallığına sahip ürünlerin tüketiminden vergi alınması esasına dayanan "günah vergileri"ne de oldukça benzemektedir. Günah vergilerinin temel amacı yasal ve yaygın kullanımı olduğu halde toplum tarafından kullanımı hoş karşılanmayan erdemsiz malların vergilendirilmesi ve bu yolla tüketimi ve negatif dışsallığı azaltmak olsa da (Hyman, 1999) Türkiye'de ÖTV önemli bir vergi gelirine dönüşmüştür.

Türkiye'de yürürlükte olan ÖTV kanunu incelendiğinde kanunun ekli listelerinde yer alan mal ve hizmetlerin yine listede belirtilen oranlarda vergilendirilmesi usulüyle çalıştığı görülmektedir. İlgili kanun, özel tüketim vergisinin amacı ve kapsamını belirlerken ekte yer alan I, II, III ve IV nolu listeler ÖTV uygulanan mal ve hizmetler ile alınan vergi oranını (ya da miktarını) içermektedir. I nolu liste genel bir ifadeyle akaryakıt ve yağları; II nolu liste motorlu araçları, III nolu liste alkolsüz ve alkollü içecekler ile tütün ürünlerini ve IV nolu liste ise çeşitli lüks tüketim mallarını içermektedir.

KDV ve ÖTV arasında usul yönünden önemli bir fark, KDV'nin ekli listede yer alan indirime tabi mallar dışındaki tüm mallara uygulanması, ÖTV için yalnızca ekli listede yer alan malların vergiye tabi olmasıdır. Yine usul açısından bir diğer fark ise ÖTV yalnızca ithal ya da ilk satış işlemi sırasında bir defaya mahsus olarak matraha tabi olmaktadır. KDV ise hem ara hem de nihai mallar üzerinden alınmaktadır. Son olarak, bu iki dolaylı vergi arasındaki bir diğer fark da vergilendirme aşamasında ortaya çıkmaktadır. Buna göre, aynı listede yer alsalar bile mal ve hizmetlerin büyük bir kısmı için ÖTV oranları birbirinden farklıdır ve her değişiklik ile yeniden belirlenmektedir. Ayrıca ÖTV hem oransal hem de maktu vergilerin birlikte kullanıldığı bir vergilendirme esasına sahiptir. Örneğin, özellikle tütün ürünleri ve alkollü içecekler grubunda yer alan mallardan alınan ÖTV iki çeşit vergiden oluşmaktadır: maktu vergi ve oransal vergi. Maktu vergi malın miktarı üzerinden birim başına alınan vergi çeşididir (Uğur & Kömürcüler, 2015). Oransal vergi ise malın satış tutarı üzerinden belirli bir yüzde ile alınan vergi çeşididir. ÖTV mevzuatını daha karmaşık hale getiren bir diğer unsur ise uygulanan asgari maktu vergilerdir. Asgari maktu vergi yine birim başına belirlenen maktu bir vergidir. Ancak vergileme esnasında mal veya hizmet için belirlenmiş olan asgari maktu vergi ile oransal vergi karşılaştırılır ve yüksek olan vergi geçerli kabul edilir.

ÖTV oranlarının kanun tebliğlerinde yapılan her değişiklik ile yeniden belirlenmesi bu vergiyi dinamik bir politika aracına dönüştürmektedir. 2003 yılından bu yana ÖTV oranlarının esas olarak Ocak ve Temmuz dönemleri için altı aylık belirlendiği ve bu dönemlerde tüketici fiyat endeksindeki artış kadar artırıldığı bir temel politikanın izlendiği söylenebilir. Ancak kimi dönemlerde bu politikanın dışında değişiklikler yapıldığı görülmektedir. 2003 yılından 2019 sonuna dek ÖTV kanununda yapılan toplam değişiklik sayısı 130'dur. Bu değişikliklerin bazıları 2008 küresel krizi sonrası getirilen muafiyetlerdir. 2009, 2011, 2017 ve 2018 yıllarında mobilya, beyaz eşya gibi dayanıklı tüketim malları ya

da taşıtları kapsayacak şekilde toplam yedi defa geçici ÖTV muafiyeti getirildiği görülmektedir. Bu dönemlerdeki muafiyetlerin canlandırıcı maliye politikası aracı olarak kullanıldığı ve temel amacının iktisadi faaliyeti genişletmek olduğu açıktır. Hem değişikliklerin sıklığı hem de daralma dönemlerinde uygulanan muafiyetler birlikte değerlendirildiğinde, Türkiye ekonomisinde ÖTV'nin (KDV'de olduğu gibi) bir geleneksel olmayan maliye politikası aracı olarak kullanıldığı anlaşılmaktadır. Bu açıdan değerlendirildiğinde, Türkiye'nin geleneksel olmayan ve mikro çerçeveli maliye politikası uygulamalarının hem iktisadi faaliyet ve makro iktisadi istikrar hem de bütçe ve mali disiplin üzerindeki etkilerinin incelenmeye değer olduğu düşünülmektedir.

ÖTV listelerinde yer alan malların büyük çoğunluğu aynı zamanda KDV'ye de tabidir. Bu durumdaki mal veya hizmetlerin bir kısmında KDV matrahına ödenecek ÖTV tutarı da eklenmektedir. Bu nedenle, söz konusu mal ve hizmetler için ÖTV'nin KDV'si olarak ifade edilebilecek bileşke bir vergi ortaya çıkmaktadır. Bu ek vergi yüküne tabi mallar ÖTV kanununun II sayılı ekinde yer alan Motorlu Araçlar ve III sayılı ekinde yer alan Alkollü İçeceklerdir.

Türk vergi sisteminin diğer üç dolaylı tüketim vergisi belirli mal ve hizmet gruplarına yönelik harcama vergileri olarak düzenlenen ÖİV, BMSV ve ŞOV'dur. Bu üç verginin toplam vergi gelirleri içerisindeki payları oldukça düşük, kapsamları da KDV ve ÖTV'ye kıyasla çok daha dardır. ÖİV 6802 sayılı Gider Vergileri Kanunu ile düzenlenen ve ilk olarak 1999 depreminin yarattığı ekonomik etkilerin bertaraf edilmesi amacıyla 26.11.1999 tarihinde 4481 nolu kanun aracılığıyla yürürlüğe giren bir dolaylı vergidir. İlk kanunda ÖİV'nin geçici süreyle yürürlükte kalması öngörülmüş olsa da 2000 yılındaki süre uzatımının ardından 02.01.2004 tarihli 5035 sayılı kanun ile kalıcı hale getirilmiştir. ÖİV sabit ve mobil telefon işletmecileri tarafından verilen iletişim hizmetleri ve radyo ve televizyon yayınlarının aboneliklerinden tahsil edilmektedir.

Yine 6802 sayılı Gider Vergileri Kanunu kapsamında düzenlenen BMSV bankalar ya da benzer finansal kuruluşlar tarafından verilen bankacılık, sigortacılık, menkul kıymet alım satımı ve kambiyo işlemleri gibi finansal hizmetleri vergilendirmektedir. ŞOV ise ilk olarak 5035 sayılı kanun aracılığıyla 6082 sayılı Gider Vergileri Kanunu'na eklenmiş ancak 01.04.2007 tarihinden itibaren 5602 sayılı Şans Oyunları Hasılatından Alınan Vergi, Fon ve Payların Düzenlenmesi Hakkında Kanun kapsamına alınmıştır. Türkiye'de düzenlenen her türlü şans oyunlarına katılımdan oransal olarak vergi alınmasını düzenlemektedir.

4. Veri ve Metodoloji

Bu bölümde ilk olarak hanelerin dolaylı vergi yüklerini hesaplamak için kullanılan veri seti ayrıntılı bir şekilde tanıtılmış ardından hanelerin dolaylı vergi yüklerini hesaplama sürecinde gerçekleştirilen varsayımlara ve karşılaşılan kısıtlara yer verilmiştir. Sonrasında dolaylı vergilerin tüketim eşitsizliği üzerindeki etkilerini incelemek için kullanılan artan oranlılık endeksine yer verilmiştir.

4.1. Veri Seti

Hanelerin dolaylı vergi yüklerini hesaplamak için TÜİK tarafından gerçekleştirilen 2004-2019 dönemi Hanehalkı Bütçe Araştırmalarından (HBA) elde edilen veriler kullanılmıştır. HBA'da bir yıl boyunca her ay belirli sayıda hanehalkı ile görüşülerek hanehalklarının aylık harcama bilgileri toplanmaktadır[2].

HBA, Türkiye nüfusunu temsil etme gücüne sahip bir örneklem kullanılarak 2002 yılından itibaren her yıl düzenli bir şekilde gerçekleştirilmektedir. HBA'nın uygulanma amaçlarından biri hanelerin tüketim yapısı ve tüketim kalıplarında zaman içinde meydana gelen değişiklikleri izlemektir. Bu doğrultuda HBA'da Amaca Yönelik Kişisel Tüketim Sınıflaması'na (COICOP) göre hanelerin anket ayı içinde yaptığı tüm mal ve hizmet harcamalarına ilişkin bilgiler yer almaktadır[3].

Tüketim harcamalarının sınıflanmasında 2015 yılına kadar COICOP/HBS, 2015'ten itibaren ise COICOP'un[4] yeni versiyonu (v.2011) kullanılmaktadır. Bu doğrultuda en ayrıntılı COICOP sınıflandırması olan 5 basamaklı COICOP sınıflandırmasına göre 2004-2014 döneminde 199 olan toplam mal ve hizmet sayısı 2015 yılında 303'e yükseltilmiştir. HBA'nın bu özelliği farklı vergi ve vergi oranlarına tabi harcama kategorileri arasında ayrıma giderek hanelerin dolaylı vergi yüklerinin ayrıntılı bir şekilde hesaplanmasını sağlamaktadır.

4.2. Dolaylı Vergi Yüklerinin ve Artan Oranlılığın Hesaplanmasına İlişkin Metodoloji

Hanehalkları tarafından tüketilen mal ve hizmetlerin bazıları yalnızca tek bir vergiye tabi iken bazı mal ve hizmetler birden fazla vergi içerebilmektedir. Örneğin gıda ve alkolsüz içecekler alt harcama grubunda yer alan mallara yalnızca KDV uygulanırken alkollü içecekler ve tütün alt harcama grubunda yer alan mallara hem KDV hem de ÖTV uygulanmaktadır. Bu yüzden KDV, ÖTV, ÖİV, BMSV ve ŞOV'a ilişkin vergi oranları elde edilerek HBA ile uyumlu bir şekilde tüm mal ve hizmetler için ayrı ayrı toplam vergi oranlarına ulaşılmıştır. Ayrıca vergilendirme rejiminde sık sık yapılan güncellemeler ve getirilen istisnalar ile vergi oranlarının her yıl değişmesi nedeniyle ele alınan dönemde tüm mal ve hizmetler için toplam vergi oranları (vergi ağırlıkları) yeniden elde edilmiştir. Sonuç olarak bu bilgiler doğrultusunda hanelerin dolaylı vergi yükü aşağıdaki formül yardımıyla hesaplanmıştır.

$$TVY_t^h = \sum_{i=1}^n \frac{c_{i,t}^h}{(1+\tau_{i,t})} * \tau_{i,t}$$

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[2] *Örneğin 2016 yılı HBA'da her ay 1296 hanehalkı olmak üzere bir yıl boyunca toplam 15552 hanehalkı ile görüşülmüştür.*

[3] *12 alt harcama grubundan oluşan 1 basamaklı COICOP sınıflandırması ekteki tabloda raporlanmıştır.*

[4] *Bknz: <https://unstats.un.org/unsd/classifications/unsdclassifications/COICOP_2018_-_pre-edited_white_cover_version_-_2018-12-26.pdf>, 02.02.2022.*

Yukarıdaki eşitlikte TVY_t^h herhangi bir h hanesinin t yılında ödediği toplam dolaylı harcama vergisi miktarını (toplam dolaylı harcama vergi yükünü) ifade etmektedir. $C_{i,t}^h$, hanenin t yılında her bir i malına ya da hizmetine yaptığı brüt (vergi dahil) harcamayı ifade etmektedir. $\tau_{i,t}$ i malı ya da hizmeti için t yılındaki dolaylı harcamalar için vergi yüzdelerini ifade etmektedir ve beş tür dolaylı verginin toplamından oluşmaktadır. Bu eşitlikte yer alan kesirli kısım ($\frac{C_{i,t}^h}{(1+\tau_{i,t})}$) ise t yılında her bir i malına ya da hizmetine yapılan net (vergilerden arındırılmış) harcamayı vermektedir.

Dolaylı vergilerin artan oranlılığın ölçülmesinde kullanılan çok sayıda ölçüt bulunmaktadır. Kakwani (1977) endeksi artan oranlılığın ölçülmesinde en sık kullanılan endeksler arasındadır. Başlangıçta gelir vergisinin artan oranlılığının ölçülmesi için geliştirilmiş olsa da herhangi bir vergi ya da transferin artan oranlılığının ölçülmesinde kullanılması için uygundur. Endeks, seçilen vergi ya da transferin bir refah göstergesine göre sıralanmış hanehalkları (ya da bireyler) boyunca hesaplanmış konsantrasyon katsayısı ile aynı refah göstergesinin vergi öncesi Gini katsayısı arasındaki fark şeklinde ölçülmektedir:

$$K_t = C_{vergi} - Gini_R$$

Endeks değeri seçilen vergi ya da transferin, seçilen refah göstergesinin dağılımına göre ne kadar daha eşit ya da eşitsiz olduğunu ölçmektedir. Endeks değeri -1 ile 1 arasında değer alırken negatif değerler azalan oranlılığı, pozitif değerler ise artan oranlılığı belirtmektedir. Endeksin sıfır ya da sıfıra yakın değer alması ise seçilen vergi ya da transferin eşitsizliğe etkisinin nötr yapıda olduğunu ifade etmektedir.

Kakwani endeksinin hesaplanmasında dikkat edilmesi gereken hususlardan birisi seçilen birimdir. Hanehalkı Bütçe Anketi araştırmasında hesaplama birimi hanehalklarıdır ve dolayısıyla farklı büyüklükteki hanehalklarının ölçeklendirilmesi önem kazanmaktadır. Literatürde hanehalklarının birim kabul edildiği çalışmalarda, artan oranlılığın ve çeşitli tüketim değişkenlerinin önerilen farklı yöntemlerle hesaplanmış hanehalkı büyüklüklerine göre düzeltilmesinin gerekli olduğu ifade edilmektedir (Atkinson et al., 1995). Bu çalışmada OECD tarafından önerilen ve Hanehalkı Bütçe Anketi'nde sunulan OECD eşdeğer hanehalkı büyüklüğü tanımı kullanılmıştır. OECD hanehalkı eşdeğer büyüklüğü, hanedeki ilk yetişkin bireyi 1, diğer 14 yaş ve üstü yetişkinleri ise 0.5 değeri ile ağırlıklandırmaktadır. 14 yaş altı çocukları ise 0.3 katsayısı ile ağırlıklandırarak hanehalkı eşdeğer büyüklüğü elde edilmektedir. Çalışma kapsamında Thomas (2021)'de önerilen alternatif hanehalkı eşdeğer büyüklük tanımları da kullanılmış, sonuçların benzerlik gösterdiği görülmüştür.

Ev sahipleri için tahmin edilen izafi kiralar hanehalkı bütçesi içerisinde gerçek bir harcama olarak yer almamaktadır. Gerçek kiralar ise, hanehalklarının harcamaları içerisinde yer alsa da dolaylı tüketim vergilerinin konusuna girmemektedir. Dolayısıyla kira harcamaları vergiden muaftır ve bu nedenle artan oranlılığı incelerken harcamalar içerisinde değerlendirilmesi oldukça tartışmalıdır (Thomas, 2020). Bu çalışma boyunca temel göstergelerin tümü, gerçek ve izafi kiraların dahil edildiği toplam harcamalar ile

hesaplanmıştır. Ancak gerekli olduğunda kiraların dışlandığı toplam harcamalarla göstergelerin nasıl değiştiği belirtilmiştir.

5. Bulgular

KDV, ÖTV, ÖİV, BMSV ve ŞOV'dan oluşan dolaylı vergiler tüketicilerden, harcamaları sırasında doğrudan fiyata yansıtılarak tahsil edilmektedir. Dolayısıyla tüketiciler harcamaları sırasında fiyatlarda içerilmiş olarak bu dolaylı vergileri ödemektedirler. Türkiye'de hanehalklarının toplam harcamaları içerisinde dolaylı vergilerin payına ilişkin tanımlayıcı istatistikler dolaylı vergi yükünü belirlemeye imkân sağlamaktadır. Şekil 1 çalışmanın örneklemini oluşturan 2004-2019 yılları arasında Türkiye'de hanehalklarının bütçesi içinde dolaylı vergi yükünün ortalama payını ve bu payın yıllar içerisindeki seyrini göstermektedir. Buna göre, Türkiye'de hanehalklarının toplam harcamalarının ortalama %15,1'i dolaylı vergi ödemesi olarak gerçekleşmiştir. Bu oran hesaplanırken hanehalklarının yaptığı tüm harcamalar dikkate alınmıştır. Eğer izafi kira harcamaları dışlanırsa bu oran %17,6'ya yükselirken hem izafi kiralar hem de gerçek kiralar dışlandığında dolaylı vergi yükünün hanehalkı bütçesi içerisindeki payı %18,6 olarak ölçülmektedir[5].

Şekil: 1
Toplam Dolaylı Vergi Yükünün Hanehalkı Bütçesi İçindeki Payı
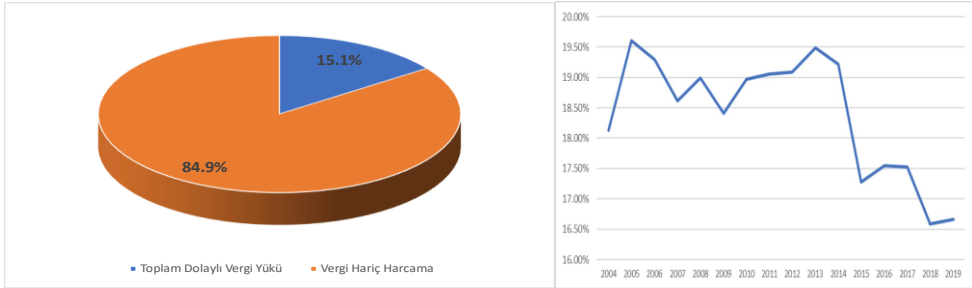
Kaynak: Yazarların hesaplamasıdır.

Şekil 1 aynı zamanda toplam dolaylı vergi yükünün hanehalkı bütçesi içindeki payının incelenen dönemde yıllar içindeki seyrini sunmaktadır. Toplam dolaylı vergi yükünün 2004-2019 döneminde dalgalı bir seyir izlediği anlaşılmaktadır. İlk olarak 2005 yılından başlayan bir düşüş trendi göze çarpmaktadır. Ancak bu trend 2008 yılında kesintiye uğramaktadır. 2008 yılında yaşanan küresel finansal krizle birlikte toplam dolaylı vergi yükünün bütçedeki payı takip eden beş yıl boyunca düzenli biçimde artış göstermiştir. Artış trendi kriz döneminde takip edilen genişletici maliye politikalarına karşın hanehalkı harcamasındaki daralmanın daha baskın olduğunu ve izlenen geleneksel olmayan maliye

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[5] *Kira ödemelerinin hiçbir dolaylı vergi türüne konu olmaması ve bazı yazarlar tarafından bir harcama türünden daha çok transfer olarak kategorilendirilmesi nedenleriyle, bazı kira harcamalarının dışlandığı hesaplamaların kullanıldığı görülmektedir.*

politikalarının (vergi muafiyetlerinin) güçsüz kaldığını ima etmektedir. Yıllar içindeki seyirde gözlemlenen üçüncü dönem ise 2013 sonrası süregelen düşüş trendidir. Bu dönemde toplam dolaylı vergi yükünün hanehalkı bütçesi içindeki payı kademeli biçimde düşmüştür. Bu düşüşte daha sonraki bölümlerde gösterileceği gibi, 2015 yılından itibaren ÖTV oranlarındaki göreli düşüşün etkili olduğu değerlendirilmektedir. Toplam dolaylı vergi yükünün bu seyri, alt bölümlerde görülebileceği üzere KDV'nin hanehalkı bütçesi içindeki payının seyrine oldukça benzemektedir.

Şekil 2 toplam dolaylı vergi yükünün beş dolaylı vergi türü arasında nasıl dağıldığını göstermektedir. Türkiye'de toplam dolaylı vergi yükünün neredeyse tamamı KDV ve ÖTV'den oluşmaktadır. Bu iki vergi türünün toplam dolaylı vergiler içerisindeki payı %98'dir. ÖİV, BMSV ve ŞOV toplamı dolaylı vergi yükünün yalnızca %2'sini oluşturmaktadır. Bu oranlar, dolaylı vergiler arasında yalnızca KDV ve ÖTV'nin yeniden dağıtım ya da mali canlandırma amacı taşıyan maliye politikasının bir aracı olabileceğini ifade etmektedir ve bu nedenle çalışmanın kalanında diğer üç dolaylı vergi çeşidi analiz kapsamı dışında bırakılmıştır.

Şekil: 2
Toplam Dolaylı Vergi Yükünün Dolaylı Vergiler Arasında Dağılımı
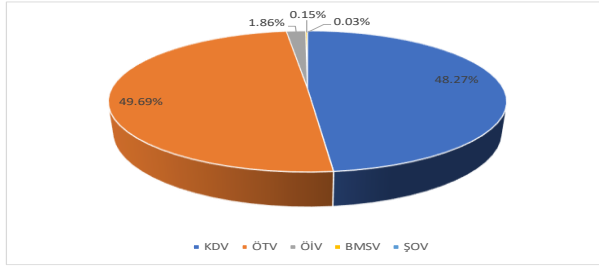
Kaynak: Yazarların hesaplamasıdır.

Hanehalkı bütçesi içerisinde KDV ve ÖTV'nin payı ise birbirine çok yakındır. KDV'nin payı %48,3 iken ÖTV'nin payı %49,7'dir. İki oranın yakınlığı Türkiye'de ÖTV oranlarının ve kapsamının genişliğine işaret etmektedir. KDV'nin toplam dolaylı vergiler içerisindeki payı uluslararası ortalamalar ile benzerlik göstermektedir. Örneğin İngiltere'de KDV'nin toplam dolaylı vergiler içerisindeki payı %45'tir (House of Commons, 2021). Ancak Türkiye'de ÖTV'nin toplam dolaylı vergiler içindeki payı oldukça yüksektir. 2018 yılı itibariyle OECD ülkeleri ortalamasında ÖTV'nin toplam vergi gelirleri içerisindeki payı %7,2 iken Türkiye'de bu oran %14,9 ile OECD ülkeleri arasında en yüksektir (Thomas, 2021).

5.1. Hanehalklarının KDV ve ÖTV Yükü

KDV hanehalkı bütçesi içerisindeki payı açısından ikinci sırada yer alıyor olsa da kapsamı açısından en geniş dolaylı tüketim vergisidir. Kanunda ekli listelerde belirtilen

istisnalar hariç tüm mal ve hizmetlerden KDV tahsil edilmektedir. Bu nedenle vergi tabanı en yaygın vergi türü olduğu söylenebilir. Şekil 3'te Türkiye'de çalışmanın incelediği dönem olan 2004-2019 yılları arasında hanehalklarının bütçesi içerisinde KDV ve ÖTV'nin payları yer almaktadır. KDV'nin bütçe içerisindeki payı tüm yılların ortalamasında %7,9 olarak gerçekleşirken bu oranın zaman içerisinde sınırlı bir azalma gösterdiği görülmektedir. 2004 yılında hanehalkı bütçesinin %9,2'si KDV ödemesinden oluşurken, 2018 yılında bu oran %7,4'e gerilemiştir. Bu düşüşte 2004 yılında tıbbi ürünler ve hizmetler, 2006 yılında ise giyim ürünlerinde olduğu gibi düşük KDV oranına tabi malların listesinin giderek genişletilmesinin etkili olduğu düşünülmektedir[6]. KDV'deki düşüş trendinin benzer biçimde toplam dolaylı vergi yüküne yansıdığı da görülmektedir.

Türkiye'de yürürlükte olan KDV mevzuatında istisnalar ve indirimli oranlar hariç uygulanan standart KDV oranı %18 olarak belirlenmiştir. Bu oran, OECD ülkelerinde 2020 yılı itibariyle %27 (Macaristan) ve %10 (İsviçre ve Kanada) arasında değişmekle birlikte, Türkiye'de geçerli standart KDV oranı AB ülkeleri (ortalama %21,8) ve OECD ülkeleri (ortalama %19,3) ortalamalarından düşüktür (OECD, 2021).

Şekil: 3
KDV ve ÖTV'nin Hanehalkı Bütçesi İçindeki Payı
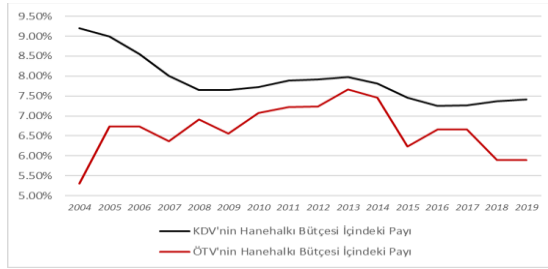
Kaynak: Yazarların hesaplamasıdır.

ÖTV ise uygulama esası itibariyle KDV'den farklı yapıdadır. ÖTV kanununda ekli listede belirtilen mal ve hizmetlerin tüketiminden yine listede belirtilen oranda (ya da tutarlarda) vergi alınması söz konusudur. Bu açıdan değerlendirildiğinde KDV'ye tabi olmayan mallar istisna konumdayken, ÖTV'de istisnai mallardan vergi alınmaktadır. Bu nedenle ÖTV'nin kapsamı çok daha dardır.

Şekil 3 Türkiye'de hanehalklarının bütçeleri içerisinde ÖTV'nin payını yıllar itibariyle göstermektedir. Buna göre, öncelikle ÖTV yükünün ortalamada KDV yükünden

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[6] *KDV yükünde, 2008 küresel krizini takip eden beş yıllık dönem hariç bir azalma trendi olduğu anlaşılmaktadır. Toplam dolaylı vergi yükünde de aynı dönemlerde azalmaya neden olan bu düşüşün bir nedeni yukarıda belirtildiği gibi, hanehalklarının bütçesi içerisinde önemli yer tutan bazı mal ve hizmetlerin indirimli KDV kapsamına alınmasıdır. Ancak bir nedeni de tüketicilerin harcama kalıplarındaki değişim olabilir. KDV yükündeki değişimin bu iki kaynak arasında ayrıştırılması, dinamik bir model tahmini gerektirmekte ve bu çalışmanın kapsamı dışında kalmaktadır.*

düşük olduğunu söylemek mümkündür. Bununla birlikte, ÖTV yükünün yıllar içerisinde iki belirgin trende sahip olduğu görülmektedir. 2004 ile 2013 yılları arasında ÖTV yükünde güçlü bir artış trendi göze çarpmaktadır. Bu dönemde hanehalklarının bütçesi içerisinde ÖTV'nin payı ortalamada 2,5 puan artmıştır. Ancak 2013 yılından itibaren örneklem sonuna dek izlenen belirgin düşüş trendi ile birlikte 2019 yılı itibariyle bu pay yeniden %6'nın altına gerilemiştir.

Şekil 1 ve Şekil 3'ün birlikte incelenmesi, toplam dolaylı vergi yükünde ortaya çıkan değişmelerin kaynağının belirlenmesini sağlamaktadır. Toplam dolaylı vergi yükünde 2005-2009 yılları arasındaki azalmanın KDV yükündeki düşüşten, 2009-2013 arasındaki artış ile 2013-2019 dönemindeki azalmanın ise hem KDV hem ÖTV'den kaynaklandığı görülmektedir.

Tablo 1. ise hanehalklarının KDV ve ÖTV yüklerinin ana mal grupları arasında nasıl dağıldığını göstermektedir.

Tablo: 1
Hanehalklarının KDV ve ÖTV Yükünün Ana Mal ve Hizmet Grupları Arasında Dağılımı

KDV					
Mal ve Hizmet Grubu	Ortalama	2004	2009	2013	2019
Gıda	%17,2	%20,5	%19,4	%16,3	%18,5
İçecekler ve Tütün Ürünleri	%3,4	%4,0	%3,9	%3,2	%3,4
Giyim	%5,1	%10,1	%4,8	%4,8	%5,0
Barınmaya İlişkin Harcamalar	%17,3	%16,5	%18,7	%17,5	%16,2
Dayanıksız Tüketim Malları	%10,9	%10,2	%10,4	%11,2	%10,4
Sağlık Harcamaları	%1,9	%2,9	%1,8	%1,8	%2,2
Ulaşım Harcamaları	%18,7	%11,8	%16,0	%19,1	%17,6
Telekomünikasyon Harcamaları	%6,3	%6,2	%7,1	%6,5	%5,9
Spor, Hobi ve Eğlence Harcamaları	%4,9	%3,3	%4,3	%5,0	%5,2
Eğitim Harcamaları	%2,1	%1,6	%1,8	%2,1	%2,4
Konaklama ve Dışarıda Yemek	%4,9	%6,9	%4,8	%5,3	%4,2
Çeşitli Kişisel Mal ve Hizmetler	%7,4	%5,8	%7,0	%7,1	%8,9
Toplam	%100	%100	%100	%100	%100
ÖTV					
Mal ve Hizmet Grubu	Ortalama	2004	2009	2013	2019
Akaryakıt ve Yağlar	%39,0	%51,6	%51,9	%44,1	%30,4
Motorlu Araçlar	%19,2	%13,7	%9,2	%17,4	%16,3
Alkollü İçecekler ve Tütün Ürünleri	%30,8	%27,7	%28,4	%28,1	%41,0
Kişisel ve Lüks Tüketim Maddeleri	%10,9	%6,9	%10,6	%10,4	%12,2
Toplam	%100	%100	%100	%100	%100

Kaynak: Yazarların hesaplamasıdır.

COICOP sınıflandırmasının birinci basamak ayrımında yer alan 12 ana mal ve hizmet grubu içerisinde KDV yükünün en büyük payını oluşturan gruplar sırasıyla Ulaşım Harcamaları, Barınmaya İlişkin Harcamalar ve Gıda Harcamalarıdır. Bu üç gruptaki mal ve hizmetler için ödenen KDV, toplam KDV yükünün yarısından fazlasını oluşturmaktadır. Gıda grubunda yer alan malların büyük çoğunlukla düşük KDV oranına tabi mallar arasında yer almasına rağmen yüksek KDV yükü yaratmasının temel nedeni, hanehalkı bütçesi içerisinde gıdanın yüksek payıdır. Öte yandan sağlık ve eğitim sektörlerinin hanehalkı bütçesi içerisindeki payı, kamunun bu sektörlerdeki ücretsiz arzı nedeniyle düşüktür ve buna bağlı olarak KDV yükü de en düşük iki mal grubudur. Bu açıdan değerlendirildiğinde,

hanehalklarının KDV yükünün temel belirleyicisinin ilgili mal grubunun hanehalkı
bütçesinden aldığı pay olduğu söylenebilir. Tablodan görülebilecek bir diğer bulgu ise
ulaşım harcamalarının yarattığı KDV yükünde 2004 ile 2019 arasında yaşanan önemli
artıştır.

ÖTV yükünün ise temel kaynakları Akaryakıt ve Yağlar ile Alkollü İçecekler ve
Tütün Ürünleridir. Bu iki gruptaki mallara yapılan tüketime ödenen ÖTV toplam ÖTV
yükünün sırasıyla %39 ve %30'unu oluşturmaktadır. Öte yandan yıllar içerisinde değişim
izlendiğinde, Akaryakıt ve Yağlar kategorisinde 2004 yılından 2019 yılına önemli bir azalış
görülmektedir. Burada, 2018 yılında yürürlüğe giren ve akaryakıttaki vergi oranlarını fiyat
hareketlerine bağlı olarak değiştiren eşel mobil[7] sisteminin yarattığı geçici etkinin belirgin
olduğu ifade edilmelidir. Bu gruptaki ÖTV düşüşü özellikle örneklemin son beş yıllık
döneminde izlenmektedir. Alkollü İçecekler ve Tütün Ürünleri grubunun payı ise yaklaşık
%50 artmıştır. Benzer şekilde Kişisel ve Lüks Tüketim Maddelerinin payında da yaklaşık
%77'lik bir artış tespit edilmiştir.

5.2. Harcamalara göre KDV ve ÖTV'nin Artan Oranlılığı

KDV'nin artan oranlılığını incelemek için ilk olarak artan harcama düzeylerinde
KDV yükü tespit edilmiştir. Bunun için, her yıldaki anket örneklemine dahil edilen
hanehalkları harcama düzeylerine göre 10 gruba ayrılmıştır[8]. Şekil 4 farklı harcama
gruplarındaki hanehalklarında KDV'nin bütçe içindeki payını göstermektedir.

Şekil: 4
Harcama Gruplarına Göre KDV ve ÖTV'nin Hanehalkı Bütçesi İçindeki Payı
(2004-2019)
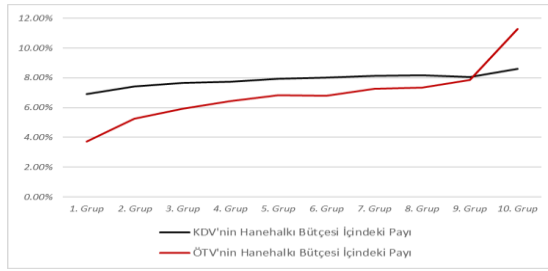
Kaynak: Yazarların hesaplamasıdır.

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[7] *Eşel Mobil sisteminin başladığı 2018 yılından itibaren akaryakıt fiyatlarındaki artışlar vergi indirimiyle telafi
edilerek pompa fiyatlarına yansıtılmamıştır. Eşel mobil sisteminin uygulandığı dönem boyunca akaryakıtta ÖTV
oranı sıfıra kadar indirilmiştir. Enerji Bakanı'nın açıklamasına göre Ekim 2019 itibariyle bu yöntemle
vazgeçilen vergi tutarı 52 milyar TL'ye ulaşmıştır (Anadolu Ajansı, 2019).*

[8] *Harcama grupları belirlenirken tüm örneklemi on dilime bölmek yerine, her yıl kendi içerisinde on dilime
bölünmüştür. Örneğin herhangi bir i. gruba karşılık gelen değer, her yıl i. gruba giren hanelerin vergi yüklerinin
ortalamasıdır.*

Buna göre, KDV'nin hanehalkı harcamaları içerisindeki yüzde payının harcama dilimleri boyunca arttığı açıktır. En düşük harcama grubunda KDV yükü hanehalkı bütçesinin %7,25'ini oluştururken, en üst harcama grubunda bu oran yaklaşık %8,5'e çıkmaktadır. Sonuç olarak, yalnızca KDV yükünün harcama dilimleri boyunca nasıl değiştiğine bakıldığında KDV'nin artan oranlı olduğu görülmektedir. Ancak gruplar arasındaki fark oldukça düşüktür. Şekil 4 ÖTV'nin ise açıkça artan oranlı olduğunu göstermektedir.

Artan oranlılığı niceliksel olarak belirlemenin bir yolu literatürde sıklıkla kullanılan artan oranlılık endeksleridir. Şekil 5 KDV için ödenen tutarlar ile tüketim eşitsizliğini temsil eden harcama dağılımı kullanılarak her yıl için hesaplanan Kakwani endeks değerlerini göstermektedir. Şekil 5'te literatürde gerçek ve izafi kiraların harcamaya dahil edilip edilmemesine ilişkin tartışmalara ithafen olası üç senaryoda endeks değerleri sunulmuştur.

Kiraların harcamalar içerisinde değerlendirilmesinin yarattığı fark Şekil 5'te açıkça görülmektedir. İzafi ve gerçek kiraların dahil edildiği hesaplamaya göre, Kakwani endeksi tüm yıllar boyunca pozitif değerler almaktadır ve KDV'nin artan oranlılığını ifade etmektedir. Bunula birlikte, Şekil 5'in ima ettiği sonuçları birkaç maddede toplamak mümkündür. Öncelikle, KDV'nin artan oranlı olup olmadığı tüm dönem ortalamasında harcamaların hesaplama biçimine bağlı olarak değişmektedir. Eğer izafi kiralar ya da tüm kiralar harcamalardan dışlanırsa, KDV'nin sıfır değerine yakın olsa da azalan oranlı olduğu görülmektedir. Bu durum literatürdeki çelişkili sonuçları desteklemekle birlikte, kiraların dolaylı vergilere tabi olmaması ve kira harcamalarının Türkiye'deki hanehalklarının bütçelerinde aldığı yüksek pay dikkate alınmalıdır.

Şekil: 5
KDV'nin Artan Oranlılığı
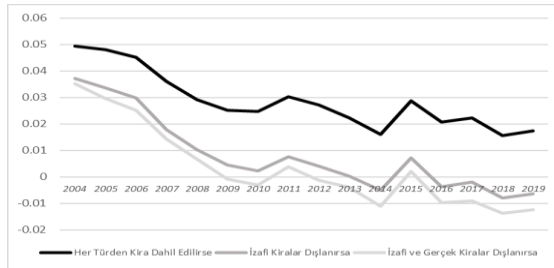
Kaynak: Yazarların hesaplamasıdır.

Ancak izafi kiralar ya da hem izafi hem de gerçek kiralar dışlandığında Kakwani endeksinin 2008 krizinden sonraki bazı yıllarda negatif değerler aldığı görülmektedir. Öte yandan, tüm hesaplama biçimlerinde ortak sonuç, endeksin düzey değeri hangi bölgede olursa olsun örneklemin başından itibaren görülen ve özellikle 2008 yılındaki küresel finansal krizden sonra hızlanan düşüştür. Kiraların dışlandığı durumda 2008 krizinden itibaren KDV'nin azalan oranlı olduğu görülmekte iken kiraların dahil edildiği durumda

artan oranlılığın devam ettiği ancak önemli ölçüde azalarak sıfıra yaklaştığı fark edilmektedir. 2008 krizinden bu yana neredeyse sıfır düzeyinde devam ederek nötr bir vergi yapısındadır. Bu açıdan değerlendirildiğinde, KDV'nin tüketim eşitsizliği üzerindeki etkisinin giderek bozucu bir hale dönüşmesi yöntemden bağımsız biçimde izlenmektedir.

Kakwani endeksi vasıtasıyla artan oranlılık ölçümleri ÖTV için de ayrıca yapılmış ve Şekil 6'da sunulmuştur. ÖTV harcama hesaplama biçimlerinin tümüne göre hem örneklem ortalamasında hem de her yıl pozitif değerler almaktadır. Bir başka deyişle, ÖTV istisnasız biçimde artan oranlıdır. Ancak, 2006 yılında başlayan keskin düşüşle birlikte artan oranlılığın KDV'nin seyrine benzer biçimde azaldığı görülmektedir. ÖTV ile KDV arasında artan oranlılık açısından iki önemli fark şu şekilde özetlenebilir. Birincisi, ÖTV her dönem pozitif değerler almaktadır ve KDV'ye kıyasla endeks değeri daha yüksektir. İkincisi ise, ÖTV oranlarının mal bazında altı ayda bir yeniden belirlenmesinin etkisiyle endeks değerleri oldukça oynaktır.

Şekil: 6
ÖTV'nin Artan Oranlılığı
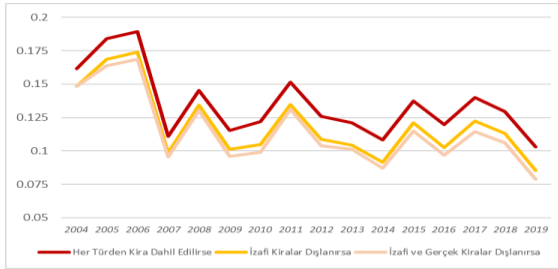
Kaynak: Yazarların hesaplamasıdır.

Vergilerin artan oranlılığına ilişkin literatürde tartışmalı konulardan birisi de refah göstergesi olarak hangi değişkenin kullanılacağıdır. Dolaylı vergi yükünün tüketim dağılımı ile mi yoksa gelir dağılımı ile mi kıyaslanacağı tartışılmaktadır. Bir başka açıdan değerlendirildiğinde bu tartışma dolaylı vergilerin hangi refah göstergesinin dağılımı üzerindeki etkisinin inceleneceği ile ilgilidir. İkinci bölümde açıklandığı üzere, vergi yükünü gelir dağılımı boyunca takip eden çalışmalar tüketim düzleştirmesinin düşük gelir gruplarında finansal piyasalara erişimdeki kısıtlar nedeniyle mümkün olmadığını savunmaktadır. Bazı çalışmalar ise tüketimin ömür boyu gelirin çok daha isabetli bir göstergesi olduğunu iddia etmekte ve vergi yükünü tüketim grupları boyunca takip etmektedir. Bu çalışma Türkiye'de dolaylı vergi yükünün artan oranlılığını incelerken refah göstergesi olarak tüketim değişkenini kullanmaktadır. Bu bölümde ise aynı analizin gelir değişkeni kullanılarak tekrarlanması durumunda elde edilen bulgular sunulmaktadır.

Şekil 7 KDV ve ÖTV ödemelerinin hanehalkı aylık geliri içindeki payını gelir grupları boyunca izlemektedir. Buna göre, her iki vergi türünün artan oranlılığı arasında önemli derecede fark bulunmaktadır. KDV'nin gelir içindeki payı gelir dilimleri arttıkça

azalmaktadır. Dolayısıyla KDV'nin gelire göre azalan oranlı bir vergi olduğu ortaya çıkmaktadır. Öte yandan ÖTV ise oldukça düşük düzeyde de olsa artan oranlı yapıda tespit edilmektedir.

Şekil: 7
Gelir Gruplarına Göre KDV ve ÖTV'nin Hanehalkı Geliri İçindeki Payı (2004-2019)
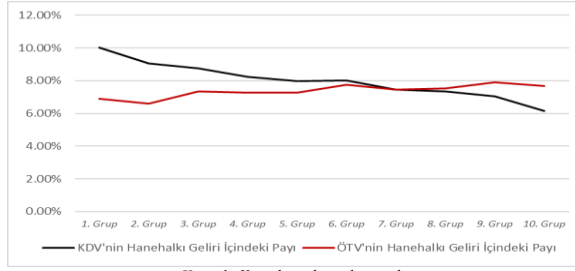
Kaynak: Yazarların hesaplamasıdır.

Şekil 8 ise hem KDV hem de ÖTV için gelire göre hesaplanmış Kakwani endeks sonuçlarını sunmaktadır. Artan oranlılığın ölçümü için kullanılan endeks değerinin hesaplanmasında KDV ve ÖTV yüklerinin hanehalkları boyunca dağılımları, bu kez hanehalkı yıllık reel gelirin dağılımı ile karşılaştırılmıştır. Harcama dağılımına göre tüm yıllar boyunca artan oranlı olduğu belirlenen ÖTV, gelire göre hesaplandığında da tüm yıllarda pozitif değer almaktadır. Yine 2006 yılındaki düşüş ve sonrasındaki oynak seyir takip edilebilmektedir. Bu açıdan bulguların tutarlı olduğu söylenebilir.

Şekil: 8
KDV ve ÖTV'nin Artan Oranlılığı (2004-2019)
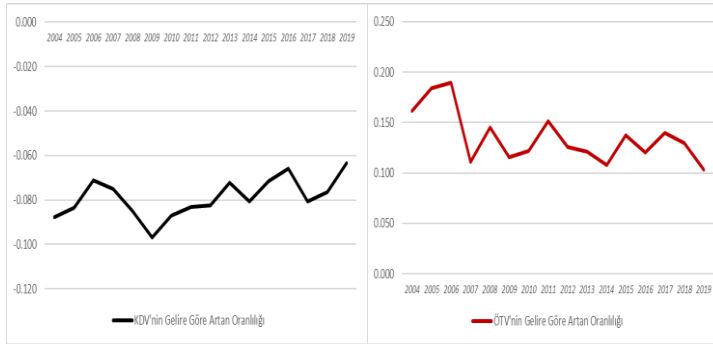
Kaynak: Yazarların hesaplamasıdır.

KDV açısından incelendiğinde ise harcamaya göre ve gelire göre yapılan hesaplamalarda önemli fark olduğu göze çarpmaktadır. KDV'nin çeşitli türde tanımlanmış harcamaların dağılımı ile kıyaslandığında, bazı dönemler hariç pozitif değerler ortaya çıkmıştır. Ancak hanehalklarının yıllık reel gelirlerine göre hesap edildiğinde, KDV'nin tüm

yıllar boyunca negatif değerler aldığı, bir başka deyişle azalan oranlı olduğu söylenebilir. KDV'nin gelir dağılımı ile kıyaslandığında azalan oranlı olduğu şeklindeki bulgu Albayrak (2010) ile uyumludur. KDV'nin artan oranlılığında harcama ve gelire göre elde edilen farklı sonuçlar da literatürle uyumludur (örn., Thomas, 2021). Şekil 8, Kakwani indeksinde dalgalanmalar olsa da 2004-2019 yılları arasında değişimin çok büyük boyutlu olmadığını göstermektedir.

Şekil: 9
Tüketim ve Gelir Gini Katsayıları (2008-2019)
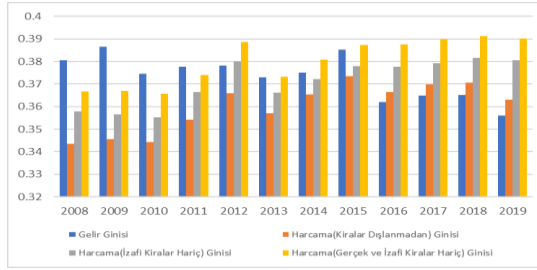
Kaynak: Yazarların hesaplamasıdır.

KDV'nin tüketim ve gelire göre hesaplanan artan oranlılıkları arasındaki farkın nedeni olarak iki husus iddia edilebilir. Bunlardan ilki, kira harcamalarının hesaplamaya nasıl dahil edileceği tartışmasına ilişkindir. Eğer kira harcamaları dolaylı vergilere tabi olmamasına rağmen harcamalardan dışlanmazsa tüketim ve gelire göre yapılan hesaplamalar KDV'nin artan oranlı olduğunu işaret etmektedir. Bu durum, Türkiye'de kira harcamalarının gelir dağılımı ve tüketim dağılımı üzerindeki etkilerinin dikkatle incelenmesi ve hesaba katılması gerektiğini göstermektedir. İkinci husus ise Türkiye'de gelir ve tüketim dağılımının incelenen dönemde izlediği seyrin birbirinden farklı olmasıdır. Şekil 9'dan görülebildiği üzere, 2004-2019 döneminde Türkiye'de gelir dağılımı az da olsa düzelme eğilimi gösterirken tüketim dağılımı giderek bozulmaktadır. Bu da tüm mal ve hizmet harcamalarından alınan KDV'nin gelir ve tüketime göre artan oranlılığının farklı olmasına neden olmaktadır. 2004-2015 arası gelir dağılımı harcama dağılımına göre daha eşitsiz iken harcama eşitsizliği zaman içinde artarak 2016 sonrası gelir eşitsizliğini geçmiştir.

5.3. Alternatif KDV Rejimleri ve Artan Oranlılığa Etkisi

Çalışmada son olarak alternatif KDV rejimleri tanımlanması ile bu rejimlerde artan oranlılığın nasıl değiştiği ölçülerek politika çıkarımı sağlanmaya çalışılmıştır. KDV'nin sıfıra yakın ya da azalan oranlı olduğuna dair bulgular, harcama diliminin alt gruplarında yer alan hanehalklarının daha yüksek KDV yükü ile karşılaştıklarını göstermektedir. Bu bölümde oluşturulan alternatif KDV rejimleri belirlenirken bu bilgiyi temel alan bir strateji geliştirilmiştir. Bu doğrultuda öncelikle, temel 12 mal ve hizmet grubu için KDV yüklerinin artan oranlı olup olmadığı belirlenmiştir. Ardından harcama grubuna göre en alt iki yüzde

onluk dilimde yer alan hanelerin bütçeleri içerisinde 12 mal ve hizmet grubunun ağırlığı ölçülmüştür.

Ek 1'de yer alan şekilde görülebilecek bilgiler kullanılarak KDV'nin artan oranlı olmasını sağlayacak ya da artan oranlılığını iyileştirecek dört alternatif KDV rejimi senaryosu tasarlanmıştır. Birinci rejimde, tüm gıda ürünlerinden alınan KDV'nin %1 olduğu bir KDV rejimi belirlenmiştir. Son yıllarda hem Türkiye'de giderek daha fazla gıda üründe KDV oranlarının düşürülmesi hem de uluslararası örneklerde 2014 yılından bu yana gıda ürünlerindeki KDV'nin düşürülmesi birinci rejimin uygulanabilirliğini göstermektedir. İkinci rejim ise birinci rejime ek olarak Alkolsüz İçecekler kategorisindeki mallar için de KDV'nin %1'e düşürüldüğü bir senaryoyu tanımlamaktadır. Üçüncü rejimde ise Türkiye'de düşük harcama düzeyindeki hanehalklarının bütçesi içerisinde konuta ilişkin harcamaların önemli bir paya sahip olduğu gerçeğinden hareket etmektedir. Bu rejimde, hanehalklarının konutla ilgili olarak yaptıkları elektrik, su ve doğalgaz ödemelerinin KDV'den muaf olduğu bir senaryo izlenmiştir. Son olarak, alternatif KDV rejimlerinin dördüncüsünde toplu ulaşım için yapılan harcamaların KDV'den muaf tutulduğu varsayılmıştır.

Tablo 2 alternatif KDV rejimlerinde artan oranlılığın ve tüketim eşitsizliğinin nasıl değiştiğini göstermektedir. Halihazırda yürürlükte olan KDV rejiminde ve diğer alternatif rejimlerde Kakwani artan oranlılık endeksi hesaplanmış ve alternatif senaryoların uygulamaya konması halinde artan oranlılığın nasıl değişeceği gösterilmiştir. Aynı zamanda geçerli rejimde ve alternatif rejimlerde tüketim eşitsizliğini yansıtan Gini değeri ölçülmüş ve alternatif rejimlerde tüketim eşitsizliğinin azalıp azalmayacağı sorusu yanıtlanmıştır.

Tablo: 2
Alternatif KDV Rejimlerinde Artan Oranlılık ve Tüketim Dağılımı

	Geçerli	Rejim 1	Rejim 2	Rejim 3	Rejim 4
Toplam Harcamalara Göre Kakwani Endeksi	%1,72	%5,17	%5,32	%3,97	%2,58
Kiraların Dışlandığı Harcamalara Göre Kakwani Endeksi	-%1,24	%2,03	%2,19	%1,15	-%0,36
Tüketim Gini Değeri	35,88	36,06*	36,07*	35,97*	35,88*

Kaynak: Yazarların hesaplamasıdır.

İlk olarak, tüm alternatif rejimlerde artan oranlılığın iyileştiği tespit edilmiştir. Örneğin geçerli rejimde tüm harcamalar dahil edildiğinde ölçülen artan oranlılık endeksi %1,72 iken, alternatif rejimlerde %2,58 ile %5,32 arasında değişmektedir. Bunun ötesinde, tüm kira harcamaları dışlanarak yapılan hesaplamalarda geçerli rejimde -%1,24 değerini alarak azalan oranlı yapıda gözüken KDV, alternatif rejimlerde (Rejim 4 hariç) pozitif değerler alarak artan oranlı yapıya geçmektedir. Öte yandan, artan oranlılığın iyileşmesinde en büyük etki birinci ve ikinci rejimde gerçekleşmiştir. Gıda ürünlerindeki ya da gıda ürünleri ile alkolsüz içeceklerdeki KDV'nin %1'e düşürülmesi artan oranlılığı çok büyük ölçüde iyileştirerek tüketim dağılımını düzeltici etki meydana getirmektedir. Son olarak, alternatif rejimlerin tümünde Gini katsayılarının geçerli rejimdeki Gini katsayısından yüksek olması ve aradaki farkın istatistiki olarak anlamlı olması, alternatif rejimlerde tüketim eşitsizliğinin azaldığı sonucunu desteklemektedir. Bu bölümdeki hesaplamalarda

KDV'deki değişimlerin fiyatlara tamamen yansıdığı varsayılmaktadır. Bu nedenle burada elde edilen sonuçlar kesin etkilerden çok ortaya çıkabilecek etkilerle ilgili ipuçları olarak değerlendirilmelidir.

6. Sonuç

Türkiye'de vergi rejimi dolaylı vergilerin baskın olduğu bir yapıya sahiptir. Harcamalar üzerinden alınan dolaylı vergiler toplam vergi gelirlerinin çoğunluğunu oluştururken kamu maliyesi için önemli bir gelir kaynağı haline gelmiştir. Benzer ülke örnekleriyle kıyaslandığında Türk vergi sistemi dolaylı vergilerin baskınlığı açısından ayrışmaktadır. Bu ayrışmada, Türkiye'deki hanehalklarının bütçelerinde KDV kadar yük oluşturan ÖTV'nin de yaygın ve yüksek oranlı olması rol almaktadır.

Bu çalışma TÜİK tarafından düzenli olarak yıllık derlenen ve Türkiye'yi temsil etme kabiliyetine sahip Hanehalkı Bütçe Anketleri'ni Tüketici Fiyat Endeksi'nin baz yılı olan 2003 yılından başlayarak 2019 yılına dek olan dönem için kullanarak; öncelikle dolaylı vergi yüklerini belirlemiş ve ardından tüketim eşitsizliğine etkisini ölçmeye çalışmıştır. Bu noktada, Hanehalkı Bütçe Anketi'nde yer alan her bir mal ve hizmete ait harcama verisi en ayrıntılı haliyle kullanılmış ve bu mal ve hizmetlerin tabi olduğu KDV, ÖTV, ÖİV, BMSV ve ŞOV oranları ilgili kanun ve tebliğlerden detaylı bir çalışma ile bahsedilen dönem için belirlenmiştir. Bu amaçla beş dolaylı vergi türü için hem kanun tebliğleri hem de kanunda değişiklik yapan kararlar incelenmiş ve her bir mal ve hizmete ait vergi oranlarını ifade eden vergi matrisleri oluşturulmuştur. Bu vergi matrisleri vasıtasıyla hanehalklarının dolaylı vergi yükleri belirlenmiş, dağılımları incelenmiş ve artan oranlılığı analiz edilmiştir.

Çalışmanın bulgularından çıkarılabilecek sonuçlardan ilki, Türkiye'de hanehalklarının vergi yükünün incelenen dönemde dalgalı bir seyir izlediğidir. Türkiye'de hanelerin vergi yükü 2005-2009 arası azalmış, 2009-2013 arası artmış, 2013-2019 arası azalmıştır. İlk dönemdeki düşüş büyük ölçüde KDV kaynaklıdır. Sonraki dönemlerdeki değişme ise hem KDV hem ÖTV kaynaklıdır. İzlenen bu trendler, 2008 küresel finans krizinin hem maliye politikasındaki etkilerinin hem de tüketicilerin tüketim kalıplarındaki değişiminin belirgin olduğunu ortaya çıkarmaktadır. Kriz sonrası dönemde çok sayıda geçici vergi muafiyeti uygulanması, vergi oranlarında geçmiş yıllardaki trendin aksine değişiklikler yapılması ve değişiklik sayılarının artması maliye politikasında kriz izlerini ve izlenen geleneksel olmayan maliye politikalarını işaret etmektedir.

Dolaylı vergilerin neredeyse tamamını oluşturan KDV ve ÖTV'nin tüketim eşitsizliğini incelemek için yapılan artan oranlılık analizlerinde belirgin sonuç, artan oranlılığın hem iki vergi türünde hem de kullanılan refah türlerine göre değişiklik göstermesidir. Literatürde de tartışmalı olan refah göstergelerinden harcama kullanıldığında KDV'nin çoğunlukla artan oranlı olduğu ancak gelire göre bakıldığında azalan oranlı olduğu görülmektedir. Dolayısıyla KDV tüketim eşitsizliğini çok düşük ölçüde de olsa düzeltirken gelir eşitsizliğini bozmaktadır. ÖTV ise tüm farklı hesaplamalara göre artan oranlı bir vergi

olarak değerlendirilmektedir. Ancak artan oranlılığın zaman içerisinde azaldığı görülmektedir.

Ardından farklı dolaylı vergi rejimlerinde, vergilerin eşitsizlik üzerindeki etkisinin nasıl değiştiği incelenmiştir. Hanelerin bütçelerinde ana mal ve hizmet gruplarının aldıkları pay ve yüksek KDV'ye tabi mal ve hizmetlerin değerlendirilmesi ile tanımlanan farklı senaryolarda KDV'nin artan oranlılığı ve eşitsizlik etkileri ölçülerek politika çıkarımları geliştirilmeye çalışılmıştır. Buna göre, tüm gıda ürünlerinden alınan KDV'nin en düşük oran olan %1'e düşürülmesi ve konuta ilişkin harcamalardan alınan KDV oranının %1'e düşürülmesi, tüketim eşitsizliğini düzeltici etkide bulunacaktır. Alternatif rejimler arasında en büyük etkiyi gösteren tüm gıda harcamalarında verginin azaltılmasıdır. Dolayısıyla, düşük gelir düzeyindeki hanelerin bütçesi içerisinde büyük paya sahip olmasıyla beraber ikame edilebilirliği çok zayıf olan gıda ürünleri ve konuta ilişkin faturalardan alınan KDV'nin düşürülmesi tüketim eşitsizliğini azaltacaktır. Bu sayede vergi adaletinin geliştirilmesi ve yoksulluğun azaltılması muhtemeldir.

Türkiye'de dolaylı vergilere ve kriz sonrası maliye politikasına ilişkin mikro düzeydeki çalışmaların kısıtlı olduğu anlaşılmaktadır. Kriz sonrası yürürlüğe konulan canlandırıcı politikaların etkilerinin analiz edilmesi, vergi rejiminin yoksulluk üzerindeki etkilerinin mikro düzeyde incelenmesi ya da eşitsizliğe neden olan ana mal ve hizmet gruplarındaki fiyat ve vergi esnekliklerinin belirlenmesine ilişkin çalışmaların literatüre katkı sağlayacağı düşünülmektedir. Bu çalışmada olduğu gibi kurulan statik modeller içerisinde, yıllar içerisindeki etkilerin vergi oranlarındaki değişimle mi ya da tüketim kalıplarının değişimi ile mi olduğunu tespit etmek zordur. Dolayısıyla, Türkiye ekonomisi için geliştirilecek mikrosimülasyon gibi dinamik yöntemlerle maliye politikasının geniş kapsamlı etkilerinin ölçülmesi gelecek çalışmalar için önem arz etmektedir.

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EKLER

Ek: 1
Ana Mal Gruplarına Göre KDV Dağılımı, (2004-2019)

Kaynak: Yazarların Hesaplamasıdır.
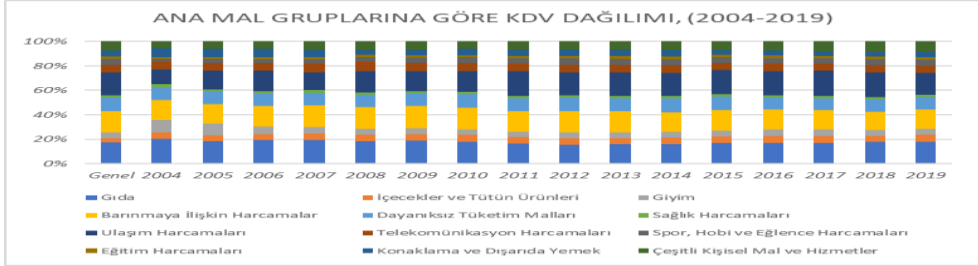
Ek: 2
Ödenen KDV ve ÖTV Tutarları, (2004 -2019)

Kaynak: Yazarların hesaplamasıdır.
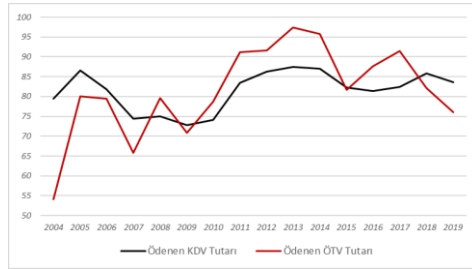
Ek: 3
1 Basamaklı COICOP Sınıflandırması

1. Gıda ve Alkolsüz İçecekler
2. Alkollü İçecekler, sigara ve tütün
3. Giyim ve Ayakkabı
4. Konut, su, elektrik, gaz ve diğer yakıtlar
5. Mobilya, ev aletleri ve ev bakım hizmetleri
6. Sağlık
7. Ulaştırma
8. Haberleşme
9. Eğlence ve kültür
10. Eğitim hizmetleri
11. Lokanta, yemek hizmetleri ve oteller
12. Çeşitli mal ve hizmetler

Kaynak: TÜİK Hanehalkı Bütçe Anketleri.

İkinci El Otomobil Fiyat Artışına Etki Eden Faktörlerin Yapısal Eşitlik Modeli ile Tespit Edilmesi: Van İli Örneği

Mehmet POLAT (https://orcid.org/0000-0002-6930-1499), Iğdır University, Türkiye; mehmetpolat@igdir.edu.tr

Caner BULUT (https://orcid.org/0000-0001-5421-300X), Iğdır University, Türkiye; caner.bulut@igdir.edu.tr

Determining the Factors Affecting the Prices Increase of Used Cars with the Structural Equation Model: The Case of Van Province

Abstract

The sharp price increases in the used car market in recent years negatively affect the purchasing power of individuals on the one hand and the market on the other. This study aims to determine the factors that cause the price increase in the used car market. In this direction, authorised dealers and gallerists operating in the province of Van were chosen as the universe of this research, and a survey was applied to a sample set of 226 people. The data obtained from the surveys were evaluated within the scope of explanatory factor analysis and structural equation modelling, respectively. In the study, four factors, namely economy, strategy, market and supply, were identified, and these factors were tested in the context of the study's model and hypotheses. As a result, it has been found that the latent variables of economy, strategy and market have a powerful and positive effect on the price increase of used cars. In addition, it has been concluded that the latent variable of supply also has a significant positive impact. However, it is not highly correlated with the price increase of used cars.

Keywords : Used Car, Price, Exploratory Factor Analysis, Structural Equation Model.

JEL Classification Codes : D40, C83.

Öz

Son yıllarda ikinci el otomobil piyasasında meydana gelen sert fiyat artışları, bir yandan bireylerin alım gücünü diğer yandan da piyasayı olumsuz etkilemektedir. Bu çalışma, ikinci el otomobil piyasasında fiyat artışına neden olan faktörlerin tespit edilmesini amaçlamaktadır. Bu doğrultuda Van ilinde faaliyet gösteren yetkili satıcı ve galericiler, anakütle olarak seçilmiş ve 226 kişiden oluşan örneklem kümesine anket uygulanmıştır. Anketlerden elde edilen veriler, başlıca açıklayıcı faktör analizi ve yapısal eşitlik modeli kapsamında değerlendirilmiştir. Çalışmada, ekonomi, strateji, pazar ve tedarik olmak üzere dört faktör tespit edilmiş ve bu faktörler, çalışmanın modeli ve hipotezleri bağlamında test edilmiştir. Sonuç olarak ikinci el otomobil fiyat artışına, ekonomi, strateji ve pazar gizli değişkenlerin oldukça güçlü ve pozitif yönde bir etkiye sahip olduğu bulgusuna ulaşılmıştır. Ayrıca tedarik gizli değişkenin de ikinci el otomobil fiyat artışına yüksek düzeyde bir ilişkisi olmasa da önemli bir düzeyde pozitif etkiye sahip olduğu sonucuna ulaşılmıştır.

Anahtar Sözcükler : İkinci El Otomobil, Fiyat, Açıklayıcı Faktör Analizi, Yapısal Eşitlik Modeli.

1. Giriş

Otomotiv sektörü, gelişmiş ve gelişmekte olan ülkelerin ekonomisinde çok önemli bir paya sahiptir. Otomotiv sektörü, gerek ülke ekonomisinin istikrarlı bir şekilde büyümesine gerekse birçok sektörün gelişmesine yardımcı olan lokomotif bir sektördür. Otomotiv sektörü, elektrik- elektronik, hafif metaller, demir-çelik, petrokimya, cam, lastik, plastik ve tekstil gibi sektörlerden faydalanmaktadır. Otomotiv sektörünün sürekli gelişimiyle üretim noktasında yaptığı atılımlar tarım, inşaat, turizm, vagon ve savunma sanayii gibi sektörlerin de gelişmesine katkı sağlamaktadır. Ayrıca otomotiv sektörü, ürünlerinin tüketiciye ulaşmasında ve kullanılmasında aktif rol alan pazarlama, finans, sigorta ve akaryakıt gibi sektörlere hem istihdam hem de talep sağlaması açısından stratejik öneme sahiptir (Du & Lin, 2017: 69; Pişkin, 2017: 12; Akal vd., 2019: 178). Şekil 1'de gösterildiği gibi otomotiv sektörü, bir taraftan birçok sektörden faydalandığı gibi diğer tarftan ise birçok sektöre tedarik sağlamaktadır.

Şekil:1
Otomotiv Sektörünün Diğer Sektörlerle İlişkisi
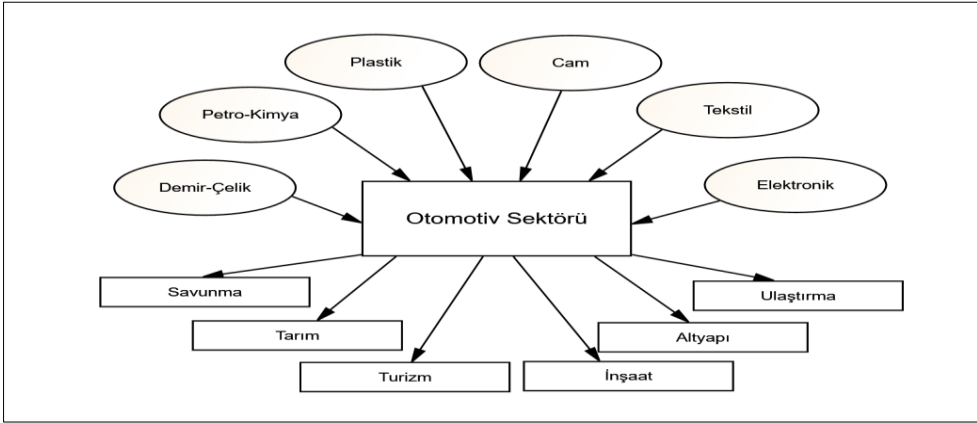
Kaynak: Otomotiv Distribütörleri Derneği (ODD), 2021.

Günümüzde küreselleşmeyle birlikte üretim, ticaret ve sermaye hareketlerinin serbestleşmesi, diğer sektörlerde olduğu gibi otomotiv sektöründe de karşılıklı bağımlılık ve rekabeti beraberinde getirmiştir. Küresel rekabet ortamında ülkemizin otomotiv sektöründe başarılı olması sektörün salt kendi çabaları ile değil aynı zamanda Türkiye'nin küresel rekabet düzeyindeki başarısı ile yakından ilişkilidir (Ülengin vd., 2010: 34-36; Polat, 2020). Lokomotif görevi gören otomotiv sektörü, bir yan beslendiği sektörlerin başarısından doğrudan etkilenirken diğer yandan beslediği sektörlerin ise başarısına ortaktır. Türkiye'nin küresel rekabet düzeyindeki başarısı da ancak yüksek teknoloji ürünlerine yönelmek ve bu çerçevede ilgili sektörleri sevk ve teşvik etmekten geçer. Bu sektörler içerisinde en kilit sektörlerin başında, otomotiv sektörü gelmektedir. Nitekim gelişmiş ve gelişmekte olan

ülkeler, otomotiv sektörüne büyük önem vermekte ve bu yarışta çok önemli yollar kat etmiş bulunmaktadırlar.

Dünya otomotiv sektörünün 2020 yılı verilerine göre toplam motorlu araç üretimi içerisinde otomobil üretimi, yaklaşık olarak %80'lik bir paya sahiptir. Ayrıca yıllık otomobil üretiminde, Çin 21,39 milyon ile birinciliği, Japonya 8,33 milyon ile ikinciliği ve Almanya ise 4,66 milyon ile üçüncülüğü göğüslemektedir. Bu yarışta Türkiye ise 2017 yılında 1.142.906 otomobil üreterek dünya sıralamasında 14. sıraya yükselmiştir. Ancak son yıllarda Covid-19 salgın hastalığı vakası sebebiyle bütün dünyayı saran ekonomik kriz neticesinde Türkiye'de otomobil üretimi, 2020 yılında 855.043'e kadar gerilemiştir. Son yıllarda yaşanan olumsuzluklara rağmen otomotiv sektörü, Türkiye ekonomisinde önemli bir yere sahiptir. Otomotiv sektörü, 2020 yılı rakamlarına göre toplam ihracat içindeki payı %13 olurken bu pay içinde otomobil sektörünün payı ise %43,6 olmuştur. Türkiye dış ticaretinde hem otomotiv hem de özelde otomobil sektörü, 2017 yılından bu yana dış ticaret fazlası vermektedir. Diğer yandan 2020 rakamlarına göre otomotiv sektörü, 58.297 personel istihdam ettiği ve GSMH içinde de %5,5 paya sahip olduğu gözlenmektedir (ODD, 2021; Statista, 2021). Ayrıca Türkiye otomotiv iç pazarında, yaklaşık 1200 yan sanayici, 1300 yetkili satıcı, 45 distribütör ve yaklaşık 65.000 ikinci el ticareti yapan galeri girişimi bulunmaktadır (MASFED, 2022). Bunların yanında motorlu araç tamiri yapan girişimler de göz önüne alındığında Türkiye'de otomotiv sektörünün büyüklüğü ve önemi daha net anlaşılmaktadır.

Otomobiller, bütün dünyada olduğu gibi Türkiye'de de tüketicilerin en çok ilgi gösterdikleri ve tercih ettikleri ulaşım araçlarındandır. Ülkemizde otomobil talebi, her geçen gün daha da artmaktadır. Özellikle ülkemizde kullanılan otomobil sayısı, 2005-2020 yılları arasında yaklaşık %127 oranında bir artış göstermiştir. Türkiye'de kişi başına düşen otomobil sayısı, 2005'te %8,47 iken 2020 yılına gelindiğinde %15,66 olduğu görülmektedir. Türkiye'de 2020 yılı rakamlarına göre 601.525 adet sıfır otomobil trafiğe kaydedilirken 6.477.153 adet ikinci el otomobil satışı olmuştur. Bu durum da Türkiye'de bireylerin otomobil taleplerinin %90'ının ikinci el otomobil piyasasından karşılandığı sonucunu vermektedir.

İkinci el otomobil piyasası, çok sayıda alıcı ve satıcısı olmasından dolayı tam rekabet piyasaya benzemektedir (Yarar & Yılmaz, 2018). Ancak ikinci el otomobil piyasasında, asimetrik bilginin hâkim olmasından dolayı da tam rekabet piyasanın simetrik bilgi özelliği ihmal edilmektedir (Akerlof, 1970). Bu iki özelliğinden dolayı ikinci el otomobil fiyatlarının belirlenmesinde alıcı ve satıcı zorlanmaktadır. Günümüzde klasik ikinci el otomobil pazarlama yöntemlerine bir de e-ticaret eklenmesiyle birlikte ikinci el otomobil pazarı, her geçen gün daha da büyümektedir. Diğer yandan otomobil pazarı büyümesine rağmen Türkiye'de otomobil fiyatlarının 2005-2020 yılları arsında %500'ün üstünde arttığı ve son birkaç yıl içinde ise fiyat artışının katlanarak devam ettiği görülmektedir. Bu fiyat artışı, bir yandan bireylerin alım gücünü olumsuz etkilerken diğer yandan piyasayı da olumsuz etkilemektedir. Ülke ekonomisi için çok önemli bir paya sahip olan ve aynı zamanda bireylerin bir yatırım aracı olarak gördükleri otomobillerde meydana gelen fiyat artışlarının

altında yatan nedenlerin tespit edilmesi, büyük önem arz etmektedir. Literatürde genellikle ikinci el otomobil fiyatlarına etki eden faktörler, Hedonik fiyat modeli, yapay sinir ağları ve regresyon analizi yöntemleri kullanılarak tespit edilmeye çalışılmıştır. Bu analizlerde, otomobillerin özellikleri kullanılarak fiyat oluşumu tahmin edilmeye çalışılmıştır. Ancak bu çalışmada ise piyasa şartları bağlamında ikinci el otomobil fiyatlarına genel olarak etki eden faktörlerin tespit edilmesi amaçlanmıştır. Bu doğrultuda pilot il olarak Van ili seçilmiş ve bu ilde faaliyet gösteren tüm yetkili satıcılar ve galericiler, ana kütle olarak tanımlanmıştır. Ayrıca veri toplama yöntemi olarak anket kullanılmış ve ankette kullanılan ölçek de bu çalışma kapsamında geliştirilmiştir. Anket yöntemi kullanılarak elde edilen veriler, başlıca açıklayıcı faktör analizi (AFA) ve yapısal eşitlik modeli (YEM) kapsamında değerlendirilmiştir.

2. Türkiye'de Otomobil Sektörünün Mevcut Durumu

Türkiye'de ilk otomotiv montaj fabrikası, 1929 yılında Ford Motor Company tarafından Tophane'de kurulmuştur. 450 kişinin çalıştığı ve günlük 48 adet aracın montaj edildiği bu fabrika, o yıllarda yaşanan ekonomik buhran nedeniyle tutunamayıp 1934 yılında faaliyetlerini durdurmuştur (Bayrakçeken, 2005: 3-4). Diğer yandan Türkiye'nin ilk %100 yerli otomobili olan "Devrim Otomobil", Cumhurbaşkanı Cemal Gürsel'in talebi ile 1961 yılında Eskişehir Devlet Demir Yolları Fabrikası'nda üretilmiştir. Ancak otomobilin ilk testi yapılırken yakıtının bitmesi sonucu yaşanan aksaklık nedeniyle politik bir karar verilerek üretiminden vazgeçilmiştir (Genç, 2018: 9). Bu denemeden de vazgeçmeyen Türkiye, 1967 yılında seri üretime geçilen ilk yerli otomobil olan "Anadol" marka otomobili üretmiştir. Anadol, yıllık 7200 adet üretim kapasitesiyle 1982'ye kadar üretimini sürdürmüştür (Bedir, 1999: 80).

1960'lı yılların sonlarına doğru uluslararası yabancı otomotiv firmalarının Türkiye'ye gelmesiyle birlikte Fransız ortaklı Oyak-Renault ve İtalyan ortaklı TOFAŞ marka otomobil fabrikaları, 1971 yılında üretime başlamışlardır. Bu iki yabancı ortaklı otomotiv firması, Türk otomotiv sektörünün gücüne güç katmıştır. Ayrıca Türkiye'nin 1980'li yıllara kadar devam ettirdiği ithal ikameci politikalar da Türk otomotiv sektörünün daha da gelişmesinde etkili olmuştur (Güneş, 2012: 220).

Türkiye'de 1980'li yıllara gelindiğinde ithal ikameci politikaların yerini serbest ticaret almış ve bunun sonucunda gümrük duvarı yıkılarak hem girdi ve ara malların hem de ana mamul ürünlerin ithalat ve ihracatı serbest bırakılmıştır. Böylece Türk otomotiv sektörünün pazar ağı genişleyerek firmalar, uluslararası alanda rekabet etme şansı yakalamışlardır. 1990'lı yıllardan bu yana gerek dünyanın önde gelen dev otomotiv firmalarıyla kurulan ortaklıklar ile gerekse de doğrudan dev firmaların teşebbüsleriyle kurulan tesisler, Türkiye'yi otomotiv üreticilerinin dünyadaki üretim merkezi haline getirmiştir (Taşkın, 2004: 25; Genç, 2018: 9). Ayrıca bu dönemde "AR-GE", "Tasarım", "Çevre" ve "Kalite Sistemleri"nin önem kazanması ve 1 Ocak 1996 yılında devreye giren Gümrük Birliği Antlaşması ile Türk otomotiv sanayisinin yapısal özelliklerinde köklü değişiklikler olmuştur (Ergene, 2017: 19).

Türkiye'nin Gümrük Birliği'ne girmesi, Türk otomotiv endüstrisine 4 ana kanal üzerinden rekabet gücü sağlamıştır. Bu kanallardan birincisi miktar kısıtlamalarının kaldırılması, ikincisi gümrük tariflerinin sıfırlanması, üçüncüsü tarife dışı ticaret bariyerlerinin elimine edilmesi ve dördüncüsü ise gelişmekte olan ülkelerden yapılan taşınır, taşınmaz ve hizmetlerin ithalatında gümrük tarifelerinin sabit duruma getirilmesi olmuştur. Böylece Türk otomotiv endüstrisinde yabancı ortaklık kurma imkânı artmış, hammadde ve ara mal temininde maliyetler düşmüş, AR-GE ve teknolojik yenileme faaliyetleri daha da hız kazanmıştır. Ayrıca hem üretici sayısının artması hem de pazar ağının daha da genişlemesiyle birlikte maliyetlerin düşmesi ve verimliliğin artması sonucu otomotiv endüstrisinde rekabetin artmasına imkân doğurmuştur. Diğer yandan Avrupa pazarındaki hedeflerini daha da yukarı taşımak isteyen Honda, Toyota ve Hyundai gibi uzakdoğu kökenli otomotiv markaları, stratejik olarak yatırımlarını Türkiye'ye yapmışlardır (Pişkin, 2017: 28).

Türkiye'de 2000'li yıllara gelindiğinde otomobil üretim miktarında ciddi dalgalanmalar olmuştur. 2000'de otomobil üretimi 297.476 adet iken 2001 yılı krizi ile birlikte otomobil üretiminde sert bir düşüş yaşanmış ve o yıl ancak 175.343 adet otomobil üretilmiştir. 2002 yılında ise otomotiv sektörü yeniden canlanmaya başlamış ve 2004'te 447.152 adet otomobil üretilmiştir (Görener & Görener, 2008: 1219).

Tablo: 1
Türkiye'de Yıllara Göre Otomobil Sayısı

Yıllar	Türkiye'deki Otomobil Üretim Sayısı	SEE*	Trafiğe Kayıt Edilen Otomobil Sayısı	SEE	Kullanımda Olan Toplam Otomobil Sayısı	SEE
2005	453.663	100	406 807	100	5.772.745	100
2006	545.682	120	396 542	97	6.140.992	106
2007	634.883	140	353 495	87	6.472.156	112
2008	621.567	137	353 168	87	6.796.629	118
2009	510.931	113	357 986	88	7.093.964	123
2010	603.394	133	485 619	119	7.544.871	131
2011	639.734	141	602 248	148	8.113.111	141
2012	577.296	127	565 791	139	8.648.875	150
2013	633.604	140	654 905	161	9.283.923	161
2014	733.439	162	585 814	144	9.857.915	171
2015	791.027	174	746 395	183	10.589.337	183
2016	950.888	210	746 074	183	11.317.998	196
2017	1.142.906	252	741 902	182	12.035.978	208
2018	1.026.461	226	526 235	129	12.398.190	215
2019	982.642	217	386 748	95	12.503.049	217
2020	855.043	188	601 525	148	13.099.041	227

* SEE: Sabit Esaslı Endeks.
Kaynak: OSD, 2021; TÜİK, 2021.

Tablo 1'de görüldüğü gibi Türkiye'de otomobil üretimi, 2005-2013 yılları arasında 450.000-635.000 bandında gidip gelmiştir. Ancak 2014 yılında bu trend kırılarak 733.439 adet otomobil üretilmiştir. 2014'te yaşanan bu hareketlenme ile birlikte Türkiye'de otomobil üretim miktarı, 3 yıl içinde yaklaşık %56'lık bir artış göstererek 2017 yılında 1.142.906 adet olmuştur. Ayrıca 2017 yılında, 921.480 otomobil ihraç edilerek Türkiye ihracat tarihinde en yüksek otomobil adedine ulaşılmıştır. Son dönemde ise 2019'dan bu yana devam eden Covid-19 salgın hastalığı vakası sebebiyle bütün dünyayı saran ekonomik kriz, Türk otomotiv sektörünün yükselen trendini olumsuz etkilemiş ve hem otomobil üretiminde hem de ihraç edilen araç sayısında ciddi düşüşler yaşanmıştır (OSD, 2021).

Tablo 1'deki verilere göre Türkiye'de 2005-2020 yılları arasında trafiğe kaydedilen otomobil sayısında genel olarak bir istikrarın olmadığı görülmektedir. Türkiye'de en çok otomobilin 2015-2017 yılları arasında trafiğe kaydedildiği gözlenmektedir. Ancak 2019 yılı dikkate alındığında trafiğe kaydedilen otomobil sayısının yükselen trendinin kırıldığı ve 2005 yılı rakamlarının altına düştüğü gözlenmektedir. 2020 gelindiğinde ise trafiğe kaydedilen otomobil sayısının bir önceki yıla göre yaklaşık %56 oranında arttığı ve 2018 yılındaki rakamların üstüne çıktığı görülmektedir. Sonuç olarak Türkiye'de kullanımda olan otomobil sayısının 2005 yılında yaklaşık 6 milyon iken 2020 yılana gelindiğinde bu sayının 13 milyona ulaştığı gözlenmektedir.

Şekil 2'de Türkiye'nin 2005-2020 yılları arasındaki otomobil ithalat ve ihracat rakamları verilmektedir. Bu veriler ışığında bakıldığında 2013-2018 yılları arasında ihracatın sürekli olarak arttığı, ancak 2018 yılından sonra azaldığı görülmektedir. Diğer yandan otomobil ithalatında ise 2016 yılına kadar bir artışın olduğu, ancak sonraki yıllarda ise 2020 yılına gelene kadar ciddi bir düşüş olduğu gözlenmektedir. Böylece Türkiye otomobil dış ticaretinde 2016 yılına kadar dış ticaret açığı ve sonraki yıllarda ise dış ticaret fazlası olmuştur. Ülkemizde ilk defa 12/08/2003 tarihinde yürürlüğe koyulan ve özellikle 2010'dan sonra da ara ara gündeme getirilen hurda teşvik uygulaması ve farklı dönemlerde yapılan ÖTV indirimleri, 2003 yılından sonra Türkiye'de hem otomobil talebinin hem de ithalatının artmasına sebep olmuştur. Ancak 2016'dan bu yana hem Türkiye'de yerli üretimdeki artış hem de döviz kurunda meydana gelen yükselmeler ise ithalat miktarının önemli miktarlarda düşmesine neden olmuştur. Ayrıca Türkiye'de özellikle bir yandan 2016 yılından bu yana konulan yüksek ÖTV oranları, ithalatı kısarken diğer yandan artan döviz oranları da ihracatın artmasına sebep olmuştur. Bu durum da 2016 yılından sonra otomobil sektöründe dış ticaret fazlası vermemize zemin hazırlamıştır.

Şekil: 2
Yıllara Göre Türkiye'de Otomobil İthalat ve İhracat Dağılımı (1.000.000 $)
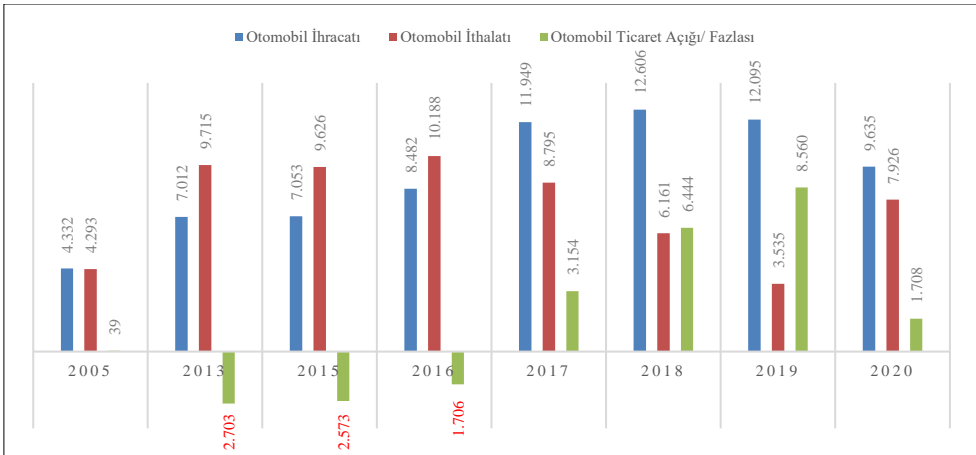
Kaynak: TÜİK, 2021.

2019 yılı sonlarında ortaya çıkan Covid-19 salgın hastalığı, özellikle otomotiv sektörünü olumsuz etkilemiştir. Ancak tüm olumsuzluklara rağmen Türkiye otomobil dış ticaretinde en yüksek ticaret fazlası, 2019 yılında verilmiştir. 2020 yılında ise bütün dünyada olduğu gibi Türkiye'de otomobil arzında meydana gelen daralma sonucunda hem otomobil ihracat rakamlarında ciddi bir düşüş olmuş hem de otomobil dış ticaret fazlasındaki pay nispeten azalmıştır.

Şekil 3'te motorlu taşıt fiyat endeksi verilmektedir. Bu veriler bağlamında bakıldığında 2005 yılından 2021 yılına kadar motorlu taşıt fiyatlarının %500'ün üstünde arttığı görülmektedir. Motorlu taşıt fiyatları, 2005-2012 yılları arasında %30 civarında arttığı ve sonraki yıllarda ise yükselen bir trend yakalayarak daha da sert yükseldiği gözlemlenmektedir. Özellikle Türkiye'de 2013 yılından bu yana döviz kurlarında meydana gelen artışlar, son yıllarda ÖTV oranlarının yükseltilmesi ve otomobil arzında meydana gelen daralmalar motorlu taşıtların fiyatlarının sert yükselmesine sebep olmuştur.

Şekil: 3
Türkiye'de 01/2005-05/2021 Arası Motorlu Taşıt Fiyat Endeksi (2005=100)
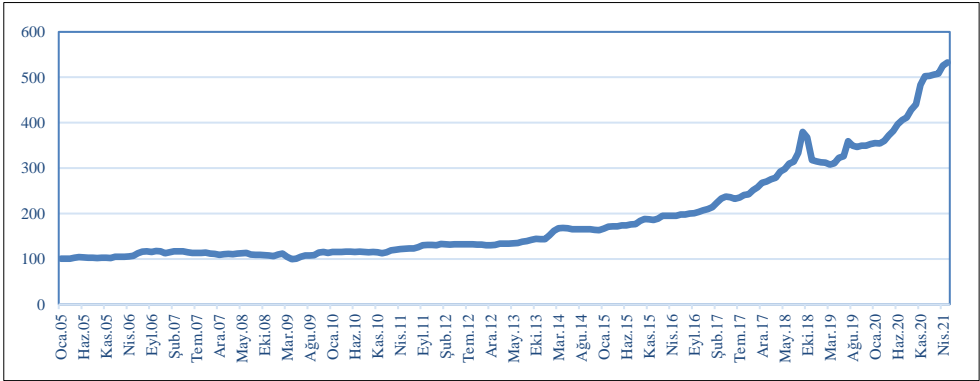
Kaynak: TÜİK, 2021.

Ayrıca 2020 yılında Covid-19 vakasının tüm dünyaya yayılması sonucu birçok sektörde olduğu gibi özellikle de otomotiv sektörü de olumsuz etkilenmiştir. Bu durum, tüm otomotiv markalarının üretim miktarlarının düşmesine ve Türkiye'de Nisan 2020'de motorlu taşıt fiyatlarının sert bir şekilde yükselmesine sebep olmuştur. Böylece motorlu taşıt fiyat endeksi, Nisan 2020'de 372,14 iken Nisan 2021'de 525,59'a kadar yükselmiştir.

Motorlu taşıtlar içinde otomobiller, otomobiller içerisinde ise ikinci el otomobiller çok büyük paya sahiptir. İkinci el otomobil pazarındaki toplam satışlar, çoğu ülkelerde sıfır otomobil satışından çok daha büyüktür. Özellikle ABD'de ikinci el otomobil satış hacmi, sıfır otomobillerin iki katından fazladır (Akçi, 2016: 333-334). Türkiye'de de ikinci el otomobil satış hacmi, toplam otomobil satış hacminin yaklaşık %90'ına denk gelmektedir

(INDICATA, 2021). Bu durum, ikinci el otomobil piyasasının ne kadar büyük önem arz ettiğini göstermektedir.

Şekil 4'te Türkiye'de 2019-2020 yılları arasında aylara göre ikinci el online otomobil ve hafif ticari araç satış rakamlar verilmiştir. Bu veriler ışığında bakıldığında bireylerin en çok 2019 ve 2021 yıllarının Aralık aylarında, 2020 yılında ise Temmuz ayında ikinci el otomobil ve hafif ticari araç satın aldıkları görülmektedir. Ayrıca genel olarak bireylerin en çok yaz aylarında tatil amacıyla ikinci el otomobil ve hafif ticari araç satın aldıkları gözlenmektedir.

Şekil: 4
Türkiye'de İkinci El Online Otomobil ve Hafif Ticari Araç Satış Rakamları
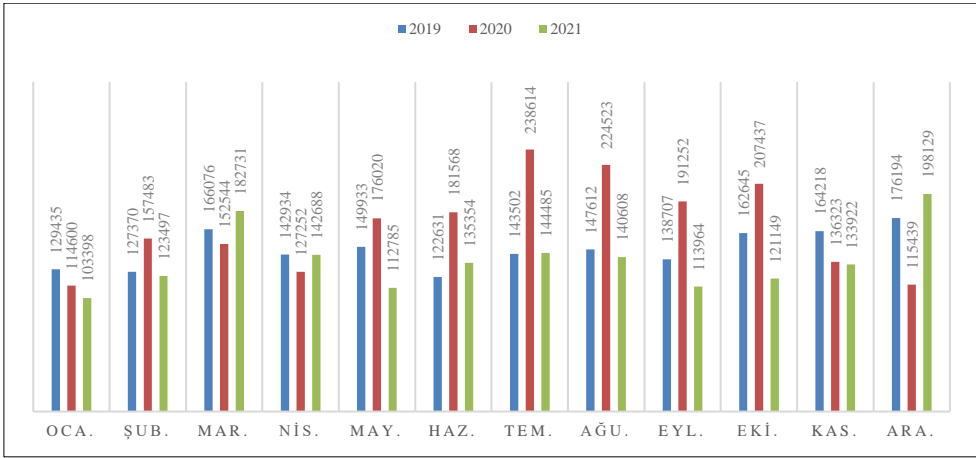
Kaynak: INDICATA, 2021.

Türkiye'de son üç yılda, en çok 2020 yılında ikinci el otomobil ve hafif ticari araç satışı olmuştur. Türkiye'de 2020 yılında online otomobil pazarında, 2.053.055 otomobil ve hafif ticari araç satılmıştır. Diğer yanda EBS danışmanlığın verilerine göre 2020 yılında online ve klasik yöntem ile toplam 6.477.153 adet otomobil satıldığı ifade edilmektedir (Bloomberg, 2022). Bu sayı, 2020 yılında trafiğe kaydolan sıfır otomobil sayısının yaklaşık 10,7 katına denk gelmektedir. Diğer yıllara da bakıldığında ikinci el otomobil satış rakamlarının sıfır otomobil satış rakamlarının çok üzerinde olduğu söylenebilir. Bu durum da Türkiye'de ikinci el otomobil pazarının ne kadar canlı olduğunu ve satılan her 11 otomobilden 10'nun ikinci el otomobil olduğunu göstermektedir.

3. Literatür

Otomotiv sektörüyle alakalı ulusal ve uluslararası birçok akademik çalışma yapılmıştır. Söz konusu çalışmalarda ağırlıklı olarak müşteri memnuniyeti, marka sadakati ve müşteri memnuniyeti ile müşteri sadakati arasındaki ilişki incelenmiştir. Bu çalışmalarda

müşteri memnuniyet ve sadakatini etkileyen birçok faktör tespit edilmiştir. Bu faktörler arasında ürün kalitesi, fiyat, beklentiler, imaj, yedek parça ve servis hizmetleri, yakıt tüketimi, motor gücü, reklam ve güven gibi faktörlerin öne çıktığı görülmüştür (Uyar, 2019; Bearden & Teel, 1983; Bloemer & Lemmink, 1992; Şenel, 2011; Azman & Gomiscek, 2015; Arıtan & Akyüz, 2015). Bazı çalışmalarda, bireylerin otomobil satın alma davranışını etkileyen faktörler incelenmiştir. Bu çalışmalarda fiyat, gelir düzeyi, kredi avantajları, vergi avantajı, konfor, servis hizmetleri, kalite, üretim yılı, güvenlik ve performansın bireylerin satın alma davranışını etkileyen en önemli faktörler arasında olduğu sonucuna varılmıştır (Kaushal, 2014; Nezakati et al., 2011; Yayar vd., 2016; Phuong et al., 2020; Arokiaraj & Banumathi, 2014; Choo & Mokhtarian, 2004).

Bireylerin otomobil satın alma davranışı ile otomobil satın alan müşterilerin memnuniyet ve sadakatini konu alan çalışmalarda görüldüğü gibi en önemli faktörün fiyat olduğu görülmektedir. Bu da otomobil fiyatlarının bireyler için ne kadar belirleyici olduğunu göstermektedir. Söz konusu otomotiv sektörüyle alakalı yapılan diğer çalışmalarda ise otomobil talebi ile otomobil fiyatlarını etkileyen faktörlerin belirlenmesi üzerine çalışmalar yapılmıştır. Bu çalışmalarda ise otomobil fiyat artışına GSYİH, faiz oranı, nüfus miktarı, enflasyon oranı, güven endeksi, akaryakıt fiyatları ve döviz endeksi gibi makroekonomik faktörlerin yanı sıra otomobilin yaşı, kalitesi, rengi, servis hizmetleri, kilometresi, teknik ve donanım özeliklerinin neden olduğu ifade edilmiştir (Genesova, 1993; Islam et al., 2017; Lessmann & Voss, 2017; Yayar & Yılmaz, 2018; Anderson, 2005; Asilkan & Irmak, 2009; Erdem & Şentürk, 2009; Daştan, 2016; Murray & Sarantis, 1999; Prieto et al., 2015).

Otomotiv sektörüyle alakalı yapılan çalışmalara genel olarak bakıldığında, otomobil fiyatlarını etkileyen faktörler ile otomobil fiyatları arasındaki ilişki şu şekilde sıralanmıştır: Çalışmalarda, GSYİH'nin artması sonucu otomobil talebinin artması ve bireylerin daha lüks modellere yönelmesi ile birlikte otomobil fiyatlarının yükseldiği ifade edilmiştir. Petrol fiyatlarında meydana gelen artışın bir yandan dayanıklı mal üreten işletmelerin maliyetlerini artırdığı ve özellikle de otomotiv sektörünün yatırım talebini etkilediği diğer yandan da bireylerin otomobil talebini olumsuz etkilediği sonucuna varılmıştır. Faiz oranlarının artmasının otomobil talebini olumsuz etkilediği, faiz oranlarının düşmesinin ise otomobil taleplerini artırdığı ve bunun neticesinde otomobil fiyatlarının arttığı sonucuna ulaşılmıştır. Döviz endeksinde meydana gelen dalgalanmaların hem arz hem de talep yönünü etkilediği, özellikle döviz oranlarının artması ile otomobil maliyetlerinin arttığı ve bunun sonucunda otomobil fiyatlarının da arttığı ifade edilmiştir (Muhammad et al., 2013; Hamilton, 1988; Pindyck & Rotemberg, 1983; Zain et al., 2020; Rusli et al., 2014; Islam et al., 2017; Lee & Ni, 2002; Pehlivanoğlu & Riyanta, 2018).

Literatürdeki çalışmalara bir bütün bakıldığında ağırlıklı olarak en çok YEM, daha sonra sırasıyla Hedonik fiyat modeli, yapay sinir ağları, regresyon analizi, markov zinciri analizi ve zaman serileri analizi yöntemleri kullanılmıştır. Bu bağlamda söz konusu bu çalışma ile verimlilik açısından en uygun yöntemin YEM olduğu uygun görülmüş ve bu yöntemin kullanılması kararlaştırılmıştır.

4. Metodoloji

Çalışmanın bu kısmında araştırmanın yöntemi, amacı, kapsamı, önerilen modeli ve hipotezleri, örneklemi, veri toplama aracı ve ölçüm modeli ifade edilmiştir.

4.1. Araştırmanın Amacı

TÜİK verilerine göre Türkiye'de kişi başına GSYH'nin 2005 yılında 7.276 $'a ve 2013 yılında 12.582 $'a kadar çıktığı; 2020 yılına gelindiğinde ise 8.600 $'a kadar gerilediği görülmektedir. Diğer yandan motorlu araç fiyat endeksinin Ocak 2005'te 100,39'a ve 2013'te 130,67'e kadar yükseldiği ve sonraki yıllarda ise daha hızlı bir yükselme trendi yakalayarak Aralık 2020'de 502,45'e kadar yükseldiği gözlenmektedir. Bu veriler ışığında bakıldığında Türkiye'de bireylerin gelir düzeyi 2005'ten 2013 yılına kadar yaklaşık olarak %73 artarken otomobil fiyatlarında ise yaklaşık %30 civarında bir artış olmuştur. Ancak 2013 yılından 2020 yılına gelindiğinde bireylerin gelir düzeyinde yaklaşık %32 bir azalış olurken otomobil fiyatlarında ise nerdeyse %500 oranında sert bir yükseliş meydana gelmiştir. Kısacası Türkiye'de 2005'ten 2020 yılına kadar bireylerin gelir düzeylerinde dalgalanmalar olmakla birlikte, gelir düzeyine bir bütün bakıldığında yaklaşık %17'lik bir artış görülürken otomobil fiyatlarında ise %500'ün üzerinde bir artış olmuştur. Ayrıca Türkiye'de nüfus miktarı 2005-2020 yılları arasında yaklaşık olarak %23 artarken kişi başına otomobil sayısının ise yaklaşık olarak %85 oranında arttığı görülmüştür. Bu verilere bir bütün olarak bakıldığında Türkiye'de son 15 yılda bireylerin otomobil fiyatlarına karşı alım güçlerinin çok yüksek derecede düştüğü ancak tüm bu olumsuzluklara rağmen bireylerin otomobile olan taleplerinin her geçen gün daha da arttığı görülmektedir.

Tüm dünyada olduğu gibi Türkiye'de de otomobiller, bireylerin zaruri ihtiyaçları haline gelen lüks tüketim mallarındandır. Türkiye'de hem bireylerin reel gelir düzeylerinde meydana gelen düşüş hem de sıfır araç tedarikinde yaşanan aksaklıklar, bireyleri daha çok ikinci el otomobil piyasasına itmiştir. Bu durum ikinci el piyasasını daha da cazip hale getirmiştir. Bu bağlamda mevcut çalışmada ikinci el otomobil piyasası ele alınarak bu piyasada meydana gelen sert fiyat artışlarına neden olan faktörlerin tespiti amaçlanmıştır.

4.2. Araştırmanın Kapsamı, Yöntemi ve Örneklemi

Araştırmanın veri seti, anket yöntemi kullanılarak toplanan verilerden oluşmaktadır. Veri toplama aracı olarak kullanılan ankette, otomobil fiyatlarına etki eden faktörlerin araştırılması için 14 maddelik bir ölçeğe yer verilmiştir[1]. Araştırmanın kapsamı doğrultusunda Van ilinde faaliyet gösteren tüm yetkili satıcılar ve galericiler ana kütle olarak

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[1] *Anket ölçeğinde, 5'li likert ölçek kullanılmıştır. Söz konusu ölçek, yazarlar tarafından geliştirilmiştir. Ölçek madde havuzu hazırlanırken 5 uzman kişinin görüşleri alınarak ölçeğin 20 maddelik taslak hali elde edilmiştir. Daha sonra pilot uygulama yapılmış ve elde edilen veriler, AFA, geçerlilik ve güvenirlik analizinden geçirilerek ölçek, 14 maddelik son halini almıştır. Çalışmanın bütünlüğünün korunması amacıyla 20 madde için yapılan analizler, çalışmaya dâhil edilmemiştir. Sadece nihai elde edilen ve çalışmanın veri setini oluşturan 14 maddelik çalışmanın analizlerine yer verilmiştir.*

değerlendirilmiştir. Diğer yandan örneklem kümesi, %95 güven aralığı ve %5 hata payı ile yaklaşık 550 yetkili satıcı ve galericiden oluşan ana kütleden 226 katılımcı olarak belirlenmiştir. Anketler, yüz yüze anket yöntemi kullanılarak 28.10.2020-09.03.2021 tarihleri arasında yapılmıştır.

Anketlerden elde edilen veriler, SPSS ve AMOS paket programları yardımıyla AFA ve YEM kullanılarak değerlendirilmiştir. İlk olarak çalışmada kullanılan ölçekteki değişkenlerin tespit edilmesi ve faktörlerin belirlenmesi amacıyla AFA uygulanmıştır. Akabinde elde edilen faktörler bağlamında model kurulmuş ve YEM çerçevesinde değerlendirilmiştir.

4.3. Açıklayıcı Faktör Analizi

Araştırma kapsamında, ölçekte yer alan değişkenlerin tespit edilmesi için AFA tatbik edilmiştir. AFA, çok değişkenli istatistiklerde göreceli olarak büyük bir değişken kümesinin temel yapısını ortaya çıkarmak amacıyla kullanılan bir yöntemdir. Diğer bir ifadeyle, ölçülebilen çok sayıdaki özelliğin altında yatan gerçek nedenleri, yani ölçülemeyen ve gözlenemeyen gizli boyutları ortaya çıkarma tekniğidir. Yani k kadar değişkenden daha az sayıda m gizli değişkeni üretmektedir (Eşmekaya, 2019: 26; Yaşlıoğlu, 2017: 75).

Çalışmada esas alınan veri kümesinin faktör analizinin yapılması için uygun olup olmadığının değerlendirilmesi maksadıyla korelasyon matrisinin oluşturulması, Barlett ve Kaiser-Meyer-Olkin (KMO) Testlerinin yapılması gerekmektedir (Eşmekaya, 2019: 27). Bu bağlamda açıklayıcı faktör analizi kapsamında ilk olarak korelasyon kat sayıları incelenmiş ve değerlerin genel olarak 0,30'un üstünde olduğu görülmüştür[2]. Korelasyon matrisinin istatistiki olarak anlamlılığını ifade eden Bartlett's Test'in sonuçları Tablo 2'de gösterildiği gibi anlamlı çıkmıştır. Diğer yandan KMO 0,825 değerini alarak örneklem büyüklüğün faktör analizi için çok iyi olduğunu ispatlamıştır[3]. Ayrıca elde edilen Anti-image matrisinde bütün ifadelerin çapraz ilişki katsayılarının 0,50'den yüksek olduğu görülmüştür.

Açıklayıcı faktör analizi kapsamında, 4 adet faktör olduğu tespit edilmiştir. Tablo 2'de verildiği gibi birinci faktör 37,408, ikinci faktör 18,274, üçüncü faktör 8,744 ve dördüncü faktör ise 8,308 oranında açıklanan varyans değeri almıştır. Diğer taraftan faktörlere bir bütün olarak bakıldığında dört faktörün neredeyse %73 oranında yüksek bir değerde varyansı açıkladığı görülmüştür[4].

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[2] *Araştırma ölçeğinde ilk etapta esas alınan 20 madde içinde AFA kriterlerine uymayan 6 madde çıkarılmış ve 14 madde ile analize devam edilmiştir.*

[3] *KMO değeri, 0-1 aralığında değerler almaktadır. Kaiser-Meyer–Olkin (KMO) değerinin 0,50 ve üzeri olması veri kümesi analizi yapmak için uygun kabul edilirken 0,50'nin altındaki değerler ise uygun kabul edilmemektedir. Ayrıca KMO değerinin 0,80'nin üstünde olması ise sonucun çok iyi olduğunu gösterir (Büyüköztürk, 2002: 470-483: Eşmekaya, 2019: 28).*

[4] *Bu tür analizlerde kümülatif varyans oranının %50 ve üzeri olması yeterlidir (Meyers et al., 2006).*

Tablo: 2
Açıklayıcı Faktör Analizi Sonuçları

	Ort.	F$_1$	F$_2$	F$_3$	F$_4$
Ekonomi					
Eko1: Fiyat artışında, döviz kuru etkilidir.	4,14	,843			
Eko2: Fiyat artışında, bankaların verdiği araç kredisi oranları etkilidir.	3,98	,830			
Eko3: Fiyat artışında, ekonomik krizler etkilidir	4,22	,787			
Strateji					
Str1: Fiyat artışında, yetkili satıcıların ve galericilerin reklam ve kampanyaları etkilidir.	3,67		,823		
Str2: Fiyat artışında, yetkili satıcı veya galericilerin 2. el satış farkları etkilidir.	3,81		,780		
Str3: Fiyat artışında, araç takas işlemleri etkilidir.	3,75		,642		
Pazarlama					
Paz1: Fiyat artışında, araç sahiplerinin internet sitelerinde rahat bir şekilde ilan vermeleri etkilidir.	4,15			,869	
Paz2: Fiyat artışında, araba sitelerinde bazı satıcıların fahiş fiyat vererek kamuoyunu yönlendirmesi etkilidir.	4,07			,831	
Paz3: Fiyat artışında, yetkili satıcı ve galericiler dışında özel şahısların internet üzerinden araç alıp-satması etkilidir.	4,17			,737	
Tedarik					
Ted1: Fiyat artışında, piyasaya sunulan sıfır araç sayısı durumu etkilidir	3,92				,898
Ted2: Fiyat artışında, araçlar üzerinden alınan vergiler etkilidir.	3,99				,866
Ted3: Fiyat artışında, yerli ve milli üretimin yetersizliği etkilidir.	3,88				,805
Ted4: Fiyat artışında, araç tedarikinin önemli bir kısmının ithal edilmesi etkilidir	4,02				,781
Ted5: Fiyat artışında, ikinci el piyasasındaki araç durumu etkilidir	3,95				,747
Açıklanan Varyans (%)		37,408	18,274	8,744	8,308
Kümülatif Açıklanan Varyans (%)		37,408	55,682	64,426	72,734
Cronbach's Alpha Kat Sayıları		,859	,714	,819	,894
Ölçeğin Toplam Cronbach's Alpha Kat Sayısı ,869					
Kaiser-Meyer-Olkin (KMO) Örneklem Yeterliliği ,825					
Bartlett's Test Chi-Square: 1759,212 (0,000)					

Ölçeğin güvenirliğinin test edilmesi için güvenirlik analizi yapılmış ve sonuç olarak birinci faktör 0,859, ikinci faktör 0,714, üçüncü faktör 0,819 ve dördüncü faktör ise 0,894 Cronbach's Alpha değeri almıştır. Çıkan sonuçlar göz önüne alındığında birinci, üçüncü ve dördüncü ölçeğin yüksek derecede, ikinci ölçeğin ise oldukça güvenilir olduğu görülmüştür. Bu da ölçekte bulunan ifadeler arasında negatif ya da düşük bir korelasyonun olmadığı ve ölçeğin oldukça güvenilir olduğu sonucunu vermiştir[5].

Şekil: 5
Scree Plot Dağılımı

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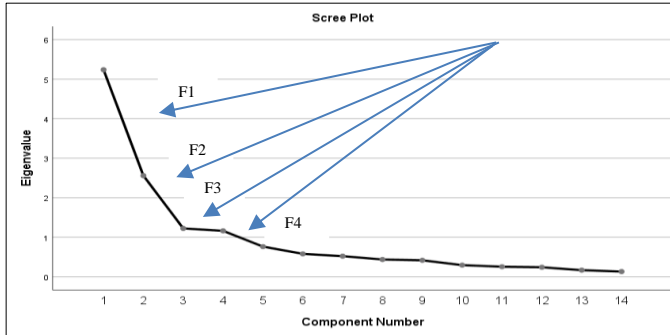
[5]   *Cronbach's Alpha kat sayı değeri, eğer 0,60 ≤∝< 0,80 aralığında olursa ölçek oldukça güvenilir eğer 0,80 ≤ ∝< 1,00 arasında olursa ölçek yüksek derecede güvenilirdir (Alpar, 2013).*

Scree Plot eğrisi, ölçekte kaç faktör olduğunu ve her bir faktörün açıkladığı varyans miktarını ifade etmektedir. Scree Plot eğrisinin kırılma noktaları arasındaki değişim göz önüne alınarak yorum yapılır. Böylece ilk faktör, en yüksek varyansı açıklarken en son faktör ise en düşük varyansı açıklar (Çakır, 2014). Bu bağlamda Şekil 5'te verilen Scree Plot eğrisine bakıldığında çalışmada esas alınan dört faktörün eğimlerinin farklı olduğu ve bu faktörlerin seçiminin tutarlı olduğu görülmektedir.

4.4. Yapısal Eşitlik Modeli

YEM, gözlenen değişken ile örtük (gizli) değişkenler arasındaki nedensel ve korelasyon ilişkisini göstermek amacıyla belli hipotezler bağlamında belirlenen modellerin test edildiği istatiksel bir tekniktir (Chamsuk et al., 2015; Dursun & Kocagöz, 2010: 3). Modelin temel amacı, araştırma kapsamında toplanan veriler ile modelin ne ölçüde desteklendiğinin belirlenmesidir (Schumacker & Lomax, 2010: 47).

Yapısal eşitlik modeli uygulamalarında parametre tahmini yapılması için elde edilen verilerin yeterli olup olmadığı çok önemlidir (Raykov & Marcoulides, 2006: 30). Genellikle akademik çalışmalarda örneklem hacminin 100'den az olmaması gerektiği ifade edilmekle birlikte denek sayısının 100-200 arası orta ve 200 üstünde olması durumunda ise büyük hacimli örneklem olduğu ifade edilmektedir (Schumacker & Lomax, 2010; Weston & Gore, 2006; Khine, 2013). Diğer taraftan yapısal eşitlik modellerinin değerlendirilmesinde ağırlıklı olarak referans alınan uyum indeksleri; $X^2/d.f.$, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI), Comperative Fit Index (CFI), Root Mean Square Error of Approx (RMSEA) ve Standardized RMR (SRMR) olarak sıralanabilir (Mulaik et al., 1989; Fan et al., 1999; Bentler, 1990; Hooper et al., 2008). Söz konusu uyum indeks ve kriterleri Tablo 3'te verilmiştir.

Tablo: 3
Yapısal Eşitlik Ölçüm Modeli Uyum İndeksleri

Model Uyum Kriterleri	İyi Uyum	Kabul Edilebilir Uyum
$X^2/d.f.$	$0 \leq \ldots \leq 2,00$	$2 < \ldots \leq 3,00$
GFI	$0,95 \leq \ldots \leq 1,00$	$0,90 \leq \ldots < 0,95$
AGFI	$0,90 \leq \ldots \leq 1,00$	$0,85 \leq \ldots < 0,90$
NFI	$0,95 \leq \ldots \leq 1,00$	$0,90 \leq \ldots < 0,95$
CFI	$0,95 \leq \ldots \leq 1,00$	$0,90 \leq \ldots < 0,95$
RMSEA	$0 \leq \ldots \leq 0,05$	$0,05 \leq \ldots \leq 0,10$
SRMR	$0 \leq \ldots \leq 0,05$	$0,05 < \ldots \leq 0,10$

YEM, örtük (gizli) değişkenleri yorumlama ve analiz etme kolaylığı sağladığı için son dönemde en popüler yöntemler arasına girmiştir (Reisinger & Turner, 1999: 71-88). Ayrıca bu model, başta ekonomi ve psikoloji başta olmak üzere eğitim, sosyoloji, pazarlama gibi birçok bilim alanında yaygın olarak kullanılmaktadır (Kaynak, 2012: 4).

4.5. Araştırmanın Modeli ve Hipotezler

Çalışmada kullanılan araştırma modeli, Şekil 6'da verilmiştir. Belirlenen model bağlamında ikinci el otomobil fiyat artışında ekonomi, strateji, pazarlama ve tedarik değişkenlerinin anlamlı bir etkiye sahip olup olmadığı araştırılmak istenmiştir.

Şekil: 6
Araştırma Modeli
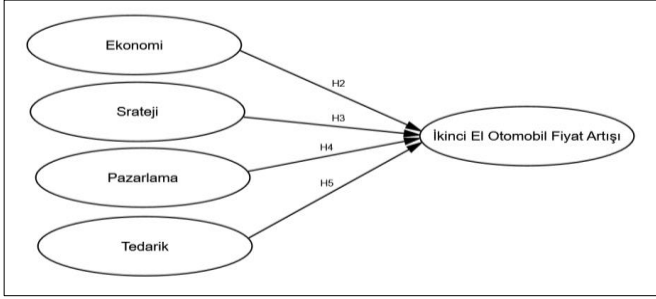
Model bağlamında belirlenen hipotezler:

H₁: Araştırmanın modeli, veriler tarafından doğrulanmaktadır.

H₂: İkinci el otomobil piyasasında meydana gelen fiyat artışlarında ekonomik etkenler etkilidir.

H₃: İkinci el otomobil piyasasında yetkili satıcı ve galericilerin stratejileri, fiyat artışlarında etkilidir.

H₄: İkinci el otomobil piyasasında pazarlama yöntemleri, fiyat artışlarında etkilidir.

H₅: Otomotiv sektöründe tedariklerle ilgili yaşan aksaklıklar, ikinci el otomobil fiyat artışlarında etkilidir.

5. Bulgular

Araştırmanın modeli bağlamında belirlenen hipotezler yapısal eşitlik modeli kapsamında test edilmiştir. Yapısal eşitlik analizinin ilk adımında, boyutlara ait ölçüm modelleri değerlendirilmiş ve ilgili değerler Tablo 5'te verilmiştir. Araştırmada esas alınan tüm boyutların alt maddelerin hem standartlaştırılmış hem de standartlaştırılmamış yol (ya da regresyon) kat sayılarının istatiksel olarak anlamlı olduğu ve yol kat sayı değerlerinin 0,5'in üstünde olduğu gözlemlenmiştir. Diğer yandan maddelerin R^2 değerlerin de genel itibariyle 0,50'nin üstünde olduğu ve sonuç olarak alt maddelerin boyutları açıklama oranlarının gayet makul seviyede olduğu görülmüştür.

Tablo: 4
Yapısal Modeldeki İlişkiler ve Parametre Tahmin Değerleri

			β_1	β_2	S.E.	C.R.	P	R^2
Eko3	<---	Ekonomi	,748	1,000			0,000	0,56
Eko2	<---	Ekonomi	,856	1,235	,124	9,940	0,000	0,78
Eko1	<---	Ekonomi	,787	1,143	,087	13,099	0,000	0,62
Str3	<---	Strateji	,603	1,000			0,000	0,36
Str2	<---	Strateji	,721	1,216	,168	7,251	0,000	0,52
Str1	<---	Strateji	,709	1,179	,163	7,213	0,000	0,50
Paz3	<---	Pazar	,733	1,000			0,000	0,53
Paz2	<---	Pazar	,689	1,011	,152	6,641	0,000	0,47
Paz1	<---	Pazar	,755	1,027	,077	13,373	0,000	0,57
Ted5	<---	Tedarik	,716	1,000			0,000	0,51
Ted4	<---	Tedarik	,758	1,063	,094	11,330	0,000	0,54
Ted3	<---	Tedarik	,980	1,471	,106	13,896	0,000	0,96
Ted2	<---	Tedarik	,657	,899	,092	9,784	0,000	0,43
Ted1	<---	Tedarik	,807	1,133	,094	12,076	0,000	0,65

β_1: Standartlaştırılmış regresyon kat sayıları, β_2: Standartlaştırılmamış regresyon kat sayıları.

Tablo 4'te ifade edildiği gibi "ekonomi" gizil değişkenini en çok açıklayan maddenin Eko2 ($\beta_1 = 0,85$; $R^2 = 0,78$) olduğu, yani "Otomobil fiyat artışında bankaların verdiği kredi oranın etkili olduğu" ifadesinin öne çıktığı görülmüştür. "Strateji" gizil değişkenini en çok açıklayan maddenin Str2 ($\beta_1 = 0,72$; $R^2 = 0,52$) olduğu, yani "İkinci el otomobil fiyat artışında otomobillerin satışındaki fiyat farklılıklarının etkili olduğu" ifadesinin ağır bastığı gözlenmiştir. "Pazar" gizil değişkenini en çok açıklayan maddenin Paz1 ($\beta_1 = 0,75$; $R^2 = 0,57$) olduğu, yani "Fiyat artışında, araç sahiplerinin internet sitelerinde rahat bir şekilde ilan vermelerinin etkili olduğu" maddesinin öne çıktığı görülmüştür. "Tedarik" gizil değişkeninde ise bu değişkenin en çok açıklayan maddenin Ted3 ($\beta_1 = 0,98$; $R^2 = 0,96$) olduğu, yani "Fiyat artışında, yerli ve milli üretimin yetersizliği etkilidir" ifadesinin öne çıktığı gözlemlenmiştir.

Yapısal eşitlik modeli analizlerinde, araştırmanın modeli ile araştırmada elde edilen veri seti arasındaki uygunluğun değerlendirilmesi ancak uyum indeksleri ile açıklanabilmektedir. Uyum indeksleri, araştırma modelinin doğrulanıp doğrulanmadığı konusunda karar verme eğiliminde yol gösteren bir takım uyum istatistiklerini içermektedir (Elverdi & Atik, 2021: 194). Çalışmada yapılan analizler sonucunda tespit edilen uyum indeks değerleri ve yorumları Tablo 5'de sunulmuştur.

Tablo: 5
Uyum İndeksleri ve Yorumları

Model Uyum Kriterleri	Elde Edilen Değerler	Sonuç
$X^2/_{d.f.}$	2,566	Kabul Edilebilir
GFI	0,902	Kabul Edilebilir
AGFI	0,853	Kabul Edilebilir
NFI	0,900	Kabul Edilebilir
CFI	0,936	Kabul Edilebilir
RMSEA	0,083	Kabul Edilebilir
SRMR	0,061	Kabul Edilebilir

Tablo 5'te görüldüğü gibi çalışmaya ilişkin elde edilen bütün uyum indekslerinin istatiksel olarak anlamlı olduğu ve H_1 hipotezin doğrulandığı sonucu elde edilmiştir. Yani,

araştırma kapsamında belirlenen modelin, eldeki veri seti ile uyum sağladığı ve modelin doğrulandığı tespit edilmiştir.

Şekil: 7
Yapısal Eşitlik Modeli
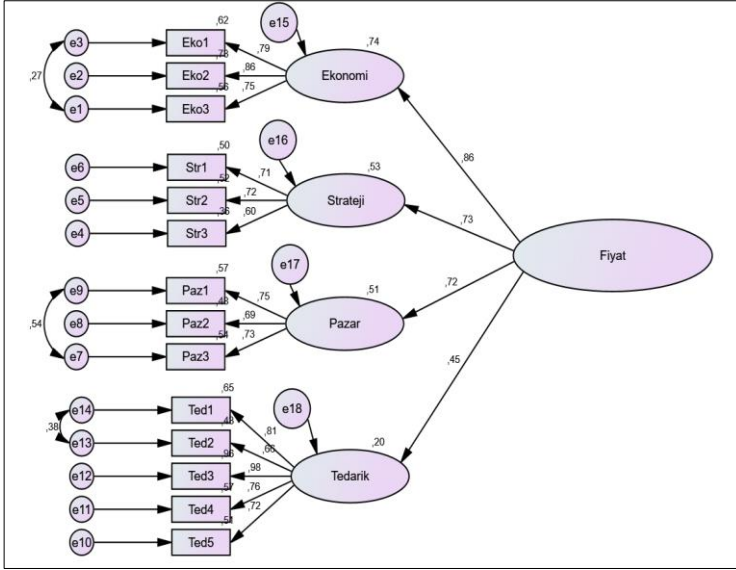
Şekil 7'de ikinci el otomobil fiyat artışına ilişkin belirlenen model ve hipotezler bağlamında uyum ve modifikasyon indeksleri göz önüne alınarak yapılan analizler sonucunda ortaya çıkan yapısal eşitlik modeli verilmiştir. Yapısal eşitlik modelinde, değişkenler arasındaki ilişki düzeyleri ve bunlara ait parametre tahmin değerleri ile R^2 değerleri net bir şekilde gösterilmiştir. Fiyat değişkenini en çok açıklayan gizil değişkenin "ekonomi" olduğu ve sırasıyla diğer değişkenlerin ise "strateji", "pazar" ve "tedarik" olduğu görülmüştür. "Ekonomi" gizil değişkenin 0,86 standartlaştırılmış regresyon kat sayısı ve %74 açıklama oranıyla fiyat değişkeniyle güçlü bir ilişkiye sahip olduğu tespit edilmiştir. "Strateji" ve "Pazar" gizil değişkenlerinin 0,73-0,72 standartlaştırılmış regresyon kat sayısı ve %53-51 açıklama oranlarıyla fiyat değişkeniyle önemli ölçüde bir ilişkiye sahip oldukları gözlemlenmiştir. "Tedarik" gizil değişkeninin ise fiyat değişkeniyle azımsanmayacak ölçüde bir ilişkiye sahip olduğu da görülmüştür.

Tablo: 6
Hipotez Test Sonuçları

Hipotezler	Değişkenler Arası Etkileşim	Regresyon Kat Sayısı (β_1)	R^2	p	Kabul/ Red
H₂	Ekonomi <--- Fiyat	,862	0,74	0,000	Kabul
H₃	Strateji <--- Fiyat	,726	0,53	0,000	Kabul
H₄	Pazar <--- Fiyat	,717	0,51	0,000	Kabul
H₅	Tedarik <--- Fiyat	,450	0,20	0,000	Kabul

Tablo 6'da görüldüğü gibi bütün hipotezlerin %5 anlam düzeyinde anlamlı olduğu görülmüş ve bu bağlamda bütün hipotezler kabul edilmiştir. Sırasıyla değişkenlere bakıldığında ekonomi (β_1 = 0,86; p≤ 0,05), strateji (β_1 = 0,73; p≤ 0,05), pazar (β_1 = 0,72; p≤ 0,05) ve tedarik (β_1 = 0,45; p≤ 0,05) değişkenlerinin fiyat artışına anlamlı ve olumlu etkileri olduğu sonucuna ulaşılmıştır. Genel olarak bir değerlendirme yapmak gerekirse model kapsamında belirlenen dört gizli değişken, 14 madde tarafından önemli bir düzeyde açıklandığı ve bu dört gizli değişken de fiyat değişkeni üzerinde anlamlı ve pozitif bir etkiye sahip olduğu görülmüştür.

6. Sonuç ve Öneriler

Bu çalışmada, Türkiye'de ikinci el otomobil piyasasında fiyat artışına neden olan faktörlerin belirlenmesi ve bu faktörlerin fiyat artışıyla olan ilişki ve etki düzeylerinin tespit edilmesi amaçlanmıştır. Araştırmada veri seti olarak Van ilinde faaliyette bulunan yetkili satıcı ve galericilerle yapılan anketlerden elde edilen veriler kullanılmıştır. Çalışmanın amacı doğrultusunda ilk olarak açıklayıcı faktör analizi uygulanmıştır. Uygulanan AFA sonucunda dört faktör belirlenmiştir. Bu faktörler; ekonomi, strateji, pazar ve tedarik olarak tanımlanmıştır. Diğer yandan AFA analiz sonucunda, Bartlett's Test'i anlamlı ve KMO değeri de 0,825 gibi iyi bir değer almıştır. Ayrıca yaklaşık %73 kümülatif varyans oranıyla açıklanan dört faktör sırasıyla; birinci faktör 0,859, ikinci faktör 0,714, üçüncü faktör 0,819 ve dördüncü faktör ise 0,894 gibi oldukça güvenilir Cronbach's Alpha değeri almıştır.

Çalışmada tespit edilen faktörler göz önüne alınarak araştırmanın modeli ve hipotezleri belirlenmiştir. Söz konusu model ve hipotezlerin test edilmesi amacıyla YEM kullanılmıştır. YEM analizi sonucunda araştırmada esas alınan tüm gizli değişkenlerin alt maddelerinin standartlaştırılmış yol kat sayılarının ve uyum indekslerinin istatiksel olarak anlamlı olduğu ve böylece araştırma kapsamında belirlenen modelin, eldeki veri seti ile uyum sağladığı ve modelin doğrulandığı (H_1 kabul) tespit edilmiştir. Sonuç olarak araştırmanın modeli kapsamında ekonomi, strateji, pazar ve tedarik gizli değişkenlerinin otomobil fiyat artışı üzerinde anlamlı ve olumlu etkilerinin sınandığı hipotezler, %5 anlam düzeyinde kabul edilmiştir. Çalışmada elde edilen bulgulara genel olarak bakıldığında neredeyse tüm maddelerin ilgili gizli değişkenlerini önemli ölçüde açıkladığı görülmüştür. Diğer yandan ikinci el otomobil fiyat artışı üzerinde ekonomi, strateji ve pazar gizli değişkenlerin pozitif eğilimli ve yüksek düzeyde bir etkilerinin olduğu ve tedarik değişkenin ise pozitif eğiliminde ancak düşük düzeyde bir etkisinin olduğu sonucuna varılmıştır. Söz konusu model kapsamında belirlenen hipotezlerin elde edilen bulgulara göre değerlendirilmesi aşağıda sıralanmıştır:

- Araştırma modelinin ilk ayağında ekonomi gizli değişkeni ile otomobil fiyat artışı arasındaki ilişki, H_2 hipotezi ile test edilmiş ve sonuç olarak ekonomi gizli değişkenin ikinci el otomobil fiyat artışına anlamlı ve olumlu etkisi olduğu sonucuna ulaşılmıştır. Diğer yandan ekonomi gizli değişkenini açıklayan üç maddenin (döviz kuru, araç kredisi oranları ve ekonomik krizler) standartlaştırılmış yol kat sayılarının istatiksel olarak anlamlı ve R^2 değerlerin

genel itibariyle 0,50'nin üstünde olduğu görülmüştür. Bu da ikinci el otomobil piyasasında, döviz kurundaki artışın, araç kredisi oranlarının düşmesine ve ekonomik krizlerin ortaya çıkmasının fiyat artışına neden olduğu sonucunu vermiştir. Benzer olarak Lee & Kang (2015) yaptıkları çalışmada, küresel krizlerin otomobil fiyatlarının yükselmesinde etkili olduğunu ifade etmişlerdir. Ayrıca Muhammad et al. (2012) ve Pant & Nidugala (2016) yaptıkları çalışmalarda, düşük faiz oranlarının ve döviz kurundaki yükselmelerin otomobil fiyatlarının yükselmesinde etkili olduğunu belirtmişlerdir.

- Strateji gizil değişkeni ile otomobil fiyat artışı arasındaki ilişki H$_3$ hipotezi ile test edilmiş ve hipotez kabul edilmiştir. Strateji gizil değişkenini açıklayan üç maddenin (reklam-kampanya, araç takas işlemleri ve otomobil satış fiyat farklılıkları) standartlaştırılmış yol kat sayılarının istatiksel olarak anlamlı ve R^2 değerlerin genel itibariyle 0,50'nin üstünde olduğu görülmüştür. Bu da ikinci el otomobil piyasasında, reklam-kampanya, araç takas işlemleri ve otomobil satış fiyat farklılıklarının fiyat artışına neden olduğu sonucunu vermiştir. Benzer olarak Peng et al. (2014), yaptıkları çalışmada, özellikle çevrimiçi reklamların otomobil satış miktarı ve fiyatları üzerinde olumlu bir etkisi olduğu sonucunu elde etmişlerdir. Viswanathan et al. (2007) yaptıkları çalışmada, otomobil satıcılarının çevrimiçi piyasaya arz ettikleri otomobiller hakkında verdikleri bilgilerin şeffaf olmaması, yani alıcı ve satıcı arasında asimetrik bilginin olması sonucu otomobil satış fiyatlarında ciddi farklılıkların ortaya çıktığı sonucuna varmışlardır.

- Pazar gizil değişkeni ile otomobil fiyat artışı arasındaki ilişki, H$_4$ hipotezi ile test edilmiş ve hipotez kabul edilmiştir. Pazar gizil değişkenini açıklayan üç maddenin standartlaştırılmış yol kat sayılarının istatiksel olarak anlamlı ve R^2 değerlerin genel itibariyle 0,50'nin üstünde olduğu görülmüştür. Böylece ikinci el otomobil piyasasında, araç sahiplerinin internet sitelerinde rahat bir şekilde ilan vermelerinin, araba sitelerinde bazı satıcıların fahiş fiyat vererek kamuoyunu yönlendirmesinin ve yetkili satıcı ve galericiler dışında özel şahısların internet üzerinden araç alıp-satmasının fiyat artışına neden olduğu sonucuna ulaşılmıştır. Dewan & Hsu, (2004), Ba & Pavlou, (2002) ve Standifird (2001) yaptıkları çalışmalarda, internet üzerinde yapılan otomobil satışlarında alıcı ve satıcı arasında asimetrik bilginin olduğunu ve e-ticaretin otomobil fiyatları üzerinde önemli bir etkiye sahip olduğunu ifade etmişlerdir.

- Tedarik gizil değişkeni ile otomobil fiyat artışı arasındaki ilişki H$_5$ hipotezi ile test edilmiş ve hipotez kabul edilmiştir. Tedarik gizil değişkenini açıklayan beş maddenin standartlaştırılmış yol kat sayılarının istatiksel olarak anlamlı ve R^2 değerlerin genel itibariyle 0,50'nin üstünde olduğu görülmüştür. Sonuç olarak ikinci el otomobil piyasasında, piyasadaki sıfır ve ikinci el araç durumunun, ÖTV ve KDV oranlarının, yerli ve milli üretiminin yetersizliğinin ve araç tedarikinin önemli bir kısmının ithal edilmesinin fiyat artışına neden olduğu sonucuna varılmıştır. Benzer olarak Koç ve Kostak (2021) çalışmalarında, yerli ve ithal otomobil arzında meydana gelen daralmaların ve tedarikte yaşanan aksaklıkların ikinci el otomobil fiyatlarının artması üzerinde çok önemli bir etkiye sahip

olduğunu ifade etmişlerdir. Ayrıca Tanaka (2020), Gülçiçek (2013) ve Önder & Şahin (2018) yaptıkları çalışmalarda, ÖTV'nin otomobil fiyat artışında önemli etkiye sahip olduğuna ve ÖTV'de yapılan indirimlerin otomobillere olan talebi önemli ölçüde artırdığına değinmişlerdir.

Çalışmada elde edilen sonuçlar değerlendirildiğinde, Türkiye'de ikinci el otomobil fiyatlarında istikrarın yakalaması için aşağıdaki öneriler, sıralanabilir:

- Otomotiv sektöründe, yerli ve milli üretime gereken önemin verilmesi ve bu çerçevede yapılacak yatırımların desteklenmesi,
- TOGG, yerli otomobil üretiminin hızlandırılması ve kapasitesinin artırılması,
- Otomobil alım satımında, denetim mekanizmasının daha da etkin hale getirilmesi,
- Otomobil alım satımında, yetkili satıcı ve galericiler arasındaki rekabetin artırılması ve buna zarar veren ve hiçbir yasal yetkisi olmayan üçüncü kişilerin piyasayı manipüle etmesine müsaade edilmemesi,
- Döviz kurlarından kaynaklanan şokların minimize edilmesi,
- ÖTV ve KDV oranlarında meydana gelen sert yükselişlerin otomobil fiyatlarını sert yükselttiği ancak ÖTV ve KDV oranlarının düşmesi durumunda ise otomobil fiyatlarının pek etkilenmediği görülmektedir. Bundan dolayı ÖTV ve KDV oranlarının makul seviye aralığında tutulması gerekmektedir.

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Döviz Kuru Volatilite Modellemesinde Beta-t-EGARCH Modelleri: Amerikan Doları / Türk Lirası Döviz Kuru Üzerinden Bir Değerlendirme

Engin BEKAR (https://orcid.org/0000-0002-9252-990X), Erzurum Technical University, Türkiye; engin.bekar@erzurum.edu.tr

Beta-t-EGARCH Models for Exchange Rate Volatility Modelling: An Evaluation on the US Dollar / Turkish Lira Exchange Rate

Abstract

To compare different risk measurement methods, in this study, the US Dollar, which is important in terms of being one of the most preferred investment instruments in Turkey and being a reserve currency, is under review. First, EGARCH (1,1) and GJR-GARCH (1,1) models were estimated using the return data based on the US Dollar / Turkish Lira exchange rate for the 2005 - 2021 period. Then, the "Beta-t-EGARCH and Its Variants", which have been introduced in recent years, fit well with the characteristics of the exchange rate series and, most importantly, are robust to extreme values and jumps in volatility have been estimated with the expectation of being able to calculate the exchange rate risk more accurately. As a result, it was determined that the model that best met the purpose of the study was the "Two-Component Beta-Skew-t-EGARCH Model with Leverage". The study is important because it draws attention to the effect of extreme values and fluctuations in the Turkish foreign exchange market volatility.

Keywords : Exchange Rate, Volatility, Jump, Extreme Value, Long Memory.

JEL Classification Codes : C22, C52, C58.

Öz

Bu çalışmada, farklı risk ölçüm yöntemlerini karşılaştırmak amacıyla Türkiye'de en çok tercih edilen yatırım araçlarından birisi olan ve rezerv para olması yönüyle de önem arz eden ABD Doları incelemeye alınmıştır. Amerikan Doları / Türk Lirası döviz kuruna dayalı olarak 2005 - 2021 dönemine ilişkin getiri verisi ile EGARCH (1,1) ve GJR-GARCH (1,1) modellerinin yanı sıra son yıllarda ortaya koyulan, kur serisinin özelliklerine iyi uyum gösteren ve en önemlisi volatilitede aşırı değerlere ve sıçramalara karşı dirençli olan "Beta-t-EGARCH Modeli ve Çeşitleri" daha doğru kur riski hesaplayabilmek beklentisiyle tahmin edilmiştir. Elde edilen bulgular sonucunda, çalışmanın amacını en iyi karşılayan modelin "İki Bileşenli Beta-Çarpık-t-EGARCH + Kaldıraç" modeli olduğu tespit edilmiştir. Çalışma, Türkiye döviz piyasasında volatilite tahmininde aşırı değerlerin ve sıçramaların etkisine dikkat çekmesi bakımından önem arz etmektedir.

Anahtar Sözcükler : Döviz Kuru, Volatilite, Sıçrama, Aşırı Değer, Uzun Hafıza.

1. Giriş

Günümüzde, finansal yatırım araçları gerek kar elde etmek gerekse de eldeki ulusal paranın değerini korumak amacıyla yatırımcılar tarafından yakından takip edilmektedir. Finans sektörü denildiğinde akla gelen en önemli kavram "risk" kavramıdır. Ekonomide karşılaşılan riskler düşünüldüğünde; piyasa riski, kredi riski, operasyonel risk gibi farklı türden riskler akla gelmektedir. Eldeki finansal varlıkların getirilerinin saçılımı, kimi zaman ekonomik kimi zaman sosyal etkenlerden dolayı artış ya da azalış gösterebilmektedir. Bu saçılım, "volatilite" olarak bilinmekte olup getirilerin ortalama etrafında homojen dağılıp dağılmadığıyla ilgili kişilere bilgi vermektedir. Saçılımdaki artış belirsizliğin ve riskin artması anlamına gelirken, saçılımdaki azalış belirsizliğin ve riskin azalmasını ifade etmektedir.

Türkiye'de yatırımcılar tarafından en çok tercih edilen yatırım araçlarından birisi dövizdir. Dövizlerin içerisinde de en çok tercih edilen yabancı para biriminin Amerikan Doları olduğu görülmektedir. Amerikan Doları aynı zamanda "rezerv para" olması nedeniyle de Türkiye için önem arz etmektedir. Bu sebepten dolayı çalışmada, tüm dünyada egemen para birimi olarak görülen Amerikan Doları karşısında Türk Lirasında yani Dolar / Türk Lirası (USD/TRY) döviz kurunda meydana gelen değişimleri incelemek, döviz kuru getiri volatilitesinin yıllar boyunca sergilediği davranışı en doğru biçimde modellemek ve döviz kuru riskini gerçeğe en yakın olarak tahmin edebilmek amacıyla çeşitli volatilite modelleri kullanılmıştır. Araştırmanın amacı, "Dolar / TL döviz kurunun riskini tahmin etmek için kullanılabilecek en uygun volatilite modeli hangisidir?" sorusuna cevap bulmaktır. Böylelikle piyasa aktörleri ve yatırımcılar karşılaşabilecekleri kur risklerine karşı daha hazırlıklı olabilecektir.

Dolar / TL kuru getirilerinin volatilitelerinin hesaplanmasıyla ilgili yıllardır farklı yöntemler kullanılarak çalışmalar yapılmıştır. Bu çalışmalarda genellikle tercih edilen modellerin "asimetrik volatilite modelleri" olduğu görülmektedir. Asimetrik modeller, pozitif ve negatif şokların volatilite üzerinde farklı etkilerini hesaba katan modeller olduğundan simetrik modellere göre piyasa gerçekleriyle çok daha fazla örtüşmektedir. Döviz kuru getiri volatilitesiyle ilgili literatürde yapılan çalışmalar incelendiğinde, asimetrik modeller arasında en çok; Swarch, Yapay Sinir Ağları, Egarch, Tgarch, Aparch, Figarch, Ms-Garch, Pgarch ve Genelleştirilmiş Hiperbolik-Çarpık-t modeli gibi modellerden yararlanıldığı görülmektedir.

Bu çalışmada, döviz kuru riskinin daha doğru tahmin edilebilmesi beklentisiyle farklı bir yöntem olarak, "Beta-t-EGARCH Volatilite Modelleri" tercih edilmiştir. Bu modellerin diğer volatilite modelleri karşısındaki üstün yönlerini "Beta Dağılımı" üzerinden değerlendirmek gerekmektedir. Beta dağılımının sahip olduğu özellikler Beta-t-EGARCH modellerinde; koşullu varyansın aşırı değerlere ve sıçramalara karşı daha dirençli olmasını, volatilite denkleminde kaldıraç etkisinin ve bir bileşenden fazlasının birlikte değerlendirilmesini yani büyük bir şoktan sonra varyans üzerinde zamana göre değişen uzun dönem bileşeninin ve kısa dönem bileşeninin etkilerinin birlikte dikkate alınmasını ve

koşullu volatilitenin taşıması muhtemel olan "uzun hafıza" özelliğinin göz önünde tutulmasını mümkün kılmaktadır.

Çalışmanın ikinci bölümünde, volatilite hesaplamaları ile ilgili literatürdeki çalışmalara yer verilmiştir. Üçüncü bölümde, çalışmada kullanılan Dolar / TL döviz kuru getiri serisinin taşıdığı özellikler ortaya koyulmuştur ve volatilite hesaplamasında kullanılan volatilite modelleri tanıtılmıştır. Dördüncü bölümde, elde edilen bulgular ortaya koyulmuştur ve tartışılmıştır. Beşinci ve son bölüm olarak ise, sonuç bölümüne yer verilmiştir.

2. Literatür Taraması

Finansal yatırım araçlarının yatırımcılar tarafından tercihinde risk faktörü önemli bir rol oynamaktadır. Risk ölçümlerinin yapılabilmesi için sıklıkla tercih edilen çeşitli volatilite modelleri mevcuttur. Bu bölümde ilk olarak, geçmiş yıllardan günümüze volatilite tahmininde kullanılan "Beta-t-EGARCH" dışındaki modellere dayalı olarak yapılmış çalışmalara yer verilirken ikinci olarak ise bu çalışmanın da yöntemini oluşturan "Beta-t-EGARCH" modelleri kullanılarak yapılmış olan çalışmalar değerlendirmeye alınmaktadır.

2.1. Beta-t-EGARCH Dışındaki Volatilite Modelleri ile Yapılan Çalışmalar

Güloğlu ve Akman (2007), Mart 2001 - Mart 2007 dönemi için nominal USD / TRY kurundaki volatiliteyi "SWARCH Modeli" ile analiz etmişlerdir. Tahmin sonucunda, yerel ya da küresel ekonomik ya da siyasal olayların döviz kuru volatilitesini etkilediği ve volatilite dönemlerinin kalıcı olduğu ortaya koyulmuştur. SWARCH modelinin kullanıldığı bir diğer çalışmada Gür ve Ertuğrul (2012), Türkiye'deki döviz kuru volatilitesini Temmuz 2001 - Mayıs 2010 dönemine ait günlük verilerden yararlanarak "ARCH, GARCH ve SWARCH" modelleri ile analiz etmişlerdir. Gerek istatistiksel performans ve gerekse de öngörü performansı bakımından SWARCH modelinin diğer modellere göre daha başarılı olduğu tespit edilmiştir. Gün (2020), USD / TRY kuru volatilitesini, kırılma ve asimetri gibi özellikleri dikkate alan "MS-GARCH" modeli ile analiz etmiştir. Temmuz 2001 - Şubat 2020 dönemi için yapılan çalışmada, kurda yüksek ve düşük riskli rejimler olduğu ve bu rejimler arasında sıklıkla geçişler yaşandığı tespit edilmiştir.

Kadılar vd. (2009), Ocak 2005 - Ocak 2008 döneminde USD / TRY kurunun seyrini analiz etmek için "Yapay Sinir Ağları (YSA)" yönteminden yararlanmışlardır. Bulgulara göre YSA yönteminin öngörü başarısının, mevsimsel ARIMA ve ARCH gibi modellerle kıyaslandığında daha yüksek olduğu sonucuna varılmıştır.

Emeç ve Özdemir (2014), Ocak 2009 - Ocak 2014 dönemi için USD / TRY kuru volatilitesini GARCH (1,1), EGARCH (1,1), TGARCH (1,1), APARCH (1,1) modelleri yardımıyla analiz etmişlerdir. Döviz kuru volatilitesini en iyi temsil eden modelin, t - dağılımı altında tahmin edilen "TGARCH (1,1) Modeli" olduğu belirlenmiştir. Kayral (2016) ise USD / TRY ve EURO / TRY kurlarının 2002 - 2015 dönemindeki günlük getirilerini dikkate alarak simetrik modellerden ARCH (1), ARCH-M (1), GARCH (1,1),

GARCH-M (1,1); asimetrik modellerden ise, EGARCH (1,1), EGARCH-M (1,1), TARCH (1,1) ve TARCH-M (1,1) modellerini kullanmıştır. En uygun modelin, AR (1) - TARCH (1,1) olduğu sonucuna varılmıştır. Bu modelden elde edilen bulgulara bakıldığında ise, kur artışına neden olan pozitif şokların negatif şoklara göre kurlardaki volatiliteyi daha fazla artırdığı sonucuna ulaşılmıştır. Sağlam ve Başar (2016), 2010 - 2015 dönemi günlük kur verisine dayanarak Türkiye döviz piyasasında USD, EURO, GBP değişkenleri için volatiliteyi modellemek amacıyla ARCH, GARCH, EGARCH ve TGARCH modellerini kullanmışlardır. Yapılan modelleme sonucunda, USD ve EURO değişkenleri için en uygun modellerin asimetrik modeller olduğu, GBP değişkeni için ise en iyi volatilite modellerinin simetrik modeller olduğu sonucuna varılmıştır. Yaman ve Koy (2019), USD / TRY kuru volatilitesini 2001-2018 ve 2001-2019 dönemleri için analiz etmişlerdir. Çalışmada, kur volatilitesinin izlediği yolu modellemek için GARCH (1,1), TARCH (1,1) ve EGARCH (1,1) modellerinden yararlanılmıştır. Koşullu volatilite sürecini en iyi tanımlayan modelin "TARCH (1,1)" modeli olduğu belirlenmiştir. Almisshal ve Emir (2021), 2005 - 2019 döneminde USD / TRY ve EUR / TRY kurlarının volatilitelerini "GARCH (1,1), EGARCH (1,1), GJR - GARCH (1,1) ve PGARCH (1,1)" modelleriyle analiz etmişlerdir. Dolar kuruna ilişkin bulgular incelendiğinde, USD / TRY kur volatilitesi için en uygun modellerin "GARCH (1,1) ve GJR - GARCH (1,1)" olduğu tespit edilmiştir.

Özdemir vd. (2018), 2.1.2006 - 30.05.2018 döneminde döviz piyasalarının zayıf formda etkin olup olmadığını "ARFIMA - FIGARCH" modeli ile analiz etmişlerdir. Elde edilen bulgulara göre, getiri volatilitesinin uzun hafıza özelliğine sahip olduğu ve Türkiye döviz piyasasının zayıf formda etkin olmadığı sonucuna varılmıştır.

Büberkökü (2021), USD / TRY ve EURO / TRY kurlarındaki koşullu volatiliteyi "Genelleştirilmiş Hiperbolik Çarpık-t Dağılım Varsayımına Dayalı Asimetrik Stokastik Volatilite Modeli" ile analiz etmiştir. Elde edilen bulgular ışığında, yüksek volatilite yapışkanlığının ve asimetrik tepkinin her iki döviz kuru için de geçerli olduğu sonucuna varılmıştır.

Bu alt bölümde incelenen çalışmalar topluca değerlendirildiğinde; Türkiye'de döviz kuru volatilite modellemesinde farklı rejimlerin dikkate alındığı çalışmalarda volatilite dönemlerinin kalıcılığına ve rejimler arasındaki geçişlere ilişkin bulgulara odaklanıldığı, döviz kuru volatilite modellemesinde kullanılan asimetrik modellerin kur dinamiklerine daha uygun olduğu ve döviz piyasasında volatilitenin uzun hafıza özelliğinin ve yapışkanlığının olduğuna vurgu yapıldığı görülmektedir.

2.2. Beta-t-EGARCH Volatilite Modelleri ile Yapılan Çalışmalar

Harvey ve Chakravarty (2008) "Beta-t-EGARCH" modelini tanıttıkları çalışmalarında, Ocak 1984 - Kasım 2007 dönemi için Dow-Jones'un ve FTSE'nin ortalamadan arındırılmış günlük 6235 adet verisine dayalı olarak "Birinci Derece Beta-t-GARCH, Beta-t-EGARCH ve IGARCH-t" modellerini tahmin etmişlerdir. Beta-t-GARCH ve Beta-t-EGARCH modellerinden tahmin edilmiş koşullu volatiliteler birbirine çok benzer

çıkmıştır. Beta-t-GARCH ve Beta-t-EGARCH modellerinin koşullu standart sapmaları ve GARCH-t modelinden elde edilen koşullu standart sapmalar arasındaki çarpıcı farklılık aykırı değerlerin hemen ardından göze çarpmaktadır. Borsa verisi üzerinden yapılan bir diğer çalışmada Sucarrat (2013), diğer borsa indeksleri gibi kaldıraç etkisini, koşullu çarpık ve kalın kuyruklu t dağılmış hataları ve zamana göre değişen uzun dönem bileşenini içinde barındıran "Nasdaq 100 Borsa İndeksi"nin Ocak 2001-Ekim 2013 dönemi günlük yüzde logaritmik getiri serisinin koşullu volatilitelerini tahmin etmek için "Beta-Çarpık-t-EGARCH" modelinden yararlanmıştır ve bu modeli "GJR-GARCH-çarpık-t" ve CS-GARCH-çarpık-t" modelleri ile karşılaştırmıştır. Schwarz (SIC)'a göre "Beta-Çarpık-t-EGARCH" modelinin uyumunun, diğer iki modelden daha iyi olduğu sonucuna varılmıştır. Yaya vd. (2016), sıçramaları ve asimetriyi eşanlı olarak dikkate alan "Genelleştirilmiş Otoregresif Skor (GAS), Üssel Genelleştirilmiş Otoregresif Skor (EGAS) ve Asimetrik Üssel Genelleştirilmiş Otoregresif Skor (AEGAS)" volatilite modellerinden yararlanarak ve Ocak 2006 - Temmuz 2014 dönemine dayalı olarak Nijerya Piyasa İndeksinin koşullu volatilitesinin dinamik yolunu tahmin etmişlerdir. GAS, EGAS ve AEGAS modelleri aynı zamanda "Beta-t-EGARCH Varyantları" olarak da bilinmektedir. Klasik volatilite modellerinden en uygun volatilite öngörü modeli olarak "IGARCH-t Modeli" seçilmiştir. Çalışmada, bu model karşısında, GAS, EGAS, AEGAS modellerinin daha üstün olduğu belirtilmiş ve finansal seride sıçramalar, aşırı değerler ve asimetri olduğunda bu koşullu volatilite modellerinin kullanımı tavsiye edilmiştir.

Harvey ve Sucarrat (2014), koşullu dağılımın kalın kuyruklu ve çarpık olduğu bir "EGARCH Modeli" önermişlerdir. Çalışma sonucunda, gerek bir bileşenli gerekse iki bileşenli olsun kaldıraç etkisine sahip "Beta-.Çarpık-t-EGARCH" modelinin, GARCH-GJR-Çarpık-t modeli ve kaldıraç etkisine sahip Normal Karışım (Mixture) GARCH (1,1) modeli ile karşılaştırıldığında, hisse senedi, petrol, altın ve döviz kuru getirilerinin koşullu volatilitelerinin modellenmesinde en iyi sonuçları verdiği tespit edilmiştir.

Blazsek (2015), Beta-t-EGARCH (1,1) modeli ile GARCH (1,1) modelinin istatistiksel performansını ve öngörü performansını karşılaştırmaktadır. Nisan 2006 - Temmuz 2010 dönemi için dokuz küresel sanayi indeksinin volatilitesi ilgili modellerle analiz edilmiştir. Beta-t-EGARCH (1,1) ile GARCH (1,1) modelleri; 2008 A.B.D. Finansal krizinin öncesi dönem, sürdüğü dönem ve sonrası dönem olmak üzere üç farklı dönem için tahmin edilmiştir. Finansal kriz sonrası dönem için GARCH (1,1) modeli ile karşılaştırma yapıldığında Beta-t-EGARCH (1,1) modelinin örneklem dışı öngörü performansının üstün olduğu ve Beta-t-EGARCH modelinin yüksek volatiliteli dönemlerden sonraki dönemlere ilişkin koşullu volatilite tahmininde diğer modellerden daha iyi performans gösterdiği sonucuna varılmıştır. Muela (2015), sekiz kompozit indeksin Ocak 2000 - Aralık 2013 dönemi günlük getirilerine dayalı olarak piyasa riski ölçümünde sıklıkla kullanılan VaR tahmini için, Standart GARCH modelinin yanı sıra Beta-t-EGARCH ve Beta-Çarpık-t-EGARCH modellerinden yararlanarak koşullu volatilite tahminleri yapmıştır. VaR tahmininde Beta-t-EGARCH ve Beta-Çarpık-t-EGARCH modellerinin, Standart GARCH modeline üstün geldiği tespit edilmiştir. Beta-t-EGARCH ve Beta-Çarpık-t-EGARCH modelleri arasında ise hem kaldıraç hem de çarpıklık barındıran "İki Bileşenli Beta-Çarpık-

t-EGARCH + Kaldıraç Modeli" VaR tahmininde kullanılan en iyi model olarak belirlenmiştir.

Salisu (2016), petrol getiri volatilitesini "Beta-Çarpık-t-EGARCH" modeli ile analiz etmiştir ve petrol getiri serisinin kalın kuyruklu, çarpık ve kaldıraça sahip olması durumunda Beta-Skew-t-EGARCH modelinin kullanımının, standart simetrik ve asimetrik GARCH modellerine göre daha uygun olduğunu ortaya koymuştur.

Bu alt bölümde incelenen çalışmalar topluca değerlendirildiğinde Beta-t-EGARCH modellerinin; aykırı değerlerin, sıçramaların, uzun hafızanın ve asimetri etkisinin varlığı söz konusu iken volatilite tahmini yapıldığında üstün performans gösterdiği görülmektedir. Bu sonuçlar, Türkiye'deki döviz kuru dinamiklerine ilişkin önceki alt bölümde incelenen çalışmalardan elde edilen bulgularla birlikte değerlendirildiğinde ise Beta-t-EGARCH modellerinin, Amerikan Doları / TL döviz kuru getirisi volatilite modellemesi için dikkate alınmasının önemi ortaya çıkmaktadır. Böylece Amerikan Doları / TL döviz kuru getirisi volatilite modellemesinde literatürde ilk defa Beta-t-EGARCH modellerinin dikkate alınmasının volatilite model performanslarında bir iyileşme sağlayıp sağlamadığı hakkında bulgulara ulaşmak da mümkün olabilecektir.

3. Veri ve Yöntem

Bu bölümün ilk alt başlığı altında, çalışmada kullanılan veri setinin nasıl oluşturulduğu, betimsel istatistiklerden yararlanarak bu veri setinin dağılım özelliklerinin neler olduğu anlatılmış ve dağılım özelliklerinin yanı sıra ayrıca; kutu - bıyık diyagramından, zaman yolu grafiklerinden ve periyodogramlardan yararlanarak incelenen veri setinin taşıması muhtemel farklı özellikleri hakkında da bilgi sahibi olmak amaçlanmıştır. Böylelikle koşullu volatilite hesaplaması için uygun modelin seçimine geçmeden önce, veri setinin özellikleri hakkında edinilen bu ön bilgilerin uygun volatilite modelinin seçilmesi aşamasında da yol gösterici olması bakımından önem arz ettiği düşünülmektedir.

Bölümün ikinci alt başlığı altında ise, Amerikan Doları / TL (USD/TRY) döviz nominal satış kuru getiri serisinin koşullu volatilite modellemesinde değerlendirilebilecek uygun modeller tanıtılmıştır ve bu modellerin özellikleri ile taşıdığı kısıtlar hakkında bilgiler verilmiştir.

3.1. Veri Seti

Çalışmada kullanılacak veri setini oluşturmak amacıyla, USD / TRY döviz kurunun 6 Ocak 2005 - 30 Eylül 2021 dönemine ilişkin nominal günlük değerlerinden yola çıkarak yüzde logaritmik getiri serisi hesaplanmıştır. İlgili döneme ilişkin Dolar / TL döviz nominal satış kurları verisi, TCMB'nin "Elektronik Veri Dağıtım Sistemi"nden alınmıştır. Aşağıdaki tabloda, döviz kuru getiri serisine ilişkin betimsel istatistikler sunulmuştur:

Tablo: 1
USD/TRY Döviz Kuru Getiri Serisine İlişkin Betimsel İstatistikler

	Ortalama	Medyan	Standart Sapma	Çarpıklık	Basıklık	J-B Prob.	Gözlem Sayısı	ARCH (10)
USD/TRY	0,044	-0,0034	0,911	1,242	34,574	0,00	4207	902,72 (p=0,00)

Tablo 1 incelendiğinde ve döviz kuru getiri serisinin dağılımı standart normal dağılımla karşılaştırıldığında, dağılımın oldukça sivri ve kalın kuyruklu, ayrıca sağa çarpık bir dağılım olduğu görülmektedir. Jarque - Bera normallik testine ilişkin test istatistik değerinin olasılığına bakıldığında ise bu olasılığın sıfır olduğu ve incelenen değişkenin normal dağıldığını ifade eden sıfır hipotezinin kuvvetli olarak reddedildiği sonucuna varılmaktadır. Bu tür dağılımlar, finansal zaman serilerinde sıklıkla karşılaşılan dağılımlardır. Buradaki basıklık değerinin çok yüksek olması, getiri serisi dağılımının Leptokurtik (sivri ve kalın kuyruklu) bir dağılım olduğunu ifade etmektedir. Sivri dağılım, varyansın normal dağılımın varyansına göre küçük olduğu yani gerçekleşecek değerlerin ortalama etrafında olmasının oldukça yüksek olasılıklı olduğunu ifade etmektedir. Kalın kuyruk ise, incelenen seride aşırı değerlerin var olması olasılığının, normal dağılıma göre yüksek olduğunu ifade etmektedir. Dağılımın sağa çarpıklığı yorumlandığında bu durum, pozitif getirilerde aşırı değerlerin oluşma olasılığının, negatif getirilerde aşırı değerlerin oluşma olasılığından daha fazla olduğunu göstermektedir. Dağılımın sağa çarpıklığı, getiri serisinin ortalamasının medyandan daha büyük olmasından da anlaşılmaktadır. Döviz kuru getiri serisinin karesinin otokorelasyonu (ARCH etkisi) incelendiğinde, seride koşullu değişen varyans etkisinin olduğu tespit edilmiştir. Şekil 1'de, getiri serisinin "Kutu - Bıyık Diyagramı" verilmiştir:

Şekil: 1
Döviz Kuru Getiri Serisinin Kutu-Bıyık Diyagramı
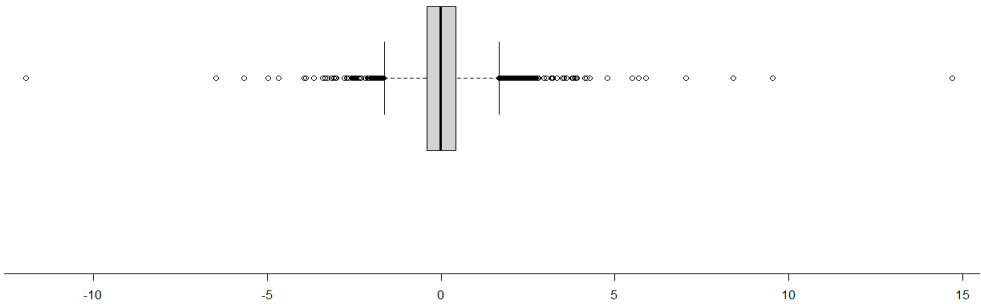
Betimsel istatistiklerin yorumlanmasında ifade edilenleri, kutu-bıyık diyagramına bakarak da söylemek mümkündür fakat bu diyagramın burada incelenmesinin esas amacı, serideki aşırı değerler hakkında bilgi sahibi olmaktır. Döviz kuru getiri serisinin kutu-bıyık diyagramı incelendiğinde, kesikli çizgi ile gösterilmiş bıyıkların dışındaki tüm noktalar aşırı değer olarak değerlendirilmektedir. Pozitif getirilerde de negatif getirilerde de birçok aşırı

değerin söz konusu olduğu diyagramdan anlaşılmaktadır. Diyagrama bakıldığında, pozitif getirilerdeki aşırı değerlerin sayısının ve büyüklüğünün negatif getirilerdeki aşırı değerlerin sayısına ve büyüklüğüne göre daha fazla olduğu görülmektedir. Veri seti hakkındaki bu bilgi de model kurma aşamasında dikkate alınması gereken bir bilgi olmaktadır.

Şekil: 2
Getiri Karelerinin ve Mutlak Getirilerin (Volatilite Vekil Değişkenleri)'nin Periyodogramları
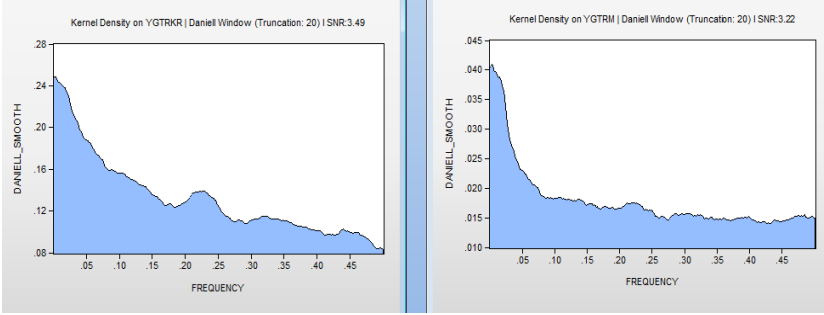
Dolar kuru getiri serisine dayalı olarak koşullu volatilitede uzun hafızanın varlığıyla ilgili fikir sahibi olabilmek için getiri serisinin karesinin ve mutlak değerinin periyodogramı çizilmiştir. Şekil 2'deki birinci periyodogram getiri karelerine ait iken, ikinci periyodogram mutlak getirilere aittir. Her iki periyodogram da analiz edildiğinde, her ikisinde de sıfır frekansı civarında grafiğin zirve yaptığı görülmektedir. Bu da koşullu volatilite de uzun dönem hafızaya işaret eden bir göstergedir.

Şekil: 3
Döviz Kuru Getiri Serisinin Grafiği
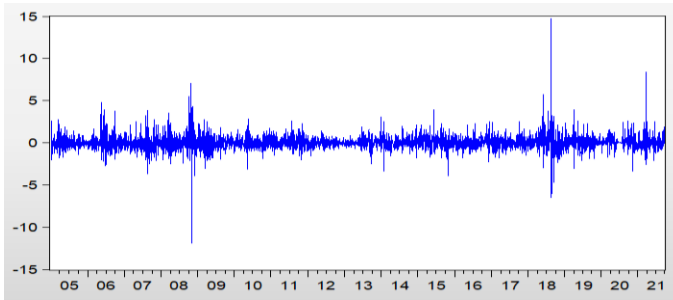
Getiri serisinin özellikleri tespit edildikten sonra getiri grafiği incelendiğinde, bazı dönemlerde volatilitenin arttığı, bazı dönemlerde ise azaldığı görülmektedir. Finansal getiri serilerinde sıklıkla karşılaşılan "Volatilite Kümelenmesi" döviz kuru getiri serisinde de söz konusudur. Ayrıca, 2008 yılının son aylarında ortaya çıkan "Küresel Kriz", döviz kuru getiri

volatilitesinde negatif yönde bir sıçramaya sebebiyet vermiştir. Bu durum, TL'nin değerindeki belirgin artışa işaret etmektedir. 2018 yılında Türkiye'de ortaya çıkan "Döviz ve Borç Krizi" de USD / TRY kuru getiri volatilitesi üzerinde pozitif yönde bir sıçramaya sebep olmuştur. Bu durum ise, TL'nin değerindeki belirgin azalışa işaret etmektedir. Ekonomik kriz kaynaklı sıçramalar kadar kuvvetli olmasa da grafikteki üçüncü sıçramanın COVID'19 pandemi dönemine denk geldiği görülmektedir. Bu pozitif sıçrama da yine TL'nin değerindeki belirgin azalışa işaret etmektedir. Volatilite modellerinin tahminine geçmeden önce, Dolar / TL kuru getiri serisinin durağanlığı ADF ve PP birim kök testleri ile test edilmiştir. Test sonuçları Tablo 2'de verilmiştir:

Tablo: 2
ADF ve PP Birim Kök Test Sonuçları

	Test İstatistik Değeri	Kritik Değer
ADF Birim Kök Testi	-60,30***	-1,94
PP Birim Kök Testi	-60,29***	-1,94

*Anlamlılık düzeylerinden α = 0,01 için ***, α = 0,05 için **, α = 0,10 için * kullanılmıştır.*

0,05 anlamlılık düzeyi için belirlenen kritik değerlerle test istatistik değerleri karşılaştırıldığında, incelenen seride birim kökün bulunduğunu iddia eden sıfır hipotezinin her iki birim kök testinde de kuvvetli bir biçimde reddedildiği sonucuna varılmıştır. Her iki birim kök testine göre de, dolar kuru getiri serisi birim kök içermemektedir.

3.2. Ekonometrik Yöntem

Çalışmada kullanılan USD / TRY döviz kurunun özellikleri ve durağanlığı analiz edildikten sonra bu bölümde, finansal varlıkların risk ölçümünde sıklıkla kullanılan "GJR-GARCH" ve "EGARCH" modellerinin yanı sıra, son yıllarda kullanılmaya başlanan "Beta-t-EGARCH" modeli ve çeşitleri üzerinde durulacaktır.

3.2.1. GJR-GARCH Modeli

GJR-GARCH modeline geçmeden önce bu modele oldukça benzer bir yapıya sahip olan TGARCH modeli üzerinde durmak, iki modelin birbirine karıştırılmaması adına faydalı olacaktır. TGARCH modeli ile volatilitede doğrusal olmayan salınımı mümkün kılmak amacıyla negatif olmama kısıtları gevşetilmektedir çünkü bir modelde parametre kısıtlarının olması, volatilitede doğrusal dışılıkları yakalamak için gereken serbestliği azaltmaktadır. Ayrıca bu modelde, şokların volatilite üzerindeki asimetrik etkileri de dikkate alınabilmektedir (Rabemananjara & Zakoian, 1993: 31).

Genel bir TGARCH modeli aşağıdaki gibi yazılmaktadır (Rabemananjara & Zakoian, 1993: 34):

$$\sigma_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i^+ \varepsilon_{t-i}^+ - \alpha_i^- \varepsilon_{t-i}^- + \sum_{j=1}^{p} \beta_j^+ \sigma_{t-j}^+ - \beta_j^- \sigma_{t-j}^-, \ \varepsilon_t^+ = \max(\varepsilon_t, 0), \ \varepsilon_t^- = \min(\varepsilon_t, 0) \tag{1}$$

$$\varepsilon_t = \sigma_t z_t, \ z_t \ \Box \ i.i.d. \ \text{ortalama 0 ve varyans 1}$$

Modeldeki σ_t değişkeni negatif değerler alabileceğinden dolayı, koşullu standart sapma olarak dikkate alınamamaktadır. Bu durumun sonucu olarak da volatilitenin geçmiş değerlerine bir eşik etkisinin dahil edilmesi gerekliliği ortaya çıkmaktadır.

TGARCH oluşum sürecinden bu modele oldukça benzer olan GJR-GARCH modeline geçildiğinde, modelin koşullu varyans denkleminin TGARCH modelinin koşullu standart sapma denklemi ile aynı fonksiyonel yapıya sahip olduğu görülmektedir. Yalnızca birinci gecikmeler dikkate alındığında GJR-GARCH modeli şöyle yazılabilmektedir (Glosten et al., 1993: 1788):

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 + \gamma \varepsilon_{t-1}^2 I_{t-1} \tag{2}$$

$$I_{t-1} = 1 \ \text{eğer} \ \varepsilon_{t-1} < 0 \ \text{ise}$$

$$= 0 \ \text{eğer} \ \varepsilon_{t-1} \geq 0 \ \text{ise}$$

Modelde kullanılan I_{t-1} kukla değişkeni vasıtasıyla şokların volatilite üzerindeki asimetrik etkisi tespit edilebilmektedir. Kaldıraç etkisi, $\gamma > 0$ kısıtı geçerli olduğunda söz konusu olmaktadır. $\omega > 0$, $\alpha > 0$, $\beta \geq 0$ ve $\alpha + \gamma \geq 0$ modelin negatif olmama kısıtlarıdır. $\gamma < 0$ olsa dahi, modelde $\alpha + \gamma \geq 0$ koşulu sağlanmalıdır (Brooks, 2008: 405).

3.2.2. EGARCH Modeli

GARCH modelinde, koşullu varyansın negatif olmaması için koyulmuş olan parametre kısıtları söz konusudur. Bu kısıtlar, koşullu varyansın geniş bir yelpazede örüntü sergilemesini engellemektedir. Bu problemin aşılabilmesi amacıyla volatilitenin üssel olarak belirlendiği ve böylelikle parametrelerin pozitif olma zorunluluğunun ortadan kalktığı, volatilite simetrisi gerektirmeyen ve Nelson (1991) çalışmasıyla ortaya koyulan "EGARCH Modeli" kullanılmaya başlandı. Öncelikle EARCH modeli dikkate alınırsa koşullu varyans denklemi, uygun bir " g fonksiyonu" için aşağıdaki gibi yazılmaktadır:

$$\ln\left(\sigma_t^2\right) = \alpha_t + \sum_{k=1}^{\infty} \beta_k g\left(z_{t-k}\right) \tag{3}$$

Burada $\{\alpha_t\}$ ve $\{\beta_k\}$ gerçek, stokastik olmayan skaler dizilerdir. Volatilite değişimleri ile getiriler arasındaki asimetrik ilişkiyi bağdaştırmak için $g\left(z_t\right)$'nin değeri z_t'nin büyüklüğünün ve işaretinin fonksiyonu olmalıdır. Bu durumda tercih edilebilecek bir "g fonksiyonu" şöyledir:

$$g(z_t) \equiv \theta z_t + \gamma \left[|z_t| - E|z_t| \right] \tag{4}$$

(3) numaralı modelde, parametrelere ilişkin kısıtlar ortadan kalktığından dolayı β_k parametreleri negatif ya da pozitif olabilmektedir. Böylelikle EGARCH modeli, salınımlı davranışlara izin veren bir model olmaktadır. Ayrıca $\ln(\sigma_t^2)$ doğrusal bir süreç izlediğinden, modelin durağanlığı ve ergodikliği kolaylıkla kontrol edilebilmektedir (Nelson, 1991: 350-51).

Nelson tarafından ortaya koyulan EARCH modelinin genelleştirilmiş halinin literatürde daha çok rastlanan gösterimi ise şöyledir (Enders, 2010: 156):

$$\ln(\sigma_t^2) = \omega + \beta \ln(\sigma_{t-1}^2) + \alpha \left| \varepsilon_{t-1} / \sqrt{\sigma_{t-1}^2} \right| + \gamma \left(\varepsilon_{t-1} / \sqrt{\sigma_{t-1}^2} \right) \tag{5}$$

(5) numarada gösterilen EGARCH(1,1) modelinde, standartlaştırılmış şoklar (ölçü biriminden bağımsız) kullanılmaktadır. Böylelikle, koşullu varyansa gelen şokların yapışkanlığının yorumu kolaylaşmaktadır (Nelson, 1991: 349). Modelin kovaryans durağanlık koşulu, $\beta < 1$ olarak ifade edilmektedir. $\gamma < 0$ kısıtının geçerli olması ise modelde kaldıraç etkisinin varlığına işaret etmektedir.

3.2.3. Beta-t-EGARCH Modeli ve Çeşitleri

Birinci derece Beta-t-EGARCH modeli, EGARCH modelindeki varyansın son gözlemin koşullu skoruna bağlı bir denklem tarafından yönlendirildiği bir modeldir. Buradaki üssel bağlantı fonksiyonu pozitif varyansı garantilemekte ve durağanlık koşullarının kolay elde edilmesine imkân vermektedir. Dinamik volatilite denkleminde koşullu skor kullanımı, aşırı değerlere daha az ağırlık verilmesini sağlamaktadır (Harvey & Sucarrat, 2014: 320). Koşullu varyansın, t dağılımının skorunun geçmiş değerlerine bağlı olduğu düşünüldüğünde, dönüştürülmüş değişkenin beta dağılımına sahip olması koşullu varyansı aşırı değerlere daha dirençli hale getirmektedir. Modelde kaldıracın ve bir bileşenden fazlasının dikkate alınması student-t dağılımı dışındaki dağılımların avantajlarındandır (Harvey & Chakravarty, 2008: 1). EGARCH modelinde, sonlu serbestlik dereceli t dağılımı için gözlemlerin koşulsuz momentleri yoktur fakat bu durum Beta-t-EGARCH modeli için geçerli değildir (Harvey & Chakravarty, 2008: 3).

Finansal getiri serilerinin ortalamalarının sıfıra oldukça yakın olması sebebiyle ve getiri tahmini yerine getiri volatilitesi tahmininin önem arz ettiği durumlarda koşullu ortalama denklemi tahmin edilmeden koşullu volatilite denkleminin tahminine geçilebilmektedir. Sucarrat, bu çalışmada da kullanılan "betategarch" adlı R paketini tanıttığı 2013 yılında yayınladığı makalesinde, incelenen getiri değişkeni öngörülebilir olduğunda getirinin ortalamadan arındırılmış (öngörülemeyen) kısmıyla yani getirinin, dinamik bir regresyondaki hata terimi olarak varsayılıp "Beta-t-EGARCH Modeli ve

Çeşitleri"nin tahmin edilebileceğinden söz etmektedir. Bu çalışmada da bu varsayım dikkate alınıp yalnızca koşullu volatilite denklemleri üzerine odaklanılmaktadır.

3.2.3.1. Tek Bileşenli Beta-t-EGARCH Modeli

Beta-t-EGARCH modeli aşağıdaki gibi ifade edilmektedir:

$$y_t = \varepsilon_t \exp\left(\lambda_{t|t-1}\right), \ t = 1,......,T \tag{6}$$

Burada ε_t, v serbestlik dereceli t dağılımına sahip serisel bağımsız bir değişkendir. Ölçeğin logaritması olan $\lambda_{t|t-1}$ ise koşullu skorun geçmiş değerlerinin doğrusal bir kombinasyonudur. y_t'nin log-benzerlik fonksiyonunun λ_t'ye göre türevi olan "Koşullu Skor" aşağıdaki gibi gösterilmektedir:

$$u_t = \frac{(v+1)(y_t)^2}{v \exp(2\lambda_{t|t-1}) + (y_t)^2} - 1, \ -1 \le u_t \le v, \ v > 0 \tag{7}$$

Bu gösterimler ışığında birinci dereceden tek bileşenli model,

$$\lambda_{t+1|t} = \omega + \varphi\lambda_{t|t-1} + \kappa u_t \tag{8}$$

olarak yazılmaktadır. Burada ω, koşulsuz ya da uzun dönem log-volatilitedir. Modelin durağanlık koşulu ise $|\varphi| < 1$ olarak ifade edilmektedir. Modelin belirlenebilirliği için $\kappa \ne 0$ koşulu sağlanmalıdır (Harvey & Sucarrat, 2014: 321). Kaldıraç faktörü de modele ilave edildiğinde, model aşağıdaki gibi gösterilmektedir:

$$\lambda_{t+1|t} = \omega + \varphi\lambda_{t|t-1} + \kappa u_t + \kappa^* \operatorname{sgn}(-y_t)(u_t + 1) \tag{9}$$

Burada $\kappa*$ kaldıraç parametresi olup, pozitif ve istatistiksel olarak anlamlı ise kaldıraç etkisinin varlığına işaret etmektedir. Modelde φ, GARCH parametresi (yapışkanlık parametresi) iken κ, ARCH parametresi (şoklara tepki parametresi) olmaktadır (Harvey & Sucarrat, 2014: 323).

3.2.3.2. İki Bileşenli Beta-t-EGARCH Modeli

İki bileşenli modellerde, koşullu volatilitedeki "uzun hafıza özelliği" dikkate alınmaktadır. İki bileşenli Beta-t-EGARCH modeli aşağıdaki gibi gösterilmektedir:

$$y_t = \varepsilon_t \exp\left(\lambda_{t|t-1}\right), \ t = 1,......,T \tag{10}$$

$$\underset{\substack{\text{log.volatilite}}}{\lambda_{t|t-1}} = \underset{\substack{\text{koşulsuz}\\\text{log.volatilite}}}{\omega} + \underset{\substack{\text{uzun-dönem}\\\text{bileşeni}}}{\lambda^{\dagger}_{1,t|t-1}} + \underset{\substack{\text{kısa-dönem}\\\text{bileşeni}}}{\lambda^{\dagger}_{2,t|t-1}} \tag{11}$$

Kısa dönem bileşeni, bir şoktan sonra varyanstaki geçici değişimleri yakalamaktadır. Uzun dönem bileşeni ise beta değişkeni tarafından yönlendirilmektedir ve aşırı değerlere karşı duyarlı değildir (Harvey, Chakravarty, 2008: 26). Kısa dönem bileşeni, uzun dönem bileşeni ile mukayese edildiğinde kısa dönem bileşeninin daha büyük $\kappa \left(= \kappa_2\right)$'ya ve daha düşük $\varphi \left(= \varphi_2\right)$'ye sahip olduğu görülmektedir. Zamana göre değişen uzun dönem ve kısa dönem bileşenleri açıkça şöyle yazılabilir:

$$\lambda^{\dagger}_{1,t+1|t} = \varphi_1 \lambda^{\dagger}_{1,t|t-1} + \kappa_1 u_t \tag{12}$$

$$\lambda^{\dagger}_{2,t+1|t} = \varphi_2 \lambda^{\dagger}_{2,t|t-1} + \kappa_2 u_t \tag{13}$$

Buradaki uzun dönem bileşeninin parametresi φ_1, bir değerine yakın ya da bire eşit çıkar. Modelin belirlenebilirliği ve durağanlığı için $0 < \varphi_2 < \varphi_1 < 1$ kısıtı geçerli olmalıdır. İki bileşenli modelde yalnızca kısa dönem bileşeni kaldıraç faktörüne sahip olduğundan, kaldıraç (volatilite asimetrisi) etkisi modele ilave edildiğinde kısa dönem bileşeni,

$$\lambda^{\dagger}_{2,t+1|t} = \varphi_2 \lambda^{\dagger}_{2,t|t-1} + \kappa_2 u_t + \kappa^* \operatorname{sgn}\left(-y_t\right)\left(u_t + 1\right) \tag{14}$$

olarak yazılabilmektedir (Harvey & Sucarrat, 2014: 324-27).

3.2.3.3. İki Bileşenli Beta-Çarpık-t-EGARCH Modeli

Bu modelde, kareli finansal getiri (volatilite vekil değişkeni) serilerinde sıklıkla karşılaşılan "uzun hafıza özelliği", logaritmik volatilitenin u_t tarafından yönlendirilen ve zamana göre değişen uzun dönem ve kısa dönem bileşenlerine ayrıştırılmasıyla dikkate alınmaktadır (Sucarrat, 2013: 139-40). Beta-t-EGARCH modelinin koşullu dağılımı çarpık olduğunda "skor" aşağıda gösterildiği gibidir:

$$u_t = u_t^+ I_{[0,\infty)}\left(y_t\right) + u_t^- I_{(-\infty,0)}\left(y_t\right), \ t = 1, \ldots\ldots, T \tag{15}$$

Burada, $u_t = u_t^+$ ve $u_t = u_t^-$ Beta-t-EGARCH modelindeki gibidir fakat beta dağılımına sahip, skorun ve serbestlik derecesinin fonksiyonu olan değişken bu modelde aşağıdaki gibi tanımlanmaktadır:

$$b_t^+ = \frac{\left(y_t\right)^2 \big/ \left[\nu \gamma^2 \exp\left(2\lambda_{t|t-1}\right)\right]}{1 + \left(y_t\right)^2 \big/ \left[\nu \gamma^2 \exp\left(2\lambda_{t|t-1}\right)\right]} \tag{16}$$

$$b_t^- = \frac{\left(y_t\right)^2 \big/ \left[\nu\gamma^{-2}\exp\left(2\lambda_{t|t-1}\right)\right]}{1+\left(y_t\right)^2 \big/ \left[\nu\gamma^{-2}\exp\left(2\lambda_{t|t-1}\right)\right]} \tag{17}$$

u_t^+ ve u_t^-'nin özellikleri y_t'nin işaretine bağlı değildir fakat b_t^+ ve b_t^- seçimi y_t'nin işaretine bağlıdır. γ ise çarpıklık parametresidir (Harvey & Sucarrat, 2014: 326).

Beta-Çarpık-t-EGARCH modeli, sıçramalara ve aşırı değerlere karşı dirençli olup volatiliteyi üssel olarak belirlemektedir. Model aynı zamanda, koşullu getirilerde kalın kuyrukları ve çarpıklığı; volatilite denkleminde ise kaldıraç ve zaman değişken uzun dönem bileşenini dikkate almaktadır (Sucarrat, 2013: 137).

4. Ampirik Bulgular

Model kurma aşamasına geçildiğinde öncelikle, uygun "koşullu ortalama denklemi" belirlenmeli ve tahmin edilmelidir. Bu denklemin doğru belirlenmesi, özellikle incelenen serinin öngörüsü yapılırken önem arz etmektedir çünkü bir seri hakkında olabildiğince kesin öngörülerde bulunabilmek ancak o serinin ortalama ve varyans davranışının doğru belirlenmesiyle mümkündür. Finansal varlıkların risklerinin hesaplanmasında ise odak noktası "koşullu varyans denklemi" olmaktadır çünkü risklerin hesaplanması ve tahmini bu denklem üzerinden gerçekleştirilmektedir. Yalnızca koşullu varyans denklemine odaklanmanın bir diğer sebebi de finansal varlıklara ilişkin getiri serilerinin ortalamalarının sıfıra çok yakın olarak gerçekleşmesi ve buna dayalı olarak incelenen getiri serisinin sıfır ortalamaya sahip olduğu varsayımıdır.

ARCH, GARCH, ARCH-M, GARCH-M, TARCH, EARCH, PARCH, GJR-GARCH ve EGARCH olarak adlandırılan simetrik ve asimetrik koşullu volatilite modelleri tahmin edilmiştir ve modeller parametre anlamlılıklarına, ARCH etkisinin ortadan kalkma durumuna ve log- benzerlik, Akaike, Schwarz gibi kriterlere bakılarak değerlendirmeye tabi tutulmuştur. Bunlardan; ARCH ve GARCH modelleri ARCH etkisini ortadan kaldırmaması sebebiyle, ARCH-M, GARCH-M ve TARCH modelleri parametre anlamsızlığı sebebiyle, EARCH ve PARCH modelleri de benzer sebeplerden dolayı uygun model olarak değerlendirmeye alınmamıştır. Yapılan tüm değerlendirmeler sonucunda, USD / TRY döviz kurunun getiri volatilitesi tahmininde literatürdeki çalışmalarda da en çok tercih edilmiş olan GJR-GARCH (1,1) ve EGARCH (1,1) modelleri tahmin edilmiştir.

Getiri serisine ilişkin koşullu ortalama denkleminin artıklarında ARCH etkisi tespit edilirse, koşullu ortalamanın koşullu varyans ile birlikte modellenmesi gerektiği sonucuna ulaşılacaktır. Getiri serisinin korelogramına bakıldığında, seride otokorelasyon göze çarpmaktadır. Otokorelasyonu ortadan kaldırmak için serinin uygun gecikmeli doğrusal bir modelle modellenmesi gerekmektedir. Yapılan çeşitli denemeler sonucunda en uygun modelin "AR(1) Modeli" olduğu tespit edilmiştir. Model tahmini Tablo 3'te verilmiştir. Sabit parametre anlamsız çıktığı için model dışında bırakılmıştır. Koşullu ortalama

modelinde, $\left|\varphi_1\right| < 1$ olarak ifade edilen durağanlık koşulu sağlanmaktadır. D-W testi ise hata terimleri arasında yalnızca birinci dereceden otokorelasyonu test etmekte olup test sonucunda modelde, birinci dereceden otokorelasyon problemi olmadığı sonucuna varılmaktadır. Tahmin edilen modelin kareli artıklarının korelogramına bakıldığında, tüm gecikmelerde otokorelasyon katsayıları anlamlı çıkmaktadır. Bu durum, getiri serisinde "otoregresif koşullu değişen varyans" problemi olabileceği hakkında bir ipucu vermektedir. Bu konuda nihai kararı vermek için ise "ARCH Testi" yapılmıştır. İlgili test istatistiğinin olasılık değeri sıfır olduğu için "Koşullu Volatilite Modelleri" kullanılarak sürecin modellenmesi gerektiği sonucuna varılmıştır. Kareli artıkların korelogramı ve ARCH testi sonucu Ek 1'de verilmiştir.

Tablo: 3
Dolar / TL Getiri Serisinin Koşullu Ortalama Modeli

	AR(1) Modeli
φ_1	0,073***
Ters AR Kökü	0,07
D-W Test İstatistiği	1,99

***, ** ve * sırasıyla 0,01, 0,05 ve 0,10 anlamlılık düzeylerine karşılık gelmektedir.

Modellerin tahmininde, dolar kuru getiri serisinin leptokurtik ve asimetrik dağılımı dikkate alındığında şokların koşullu yoğunluğu için "Çarpık-t" dağılımı tercih edilmiştir. Buna göre dolar kuru getiri serisine ilişkin koşullu volatilite, şokların çarpık-t dağıldığı varsayımı ile tahmin edilen EGARCH (1,1) ve GJR-GARCH (1,1) modelleri ile USD / TRY kuru getiri serisinin özelliklerine oldukça uygun gözüken ve ilgili serinin volatilite modellemesinde literatürde daha evvel kullanılmamış olan "Beta-t-EGARCH / Beta-Çarpık-t-EGARCH" modelleri kullanılarak tahmin edilmiştir.

İlk olarak tahmin edilen EGARCH(1,1)-çarpık-t ve GJR-GARCH(1,1)-çarpık-t modellerine ilişkin sonuçlar Tablo 4'te birlikte verilmiştir:

Tablo: 4
EGARCH (1,1) - çarpık-t ve GJR-GARCH (1,1) - çarpık-t Tahmin Sonuçları

Koşullu Ortalama Denklemi	EGARCH (1,1) çarpık-t	GJR-GARCH (1,1) çarpık-t
φ_1 **(AR(1))**	0,066***	0,065***
Koşullu Varyans Denklemi		
ω **(sabit)**	-0,026***	0,0206***
α **(ARCH)**	0,059***	0,146***
β **(GARCH)**	0,965***	0,864***
γ **(ASİMETRİ)**	0,295***	-0,255***
Dağılım Parametreleri		
Çarpıklık	1,102***	1,103***
Şekil	5,102***	5,098***
Özet İstatistikler		
Log-Benzerlik	-4467,4	-4478,3
Akaike	2,126	2,131
Schwarz	2,136	2,141

Varsayımlara İlişkin Testler		
ARCH Gecikme 3	0,59 (p=0,44)	2,425 (p=0,11)
ARCH Gecikme 5	2,37 (p=0,39)	2,854 (p=0,31)
ARCH Gecikme 7	2,77 (p=0,55)	2,956 (p=0,52)
Nyblom Stabilite Testi	6,59***	5,81***
Negatif İşaret Sapması	1,413 (p=0,15)	1,614 (p=0,10)
Pozitif İşaret Sapması	0,078 (p=0,93)	1,220 (p=0,22)
Düzeltilmiş Pearson Uyum İyiliği Testi	Grup 40 için 48,80 (p=0,13) Grup 50 için 63,29 (p=0,08)	Grup 40 için 46,63 (p=0,18) Grup 50 için 57,46 (p=0,19)

*** , ** ve * sırasıyla 0,01, 0,05 ve 0,10 anlamlılık düzeylerine karşılık gelmektedir.

Her iki model karşılaştırıldığında, her iki modelin tüm parametreleri $\alpha = 0,01$ için bile istatistiksel olarak anlamlıdır. Çarpıklık ile şekil parametrelerinin tahmin değerleri sırasıyla, dağılımın sağa çarpık ve sivri (kalın kuyruklu) olduğuna işaret etmektedir. EGARCH (1,1) modelinin tahmini sonrasında, geriye kalan koşullu değişen varyans etkisinin tespiti için yapılan "ARCH LM" testlerine göre, LM test istatistiklerinin olasılık değerleri 0,10'dan büyük olduğundan modelin artıklarında geriye kalan ARCH etkisi bulunamamıştır. Ayrıca $\gamma > 0$ olduğundan, EGARCH (1,1) modelinde kaldıraç etkisi yoktur. GJR-GARCH (1,1) modelinin tahmin sonucunda yapılan ARCH LM testlerine göre ise LM test istatistiklerinin olasılık değerleri 0,10'dan büyük olduğundan, bu modelin artıklarında da geriye kalan ARCH etkisi bulunamamıştır. Çarpıklık ve şekil parametrelerinin tahmin değerlerine bakıldığında bu model de dağılımın sağa çarpık ve sivri olduğuna işaret etmektedir.

Varsayımlara ilişkin testlere gelindiğinde ise Tablo 4'te, önceki paragrafta yorumlanan ARCH testi dışında üç teste ilişkin sonuçlara yer verilmektedir. Bu testlerden "Nyblom Stabilite Testi (1989)"nin amacı, modelin parametrelerinde zamana göre değişim olup olmadığını yani parametreler üzerinde yapısal kırılmanın etkili olup olmadığını test etmektir. Testin sıfır hipotezi $\left(H_0 \right)$, incelenen modelde yapısal kırılmanın olmadığını yani parametrelerin zaman boyunca sabit kaldığını iddia etmektedir. Tablo 4'te verilen iki modelin Nyblom stabilite testi sonuçlarına bakıldığında ise H_0'ın doğru olduğu varsayımı altında belirlenen test dağılımında, test istatistiğinin olasılık değerinin 0,01'den bile küçük olması sebebiyle H_0'ın kuvvetli bir biçimde reddedildiği görülmektedir. Bu sonuç, yapısal kırılmanın her iki modelin parametreleri üzerinde genel bir etkiye sahip olduğunu göstermektedir. Yapısal kırılmanın, bir belirlenme hatasına yol açmak suretiyle parametre tahmincilerinde sapmaya sebebiyet verebileceği düşünüldüğünde, yukarıdaki iki modelin tahmin edilen bazı katsayılarının gerçeği yansıtmayabileceği düşünülmektedir. Yapısal kırılmanın tek tek parametreler üzerindeki etkisine bakıldığında ise sosyal bilimlerde tercih edilen $\alpha = 0,05$ anlamlılık düzeyinde, EGARCH (1,1)-çarpık-t modelinin ω ve β parametreleri üzerinde yapısal kırılmanın etkili olmadığı görülmektedir. Aynı değerlendirme GJR-GARCH (1,1)-çarpık-t modeli için yapıldığında ise yine $\alpha = 0,05$ anlamlılık düzeyinde bu modelin ω, α ve β parametreleri üzerinde yapısal kırılmanın etkili olmadığı görülmektedir.

Tablo 4'teki iki modelin de durağanlık koşullarını sağlayıp sağlamadığına bakıldığında, EGARCH (1,1)-çarpık-t modelindeki GARCH parametresi (β) bireysel olarak yapısal kırılmadan etkilenmediğinden ve modelde $\beta < 1$ olduğundan dolayı bu modelin durağanlık koşulunu sağladığı söylenebilmektedir. GJR-GARCH(1,1)-çarpık-t modeline bakıldığında ise bu modeldeki kısıtlardan olan $\alpha + \gamma \geq 0$ koşulunun sağlanmadığı görülmektedir. Bu durum, γ parametresi üzerinde yapısal kırılmanın etkili olması sebebiyle bu parametre tahmininde meydana gelen sapmadan kaynaklanıyor olabilir. Bu sebepten dolayı, bu modelin durağanlığı hakkında bir şey söylenememektedir.

Tablo 4'te görülen "İşaret Sapma Testi (1993)"nin amacı, modelde kaldıraç etkisini tespit etmek suretiyle ilgili modelin koşullu volatilite denkleminde belirlenme hatasının varlığını sınamaktır. Testin sıfır hipotezi $\left(H_0\right)$, incelenen modelin volatilite denkleminde belirlenme hatasının olmadığını iddia etmektedir. H_0'ın doğru olduğu varsayımı altında belirlenen test dağılımında, ilgili test istatistiklerinin olasılık değerlerinin 0,05'ten çok daha büyük olması sebebiyle her iki modelde de pozitif ve negatif işaret sapması olmadığı yani koşullu varyansın şoklara pozitif ya da negatif bir tepkisinin söz konusu olmadığı sonucuna varılmaktadır. Bu da her iki modelin koşullu volatilite denklemlerinde belirlenme hatasının bulunmadığına işaret etmektedir.

"Düzeltilmiş Pearson Uyum İyiliği" testinin amacı ise standartlaştırılmış artıkların dağılımı ile yukarıdaki modellerin tahmininde kullanılan "Çarpık-t" teorik dağılımını karşılaştırmak suretiyle ampirik dağılımın teorik dağılımla hangi derecede örtüştüğünü tespit etmektir. Testin sıfır hipotezi $\left(H_0\right)$, stndartlaştırılmış artıkların dağılımının Çarpık-t dağılımı ile örtüştüğünü iddia etmektedir. Testi yaparken kullanılan gruplardaki 40 ve 50 sayıları, teorik dağılımın belirlenmesinde yararlanılan histogramın kutu sayısını ifade etmektedir. H_0'ın doğru olduğu varsayımı altında belirlenen test dağılımında, ilgili test istatistiklerinin olasılık değerlerinin 0,05'ten daha büyük olması sebebiyle, her iki modelde de standartlaştırılmış artıklar için "Çarpık-t" dağılımının uygun dağılım olduğu belirlenmiştir.

Çalışmada tahmin edilen diğer modeller ise "Beta-t-EGARCH ve Beta-Çarpık-t-EGARCH" modelleri olmaktadır. Bu modeller, dinamik volatilite denkleminde koşullu skor (değişkenin log-benzerliğinin λ'ya göre türevi) kullanımından dolayı aşırı değerlere daha az ağırlık vermektedir ve bunun sonucunda da koşullu varyansta olabilecek sıçramalara ve aşırı değerlere karşı dirençli olmaktadır (Harvey & Sucarrat, 2014: 320). Skorun basit bir dönüşümünün Beta dağılımına sahip olması sebebiyle modelde "Beta" dağılımına yer verilmektedir (Sucarrat, 2013: 138). Bu modellerin tahmin sonuçları Tablo 5'te verilmiştir:

Tablo: 5
Beta-t-EGARCH ve Beta-Çarpık-t-EGARCH Model Tahminleri

	Tek Bileşenli Beta-t-EGARCH	Tek Bileşenli Beta-t-EGARCH + Kaldıraç	Tek Bileşenli Beta-Çarpık-t-EGARCH	Tek Bileşenli Beta-Çarpık-t-EGARCH + Kaldıraç	İki Bileşenli Beta-t-EGARCH + Kaldıraç	İki Bileşenli Beta-Çarpık-t-EGARCH + Kaldıraç
ω	-0,504 (0,058)	-0,577 (0,055)	-0,505 (0,059)	-0,56 (0,056)	-0,521 (0,088)	-0,518 (0,09)
$\varphi_1 (= \varphi)$	0,961 (0,0067)	0,964 (0,006)	0,962 (0,006)	0,966 (0,006)	0,99 (0,004)	0,991 (0,003)
φ_2	------	------	------	------	0,893 (0,028)	0,906 (0,023)
$\kappa_1 (= \kappa)$	0,097 (0,0081)	0,083 (0,008)	0,095 (0,008)	0,082 (0,007)	0,035 (0,009)	0,033 (0,008)
κ_2	------	------	------	------	0,051 (0,011)	0,053 (0,01)
κ^*	------	-0,023 (0,004)	------	-0,027 (0,003)	-0,031 (0,005)	-0,035 (0,005)
ν	5,537 (0,459)	5,557 (0,453)	5,662 (0,478)	5,833 (0,493)	5,603 (0,458)	5,844 (0,492)
γ	------	------	1,07 (0,019)	1,115 (0,022)	------	1,112 (0,022)
Log Benzerlik	-4508,74	-4493,42	-4502,05	-4478,37	-4484,08	-4469,66
SIC	2,150	2,145	2,149	2,1398	2,144	2,1397
ARCH (10)	48,864 (p=0,000)	24,940 (p=0,005)	62,293 (p=0,000)	26,761 (p=0,003)	15,299 (p=0,122)	16,421 (p=0,088)
ARCH (20)	65,704 (p=0,000)	36,739 (p=0,013)	78,789 (p=0,000)	37,824 (p=0,009)	35,891 (p=0,016)	36,006 (p=0,015)
ARCH (30)	71,537 (p=0,000)	44,587 (p=0,042)	84,102 (p=0,000)	45,522 (p=0,034)	42,350 (p=0,067)	42,441 (p=0,066)

Tablo 5'te yer alan altı model de durağanlık ve belirlenebilirlik koşullarını sağlamaktadır. Parametre tahminlerinin işaretlerinin, büyüklüklerinin ve istatistiksel anlamlılıklarının, döviz kuru getiri serisinin incelenen özellikleri dikkate alındığında beklentilere uygun olduğu görülmektedir. Bu durum, parametre tahminlerinin, getirilerdeki sıçramalara ve aşırı değerlere karşı direnç gösterdiğinin bir kanıtıdır. Geriye kalan ARCH etkilerine bakıldığında, tek bileşenden oluşan dört modelin de dolar kuru getiri serisinde var olan koşullu değişen varyans etkisini ortadan kaldıramadığı görülmektedir. Bu durum bu dört modeldeki koşullu varyans denklemlerinin yanlış belirlenmiş olabileceğine işaret etmektedir. Söz konusu tek bileşenli ilk dört model birlikte değerlendirildiğinde, ilgili modellerde dağılımda çarpıklık faktörünün dikkate alınıp alınmamasından bağımsız olarak kaldıraç etkisine yer verilmesinin, log-benzerlik ve SIC değerleri dikkate alındığında model uyumunda iyileşme sağladığı görülmektedir.

Log - volatilitenin zamana göre değişen uzun dönem ile kısa dönem bileşenlerine ayrıldığı ve finansal serilerde karşılaşılan "Uzun Hafıza Özelliği"ni dikkate alan iki bileşenli son iki model incelendiğinde ise ilgili modellerde geriye kalan ARCH etkisinin ortadan kalktığı görülmektedir. Bu iki modelin log-benzerlik ve SIC değerleri incelendiğinde ise, çarpıklık faktörünün modelin uyum iyiliğini belirgin biçimde artırdığı tespit edilmektedir.

ARCH etkisini ortadan kaldıran beşinci ve altıncı modeller içerisinde, log-benzerlik değeri daha yüksek ve SIC değeri daha düşük olan model "İki Bileşenli Beta-Çarpık-t-EGARCH + Kaldıraç" modeli olarak belirlenmiştir. Bu modelin, belirlenebilirlik ve durağanlık kısıtı olan "$0 < \varphi_2 < \varphi_1 < 1$" koşulunu sağladığı daha önce de ifade edilmişti. Modelde ω ile gösterilen koşulsuz (uzun dönem) logaritmik volatilite -0,518 olarak tahmin edilmiştir. Buradan koşulsuz volatilite, 0,595 olarak hesaplanmaktadır.

İstatistiksel performansı en yüksek olan "İki Bileşenli Beta-Çarpık-t-EGARCH + Kaldıraç" modeli üzerinden değerlendirmeye devam edildiğinde, uzun dönem bileşeninin GARCH parametresi olan φ_1'in 0,991 olarak tahmin edildiği görülmektedir. Bu değer mutlak değerce birden küçüktür fakat bire çok yakındır. Bu bulgu, uzun dönemde dolar kuru getiri serisinin volatilitesinde yüksek düzeyde bir yapışkanlık (kümelenme) olduğunu yani kuvvetli bir volatilite kümelenmesini ifade etmektedir. φ_1, kısa dönem GARCH parametresi olan φ_2'nin tahmin değeri (0,906) ile karşılaştırıldığında, kısa dönemdeki volatilite kümelenmesinin uzun dönemdeki volatilite kümelenmesine göre daha zayıf olduğu görülmektedir.

Uzun dönem bileşeninin κ_1 ile gösterilen ARCH parametresi, 0,033 olarak tahmin edilmiştir. Bu parametre, mutlak değerce ne kadar büyükse şokların koşullu volatiliteye etkisi o kadar büyük olacaktır. Kısa dönem bileşeninin ARCH parametresi olan κ_2 ise, 0,053 olarak tahmin edilmiştir. Bu durumda kısa dönemde şokların volatilite üzerindeki etkisi uzun dönemdeki etkisine göre daha büyüktür.

κ^* ile gösterilen kaldıraç (volatilite asimetrisi) parametresinin tahmin değeri ise -0,035 olarak hesaplanmıştır. Bu parametre, volatilitenin kısa dönem bileşeni içerisinde yer almaktadır. Bu değer modelde pozitif tahmin edilmiş olsaydı, negatif şokların pozitif şoklara göre volatilite üzerinde daha büyük bir etkiye sahip olduğu yani kaldıraç etkisinin söz konusu olduğu söylenebilirdi fakat κ^* parametresi negatif tahmin edildiğinden dolayı, USD / TRY kuru getiri serisinin volatilitesi üzerinde pozitif bir şokun negatif bir şoktan daha etkili olduğu sonucuna varılabilmektedir. USD / TRY döviz kuru getirisi üzerinde pozitif bir şok, kurun yükselmesi anlamına geldiğinden Türk Lirasının değer kaybetmesini ifade etmektedir. Böyle düşünüldüğünde döviz kurlarına gelen pozitif şokların aslında TL'nin değer kaybetmesi demek olduğu ve bunun da döviz kuru getiri volatilitesinde yükselmeye yani belirsizliğe sebep olduğu anlaşılabilmektedir. Modelde $\kappa^* < 0$ ve $\gamma > 1$ olması, büyük bir pozitif şok neticesinde Dolar / TL döviz kurundan büyük pozitif getiri elde etme karşılığında göze alınan riskin fazla olduğunu göstermektedir.

ν (serbestlik derecesi) parametresinin tahmin değerine bakıldığında bu değerin 5,844 olduğu görülmektedir. Bu durum, koşullu dolar kuru getiri serisinin standart normal dağılıma göre kalın kuyruklu ve sivri bir dağılıma sahip olduğunu ifade etmektedir.

γ (çarpıklık parametresi) tahmin değerine bakıldığında ise ilgili değerin, 1,112 olarak tahmin edildiği görülmektedir. Bu değerin birden büyük olması, koşullu getirilerin dağılımının sağa çarpık olduğunu belirtmektedir. Bu durum, düşük olasılıkla da olsa pozitif yüksek getirilerin elde edilmesinin de mümkün olduğunu ifade etmektedir.

Tablo 4 ve Tablo 5'te tahmin edilen modeller ayrı ayrı değerlendirildikten sonra sonuca varma aşamasında tümünün karşılaştırmalı bir değerlendirmesini yapmak faydalı olmaktadır. GJR-GARCH (1,1)-çarpık-t modelinin durağanlığı tespit edilemediği için model değerlendirme dışında bırakılmıştır. "EGARCH (1,1)-çarpık-t modeli" ile birinci derece "İki Bileşenli Beta-Çarpık-t-EGARCH+Kaldıraç" modeli karşılaştırıldığında, EGARCH (1,1)-çarpık-t modelinin ARCH etkisini daha kuvvetli bir biçimde ortadan kaldırdığı görülmektedir. Modellerin istatistiksel performansları değerlendirildiğinde, log-benzerlik ve Schwarz kriterleri de "EGARCH (1,1)-çarpık-t" modelini işaret etmektedir fakat burada, bu çalışmanın da çıkış noktasını oluşturan koşullu volatilite denkleminin aşırı değerlere ve sıçramalara karşı dirençli olması durumu "İki Bileşenli Beta-Çarpık-t-EGARCH+Kaldıraç" modelinin tercih edilmesinin sebebidir. Ek 2'de, volatilite vekil değişkeni olarak kullanılan mutlak getirilerin grafiği ve kutu-bıyık diyagramı verilmektedir. Grafik incelendiğinde koşullu volatilitede, 2008 küresel ve 2018 yerel ekonomik krizleri kaynaklı sıçramaların yanı sıra 2021 yılındaki pandemi kaynaklı sıçrama dikkat çekmektedir. Kutu-bıyık diyagramı incelendiğinde ise mutlak getirilerin temsil ettiği koşullu volatilite serisinde çok sayıda aşırı değerin varlığı tespit edilebilmektedir. Koşullu volatilite denkleminde sıçramaların ve aşırı değerlerin dikkate alınıp uygun volatilite modelinin tercih edilmemesinin araştırmacıları yanlış sonuçlara götüreceği aşikardır.

Şekil 4 incelendiğinde, aday volatilite modelleri arasından seçilen "İki Bileşenli Beta-Çarpık-t-EGARCH+Kaldıraç" modelinden tahmin edilen koşullu standart sapmalarla birlikte mutlak döviz kuru getirilerinin çizgi grafikleri birlikte görülmektedir. Tahmin edilen koşullu standart sapmaların değişim aralığı, mutlak getirilerin değişim aralığı içerisinde kalmaktadır. Koşullu standart sapmaların incelenen dönemde hiçbir zaman mutlak getirilerin değişim aralığının üzerinde ya da altında seyrettiği görülmemektedir. Bu da, Dolar / TL döviz kuru getiri serisinin koşullu volatilitelerini tahmin amaçlı seçilen en uygun model olan "İki Bileşenli Beta-Çarpık-t-EGARCH+Kaldıraç" modelinin incelenen seriye iyi uyum sağladığını ve kur riski tahmininde kullanılabilecek uygun bir yöntem olduğunu bir kez de grafiksel olarak göstermektedir.

Çalışmadan elde edilen bulgularla farklı çalışmaların bulguları karşılaştırıldığında sonuçların örtüştüğü görülmektedir. Çalışmalarda, döviz kuru volatilite modellemesinde kullanılan asimetrik modellerin kur dinamiklerine daha uygun olduğuna, döviz piyasasında volatilitenin uzun hafıza özelliğinin ve yapışkanlığının bulunduğuna vurgu yapıldığı görülmektedir. "İki Bileşenli Beta-Çarpık-t-EGARCH+Kaldıraç" modeli bütün bu özellikleri dikkate almaktadır. Beta-t-EGARCH modelleri kullanılarak yapılan çalışmalar incelendiğinde ise; aykırı değerlerin, sıçramaların, uzun hafızanın ve asimetri etkisinin varlığı söz konusu iken volatilite tahmini yapıldığında bu modellerin üstün performans gösterdiği ifade edilmektedir. Bu çalışmada belirlenen en uygun model dikkate alındığında, çalışmanın sonucuyla bu sonuçların da örtüştüğü tespit edilebilmektedir.

Şekil: 4

"Mutlak Döviz Kuru Getiri Serisi"ne Ait Mavi Grafik ile "İki Bileşenli Beta-Çarpık-t-EGARCH + Kaldıraç Modeli"nden Tahmin Edilen Koşullu Standart Sapmalara Ait Kırmızı Grafiklerin Çizimi (2005-2021, 2007-2009, 2017-2019)

2005-2021 Dönemi   **2007-2009 Dönemi**   **2017-2019 Dönemi**
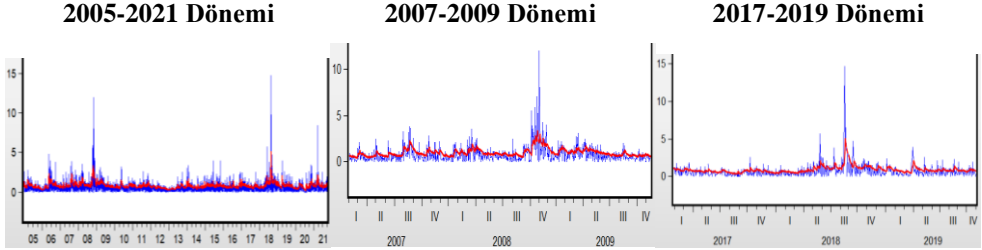
5. Sonuç

Çalışmada öncelikle Dolar / TL kuru getiri serisini betimleyen özellikler incelenmiştir. Getiri serisi dağılımının sivri - kalın kuyruklu yani leptokurtik ve aynı zamanda da sağa çarpık olduğu görülmektedir. Getiri serisinin zaman yolu grafiği incelendiğinde; 2008 küresel krizi ile 2018 yılında Türkiye'de "Döviz ve Borç Krizi" olarak adlandırılan ekonomik krizin ortaya çıktığı süreçlerde ve 2021 yılında şiddetli olarak devam eden pandemi sürecinde dolar kuru getirisindeki belirsizliğin oldukça yükseldiği görülmektedir. İlgili getiri serisinde volatilite kümelenmeleri ve ayrıca birçok "aşırı değer" söz konusudur.

Volatilitelerin farklı derecelerden yapışkanlığa sahip olduğu ve bunların zaman içerisinde değişkenlik gösterdiği çalışmada elde edilen bulgular arasındadır. Volatilite vekil değişkenlerine ilişkin periyodogramların incelenmesi sonucunda ise zaman içinde değişen belirsizliklerin uzun hafızaya sahip olduğu yani geçmiş dönemlerdeki belirsizliklerin ilerleyen dönemlerdeki belirsizlikler ile belli derecelerde bağımlılık sergilediği görülmektedir. Yüksek belirsizlik ve düşük belirsizlik dönemlerinin hemen ortadan kalkmadığı, belli süreler varlığını sürdürdüğü anlaşılmaktadır. Bu bilgilerden hareketle, kriz sonrası dönemlerde de bu belirsizliğin belli derecelerde etkisini sürdürdüğü söylenebilmektedir. Özellikle riskin yüksek olduğu dönemlere girildiğinde, piyasa aktörlerinin ve yatırımcıların bu durumun belli bir süre devam edeceğini bilmesi ve yüksek getiri beklerken yüksek kayıplarla karşılaşabilmesinin oldukça muhtemel olduğunu hatırlarından çıkarmamaları gerekmektedir.

Model kurma aşamasına geçildiğinde, "GJR-GARCH(1,1)-Çarpık-t ve EGARCH(1,1)-Çarpık-t" modelleri ve sonrasında "Beta-t-EGARCH Modeli ve Çeşitleri" tahmin edilmiştir. GJR-GARCH(1,1)-Çarpık-t modelinin durağanlık koşulunu sağlama durumu tespit edilemediğinden EGARCH(1,1)-Çarpık-t modeli ile Beta-t-EGARCH modelleri karşılaştırıldığında; EGARCH(1,1)-Çarpık-t modelinin ARCH etkisini daha kuvvetli bir biçimde ortadan kaldırmasına ve daha iyi bir istatistiksel performansa sahip

olmasına rağmen koşullu varyans denkleminin, volatilitede var olan aşırı değerlere ve sıçramalara karşı dirençli olmaması ve zaman değişken uzun dönem bileşenine yani uzun hafıza etkisine imkan vermemesi nedenlerinden dolayı tercih edilmemiştir. Bu değerlendirmelerin sonucunda da "İki Bileşenli Beta-Çarpık-t-EGARCH + Kaldıraç" en uygun model olarak seçilerek yorumlar bu model üzerinden yapılmıştır.

"İki Bileşenli Beta-Çarpık-t-EGARCH + Kaldıraç" modelinin tahmin sonuçları incelendiğinde, Dolar / TL kurunun uzun dönem volatilite değeri 0,595 olarak hesaplanmıştır. Riske Maruz Değer gibi riske dayalı olarak yapılacak hesaplamalarda bu volatilite değeri kullanılabilir bir değerdir. Modelin koşullu volatilite denkleminin uzun dönem bileşeninin φ_1 parametresi 0,991 olarak tahmin edilmiştir. Aynı zamanda ilgili denklemin kısa dönem bileşeninin φ_2 parametresine bakıldığında ise bu parametrenin tahmin değerinin 0,906 olduğu görülmektedir. Bu durum, dolar kuru getiri serisinde var olan kısa dönem volatilite kümelenmesinin uzun dönem volatilite kümelenmesinden daha zayıf olduğunu göstermektedir. Dolar kurundaki önceki dönem risklerinin sonraki dönem riskleri ile yapışkanlığının derecesi kısa dönemde uzun döneme göre daha zayıf bulunmuştur. Dolayısıyla, Dolar getirisinin koşullu volatilitesine gelecek bir volatilite şokunun etkisi kısa dönemde, uzun döneme göre daha kısa sürmektedir.

Koşullu volatilitenin şoklara karşı uzun dönemdeki ve kısa dönemdeki tepkisinin büyüklüğünü gösteren κ_1 ve κ_2 parametrelerinin tahmin değerlerine bakıldığında, bunların sırasıyla 0,033 ve 0,053 olduğu görülmektedir. Buna göre kısa dönemde, volatilitenin şoklara karşı tepkisi uzun döneme göre daha kuvvetlidir. Dolayısıyla buraya kadar elde edilen bulgular dikkate alındığında, dolar kurundan kazanç sağlama olasılığının uzun vadede daha fazla olduğu görülmektedir.

κ^* parametresinin tahmin değerine bakıldığında, bu değerin -0.035 olduğu görülmektedir. Buna göre, dolar kuruna gelen pozitif şokların kur getiri serisindeki belirsizlik üzerinde negatif şoklara göre daha etkili olduğu görülmektedir. Dolar kurundaki artışlar, Türk Lirasının değerindeki düşmeye işaret ettiği için pozitif şoklar TL'nin değer kaybetmesine, bu da belirsizliğin daha fazla artmasına sebebiyet vermektedir. Ayrıca, dolar kuru volatilitesine gelen pozitif bir şok neticesinde kısa dönemde yüksek pozitif getiri elde etme olasılığının yüksek negatif getiri elde etme olasılığından daha fazla olduğu söylenebilir. Risk iştahı fazla olan yani dolardan aşırı kar elde etmek isteyen kişiler, kısa dönemde dolara yatırım yaparak ve büyük kayıplar yaşama riskini göz önüne alarak büyük pozitif getiriler elde edebilirken, risk iştahı düşük yani normal karlarla ellerindeki TL'nin değerini korumak isteyen kişiler ise satın aldıkları doları ellerinde uzun dönem tutarak hedeflerini gerçekleştirebilmektedirler.

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EKLER

Ek: 1
Dolar Kuru Getiri Serisinin Koşullu Ortalama Modelinin Kareli Artıklarının Korelogramı ve Artıklarda ARCH Etkisi Testi Sonucu

Örneklem: 1/06/2005 9/30/2021
Gerçekleşme Sayısı: 4207

Otokorelasyon	Kısmi Korelasyon		OK	KOK	Q-İst.	Olasılık
		1	0.383	0.383	616.18	0.000
		2	0.175	0.034	745.77	0.000
		3	0.129	0.060	816.20	0.000
		4	0.118	0.053	874.89	0.000
		5	0.123	0.060	938.79	0.000
		6	0.076	-0.004	962.94	0.000
		7	0.056	0.011	976.06	0.000
		8	0.069	0.035	996.40	0.000
		9	0.096	0.054	1035.5	0.000
		10	0.035	-0.039	1040.8	0.000
		11	0.019	-0.002	1042.2	0.000
		12	0.023	-0.006	1044.5	0.000
		13	0.067	0.053	1063.7	0.000
		14	0.031	-0.027	1067.7	0.000
		15	0.037	0.027	1073.4	0.000
		16	0.030	0.001	1077.2	0.000
		17	0.058	0.040	1091.4	0.000
		18	0.076	0.032	1116.1	0.000
		19	0.059	0.015	1130.7	0.000
		20	0.055	0.017	1143.6	0.000
		21	0.022	-0.025	1145.6	0.000
		22	0.024	-0.002	1147.9	0.000
		23	0.024	0.005	1150.3	0.000
		24	0.041	0.024	1157.6	0.000
		25	0.018	-0.016	1159.0	0.000
		26	0.030	0.015	1162.7	0.000

Değişen Varyans Testi: ARCH

F-İstatistiği	721.1072	Olasılık F(1,4204)	0.0000
N*R-kare	615.8195	Olasılık Ki-Kare(1)	0.0000

Ek: 2
Mutlak Getiri Değişkeni (Volatilite Vekil Değişkeni)'ne İlişkin Grafik (Üstte) ve Kutu-Bıyık Diyagramı (Altta)
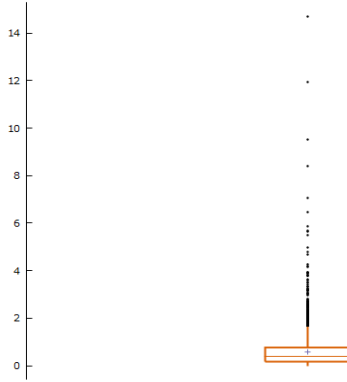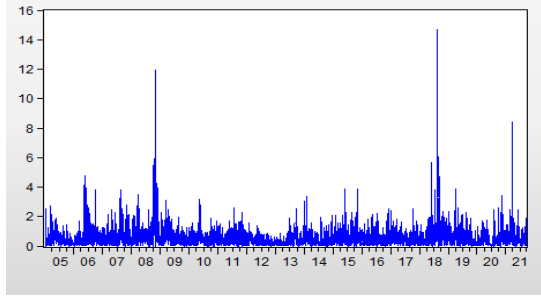
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Belediyelerin Çevre Koruma Harcamaları Üzerinde Sanayileşmenin Etkilerinin Mekânsal Analizi: Türkiye Örneği

Mustafa KIZILTAN *(https://orcid.org/0000-0002-5953-1960), Hacettepe University, Türkiye;*
mustafa.kiziltan@hacettepe.edu.tr

Ahmet Burçin YERELİ *(https://orcid.org/0000-0002-8746-6756), Hacettepe University, Türkiye;*
aby@hacettepe.edu.tr

Spatial Analysis of Industrialization Effects on Municipalities' Environmental Protection Expenditures: The Case of Turkey

Abstract

Environmental protection expenditures made by municipalities are affected by various factors, especially the level of industrialisation. This is the first study to examine the effects of industrialisation on the per capita environmental protection expenditures of municipalities in Turkey between 2007-2016. The Spatial Durbin Model is used to account for the spatial dependence and spillover effects between neighbouring municipalities. The main findings of this study are as follows: (1) The increase in industrialisation requires more environmental protection expenditures. (2) Spatial model has a significant but negative effect, showing that per capita environmental protection expenditures are concentrated in specific regions and cause the free-rider problem. (3) The increase in per capita environmental revenues increases per capita environmental protection expenditures. (4) As expected, population density and land area increase environmental protection per capita. The results of this study may provide decision-makers with a different perspective in planning and coordinating environmental protection expenditures.

Keywords	:	Environmental Protection Expenditures, Regional Public Expenditures, Municipalities, Spatial Dependence, Industrialization.

JEL Classification Codes : C21, H76, Q58.

Öz

Belediyelerin yapmış oldukları çevre koruma harcamaları başta sanayileşme düzeyi olmak üzere çeşitli faktörlerden etkilenmektedir. Bu çalışma 2007-2016 yılları arasında Türkiye'de belediyelerin kişi başı çevre koruma harcamaları üzerinde sanayileşmenin etkilerini inceleyen ilk çalışmadır. Komşu il belediyeleri arasındaki mekânsal bağımlılık ve saçılım etkilerini dikkate almak için çalışmada Mekânsal Durbin Modeli kullanılmaktadır. Bu çalışmanın temel bulguları şu şekildedir: (1) Sanayileşme düzeyinin artması daha fazla çevre koruma harcaması yapılmasını gerektirmektedir. (2) Mekânsal modelin anlamlı fakat negatif bir etkiye sahip olması kişi başı çevre koruma harcamalarının belli bölgelerde yoğunlaştığını ve bedavacılık problemine yol açtığını göstermektedir. (3) Kişi başı çevre gelirlerinin artması kişi başı çevre koruma harcamalarını artırmaktadır. (4) Nüfus yoğunluğu ve yüzölçümü daha fazla kişi başı çevre korumasını beraberinde getirmektedir. Bu çalışmanın sonuçları karar vericilere çevre koruma harcamalarının planlanmasında ve koordine edilmesinde farklı bir bakış açısı sağlayabilir.

Anahtar Sözcükler	:	Çevre Koruma Harcamaları, Bölgesel Kamu Harcamaları, Belediyeler, Mekânsal Bağımlılık, Sanayileşme.

1. Giriş

Gelişmekte olan ülkelerde yoksulluk, temiz içme suyuna erişim, sağlık hizmetlerindeki eksiklikler ve altyapı eksiklikleri önemli sorunlar arasında göze çarpmaktadır. Gelişmiş ülkelerde ise hızlı ekonomik gelişme ve nüfus artışı çevresel bozulmaya neden olmaktadır. Sanayileşme ve artan enerji kullanımı aynı zamanda çevre sağlığı üzerinde önemli riskler oluşturmaktadır (Remoundou & Koundouri, 2009). Dünya Sağlık Örgütü çevre kirliliği kaynaklı sorunların Avrupa'da tüm ölümlerin yaklaşık %20'sini oluşturduğunu tahmin etmektedir. Bu anlamda çevre, sağlığın en önemli belirleyicilerindendir denilebilir (WHO, 2019). Çevresel kirliliğinin insan sağlığı üzerindeki etkileri sebebiyle birçok ülkede çevrenin korunmasına yönelik adımlar atılmaktadır.

Türkiye son yirmi yılda hızlı bir ekonomik büyüme ve kalkınma süreci yaşamıştır. Bu hızlı ekonomik büyüme ve sanayileşme süreci çevre ve doğal kaynaklar üzerinde önemli bir baskı oluşturmuştur. Ekonomik büyüme sürecinde çevrenin ihmal edilmesi denizlerin ve nehirlerin kirlenmesine, toprak erozyonlarına ve hava kirliliğine neden olmaktadır. Çevresel tahribatlara bağlı olarak da ciddi sağlık sorunları ortaya çıkmaktadır. Örneğin şehirlerde ekonomik büyüme sonucu insanların zenginleşmesi araç sayısının artmasına, bu da egzoz emisyonları kaynaklı hava kirliliğine neden olmaktadır. Sanayileşmenin özellikle gelişmiş bölgelerde yoğunlaşması da sınai üretim kaynaklı kirliliğe yol açmaktadır. Türkiye'de hızlı kentleşmeye bağlı altyapı eksikliklerinin tamamlanması temel politika öncelikleri arasındadır. Bu sebeple çevrenin korunmasına yönelik politikalar zaman zaman bu önceliklerden sonra gelmektedir. Kamu harcamaları arasında her zaman için altyapıya yönelik harcamalar büyük yer kaplamıştır. Eğitim, sağlık ve ulaştırma harcamaları toplam kamu harcamaları içinde en yüksek paya sahip olmuşlardır. Öz gelirleri kısıtlı olduğundan harcamalarının finansmanı açısından merkezi yönetime büyük oranda bağlı olan Türkiye'deki belediyelerin çevre korumaya yönelik hizmetler konusunda önemli rol oynadıkları (Toprak, 2017; Yalçın & Gök, 2015) düşünülecek olursa bu harcamaların sürdürülebilir ve uzun vadede etkin bir biçimde gerçekleştirebilmeleri önünde önemli engeller bulunmaktadır.

Ekonomik gelişme ve sanayileşme ile çevreye yönelik olarak daha fazla önlem alınması gerektiği ise bir gerçektir. Konisky ve Woods (2012) çevre programlarını belirleyen, çevreye yönelik olarak alınacak önlemleri etkileyen temelde üç faktör olduğunu belirtmektedir. İlk olarak önemli çevresel sorunların yetkililer üzerinde politika üretme konusunda baskı yaratacağı söylenmektedir. Bu durum Arbolino vd. (2020) tarafından da vurgulanmaktadır. Onlara göre ise özellikle sanayileşen bölgelerde çevresel harcamaların arttırılması için ulusal ve yerel yönetimlere baskı uygulanmaktadır. Bu durum sanayileşmesi yüksek bölgelerde çevresel harcamaları artıran önemli bir etkendir. İkinci olarak, çevre politikaları uygulayan yerel idarelerin kurumsal ve mali kapasiteleri de farklılık göstermektedir. Daha zengin yerel idareler daha güçlü çevre programları üretmek için daha fazla mali kaynağa sahiptirler. Hızlı kentleşme ve artan sanayileşme bu kaynakların çevre konularında harcanması için yerel idareler üzerinde baskı oluşturmaktadır. Son olarak kamu çevre harcamaları kamu yöneticilerinin çevre ile nasıl ilgilendiklerini gösteren önemli bir

gösterge olduğundan (Broietti et al., 2018) çevreye yönelik ilginin gelecekte artmasının belediyeler üzerindeki bu mali baskıyı daha da arttıracağı düşünülmektedir. Facchini vd. (2017) bunun nedenini çevresel bozulmanın bireylerin çevresel kaygılarını artıracağı, bunun da daha temiz bir çevre ve daha kabul edilebilir bir kirlilik seviyesi talebine yol açacağı şeklinde açıklamaktadırlar. Çevre harcamalarının yüksek olması belediyelerin bu baskılardan etkilenerek çevreye olan ilgisinin de yüksek olduğuna işaret etmektedir. Bu nedenle yerel idarelere yapılan bölgesel kamu çevre yatırımlarının incelenmesi oldukça önemli görülmüştür.

Çalışmanın katkısı şu şekilde özetlenebilir: İlk olarak, Türkiye için il belediyeleri düzeyinde seçilmiş çevre koruma harcamalarının mekânsal analizi yapılarak literatüre katkı sunulmaya çalışılmıştır. Belediyelerin çevre korumaya yönelik olarak almış oldukları kararların birbirlerine karşılıklı bağımlılığı olacağı düşüncesiyle çalışmada bu bölgesel bağımlılık etkilerini dikkate alan mekânsal ekonometrik yöntemler kullanılmıştır. Literatürde çevre koruma harcamalarını belediyeler ölçeğinde Türkiye açısından iller düzeyinde bütüncül bir açıdan ele alan herhangi bir çalışmaya rastlanmamıştır. Çevre koruma harcamalarının etkisini mekânsal bağımlılık ve mekânsal saçılım etkileri ile inceleyen bir çalışma da bulunmamaktadır. Farklı ülke örneklerine yönelik çalışmalar da nispeten yeni sayılırlar. Bu açıdan bu çalışma Pacheco vd. (2017) ile Broietti vd. (2018) tarafından da işaret edilen yerel çevresel harcamalar ile ilgili olarak Türkiye örneği ile literatürde yer alan bir boşluğu doldurmaktadır. Ayrıca yeni bir bakış açısı sağlaması ile de yerel politika yapıcılar için yol gösterici bir niteliğe de sahiptir. İkinci olarak bu çalışmada seçilen yöntem, Türkiye için il belediyeleri düzeyinde çevre koruma harcamaları üzerinde sanayileşme düzeyi başta olmak üzere çeşitli sosyoekonomik faktörlerin etkisinin hem illerin kendileri hem de bu illerin komşuları için incelenmesine imkân vermektedir. Böylece çevrenin korunmasına yönelik politika önerilerinde bulunulacaktır. Bu çalışma bu açıdan, yapılan analiz sonrasında daha temiz ve yaşanabilir bir çevre için belediyeler tarafından atılması gereken adımlara yönelik bir rehber olma amacı taşımaktadır.

Çalışma şu şekilde devam edecektir: İkinci bölümde literatür incelemesi yer alacaktır. Üçüncü bölümde faydalanılacak olan analiz yöntemleri incelenecektir. Dördüncü bölümde veri kaynakları, kullanılan değişkenler ve tahmin edilecek modeller tanıtılacaktır. Beşinci bölüm ise bu modellerin tahmin sonuçlarını kapsayacaktır. Çalışmanın son bölümünde ise tahmin sonuçları değerlendirilerek çevre korumaya yönelik politika önerileri üzerinde durulacaktır.

2. Literatür Taraması

1987 yılında Dünya Çevre ve Kalkınma Komisyonu tarafından hazırlanan Brundtland Raporu'nda sürdürülebilir kalkınma için "*Bugünün gereksinimlerini, gelecek kuşakların gereksinimlerini karşılama yeteneğinden ödün vermeden karşılayan kalkınma*" (World Commission on Environment and Development (WCED), 1987) şeklinde bir tanım kullanılmıştır. Bu tanıma bağlı olarak kalkınma ve çevre sorunlarını bir bütün olarak ele alan yaklaşımlar giderek artmıştır.

Konuya Maliye bilimi açısından yaklaşacak olursak, çevrenin korunması bir kamu malı olarak kabul edilebilir. Çevrenin korunması için yapılan harcamalar ortak bir fayda ve pozitif dışsallık sağlamaktadır ve bu harcamalardan bireylerin dışlanması da mümkün değildir. Çevre koruma harcamalarının bir kısmı yapıldığı bölge içinde fayda ve dışsallık sağlarken, karbon dioksit emisyonu gibi kirleticilerin kontrol edilmesinin bölge sınırları dışına taşan etkileri de söz konusudur. Ayrıca bu dışsallıkların gelecek kuşaklara da yayılacak olumlu etkilerinin olacağı da aşikârdır. İşte bu dışsallıklar sebebiyle çevrenin korunmasında piyasa etkin bir rol alamayacağı için devlete önemli görevler düşmektedir (Pearce & Palmer, 2001). Kamusal mal olma özelliği taşıması nedeniyle çevre korumaya yönelik olarak yapılan harcamaların gerçek fayda ve maliyetleri de tam olarak ortaya konulamamaktadır (Morgenstern et al., 2001).

Çevre kirliliği kamu sağlığı açısından önemli bir risk unsurudur. Dünya genelinde her yıl milyonlarca insan çevre kirliliğine bağlı hastalıklara yakalanmaktadır. Hızlı ekonomik büyüme ile birlikte özellikle sanayinin daha çok yoğunlaştığı, nüfusun daha fazla toplandığı bölgelerde çevre kirliliğine bağlı sorunlarda artış gözlenmektedir. Bu alandaki literatür çevre koruma harcamalarının bölgeler arasında farklılaştığını ortaya koymaktadır. Yerel ve bölgesel nitelikli analizler olsa da mekânsal etkileri dikkate alan çalışmalarda çevre koruma harcamaları açısından literatürde boşluk olduğu da dikkati çekmektedir. Paril vd. (2022) çevre korumanın yerel yönetimler için zaman ve mekânı da içeren çok boyutlu bir konu olduğunu belirterek çevre problemlerinin yayılma etkilerine vurgu yapmaktadırlar. Çevrenin korunması için temel bir önemi olan kamu çevre harcamalarının ulusal boyutunun sıklıkla tartışıldığını, ancak bölgesel, yerel ve belediye düzeyindeki incelemelerin nispeten az olduğunu belirtmektedirler.

Çevre politikaları, merkezi yönetim ve yerel yönetimler tarafından müştereken belirlenen politikalardır. Oates'ın (2001) belirttiği üzere yerel yönetimlerin çevreye yönelik politikalar uygulaması aynı zamanda bir "*çevresel federalizm*" örneğidir. Yerel yönetimler bölgelerinde yaşayan vatandaşların isteklerine uygun olarak çevreye yönelik politikalar gerçekleştirme konusunda daha etkin davranabilirler. Çevreye yönelik kaygıların ve daha iyi bir çevrede yaşamaya yönelik taleplerin artması yerel yönetimler üzerinde çevre için harcama yapılması yönündeki baskıyı da artırmaktadır (D'Uva, 2017).

İlk olarak Case vd.'nin (1993) yerel kamu harcama politikalarının mekânsal ilişkilerini ele almalarından sonra buna yönelik çalışmalar tüm dünyada artış göstermiştir. Sole-Olle (2006) toplam yerel harcama politikalarından kaynaklanan saçılım etkilerinin hesaplanması için bir çerçeve sunmuştur. Ancak çevre koruma harcamaları söz konusu olduğunda yerel düzeyde komşuluk ilişkilerini de dikkate alan daha az sayıda çalışma yapıldığı gözlenmektedir. Örneğin Çek Cumhuriyeti'nde yerel kamu harcamalarının mekânsal bağımlılığını analiz eden Šťastná (2009) çevre koruma harcamaları ile sanayi ve altyapı harcamaları için negatif bir mekânsal bağımlılık bulmuştur. Bu etkinin komşu yerel yönetimlerce yapılan harcamaların faydalarının diğer bölgelere yayıldığının ispatı olduğu belirtilmektedir. Yani saçılım etkisi komşu yerel yönetimlerin yapılan bu harcamalardan

olumlu etkilendiği yönündedir. Bu sayede harcamaların yüksek olduğu yerlere komşu idarelerin harcamalarının düşük olmasına neden olan bir dışsallık sağlanmaktadır.

Hızlı sanayileşen Çin, bu alanda yapılan çalışmaların en yoğun olduğu ülkeler arasındadır. Deng vd. (2012) 2005 yılı için 249 Çin şehrine yönelik olarak mekânsal bir analiz yapmışlardır. Bu çalışma Çin için yerel düzeyde çevre koruma harcamalarına yönelik ilk analizdir. Bulgularına göre Çin'de şehir yönetimleri komşularının çevre harcamalarını artırmalarına kendi harcamalarını azaltarak karşılık vermektedirler. Bu pozitif dışsallığın bir göstergesidir. Sosyal olarak optimal düzeyde çevre harcaması için üst katman yönetimlerin devreye girmesi gerektiği vurgulanmaktadır. Yine Çin'de 30 il yönetiminin çevre korumaya yönelik çabalarını inceleyen Jiang (2014) çevre koruma ile ilgili stratejik davranışları ortaya koymuştur. Modelinde içsellik ve mekânsal hata bağımlılığı etkilerini dikkate alabilmek için gecikmeli panel veri yaklaşımını kullanmıştır. Bu modelde, ildeki çıktı düzeyi, il nüfusu, ildeki katma değer, il yönetimlerinin genel bütçe gelirleri, ilin toplam ihracat ve ithalat düzeyi, ildeki enerji tüketimi, kentleşme, nüfus yoğunluğu, eğitim düzeyi gibi değişkenler kullanılmıştır. Sabit etkileri dikkate alan tahmin sonuçları Çin'de il yönetimlerinin çevre koruması açısından stratejik davrandıklarını ortaya koymaktadır. Yani Çin il yönetimleri diğer illerin çabalarına aynı düzeyde pozitif olarak karşılık vermektedirler. Bu da çevrenin korunması açısından saçılım etkilerinin doğal bir sonucudur.

López vd. (2017) İspanya'da 2010-2012 yıllarında 5.000 ve üzerinde kişinin yaşadığı bölge belediyeleri için tüm kamu harcamalarının mekânsal saçılım etkilerini analiz etmişlerdir. Analizlerinde çevre harcamalarının yanı sıra belediyelerin güvenlik, konut, refah, sosyal hizmet, istihdamın teşvik edilmesi, sağlık, eğitim, kültür ve spor alanlarına yönelik harcamaları da ele alınmıştır. Sonuçları yerel yönetimlerin harcamalar açısından İspanya özelinde komşularının nüfus yapısı ve ekonomik faktörler gibi özelliklerinden etkilendiklerini göstermektedir. Bu etki alt harcama grupları için de geçerlidir. Bu durum mekânsal saçılım etkilerinin İspanya için de geçerli olduğuna işaret etmektedir. İspanya'da bölgesel ve ulusal çevre politikalarının ilişkisini analiz eden Fernandez (2018) ise *"yeşil bütçeleme"* kavramına yeni bir yaklaşım getirmektedir. Avrupa Birliği'nden İspanya'nın aldığı çevresel fonların verimli bir şekilde kullanılmadığı ve çevresel konuların tam olarak mali sisteme entegre edilemediğini belirtmektedir. Zaten İspanya için çevre harcamalarının toplam bütçe içinde çok fazla bir yer kaplamadığını vurgulamaktadır. Yapılan tahminler ulusal düzeyde anlamlı bir sonuç ortaya koyamasa da bölgesel düzeyde çevre politikaları anlamlı sonuçlar üretmişlerdir. Genel olarak altyapı sorunları ve yüksek işsizlik düzeyinin İspanya'da bütüncül bir kamu çevre politikası oluşturulmasını engellediği belirtilmektedir.

İtalya'da yerel meclislerin kamu harcamaları kararlarının birbirine olan karşılıklı bağımlılığını mekânsal ekonometri ile inceleyen Ermini ve Santolini (2010) hem toplam harcamalar hem de alt düzey harcamalar için anlamlı pozitif ilişkiler bulmuşlardır. İdareler arasındaki yatay düzeydeki bu ilişkinin göreli rekabet hipotezinin geçersizliğini gösterdiğini belirtmektedirler. Onlara göre yerel meclisler arası ortaklık kurulması mali açıdan etkinlik sağlayacaktır. D'Uva (2017) ise İtalya'da bölge düzeyinde 2001-2014 döneminde nüfus ve sanayi gruplaşmasının yerel çevre koruma harcamaları üzerindeki etkisini Blundell-Bond

modeli ile incelemiştir. Sonuçları nüfus baskısının ve sanayinin çevre harcamaları üzerindeki etkisini kanıtlamaktadır. Broietti vd. (2018) ise 2012-2016 yıllarında 4.269 Brezilya yerel belediyesinin çevresel harcamalarının belirleyicilerini panel veri yöntemleri ile analiz etmişlerdir. Sonuçlarına göre Kuzey bölgelerinde yer alan belediyeler çevre harcamaları açısından toplam harcamalara göre ortalama olarak en yüksek değerlere sahiptirler. Çalışmalarının yerel yönetimlerin çevre harcamalarında şeffaflığın ve çevreye yönelik ilginin artmasına katkıda bulunmasını umduklarını belirtmektedirler.

Çin için Wu vd. (2019) tarafından yapılan başka bir çalışmada ise 2001-2014 dönemi analiz edilirken Mekânsal Durbin Modeli kullanılmıştır. Değişkenleri enerji tüketimi, doğrudan yabancı yatırımlar ve kentleşmedir. Temel açıklayıcı değişken ise çevre koruma harcamalarının bir göstergesi niteliğindeki çevresel düzenlemelerdir. Yine hava kirliliğinin kontrolü için mekânsal bağımlılık etkilerinin varlığı ispatlanmıştır. Bir ilde çevresel düzenlemelerin artması başka bir ildeki hava kirliliğini azaltmaktadır. Bu da il idarelerinin çevresel düzenlemeler açısından stratejik bir ilişki içinde olduklarını göstermektedir. Pozitif dışsallıklardan faydalanmak isteyen idareler kendi kontrollerini azaltma yönünde hareket edebilmektedirler. Bu da yerelleşme yolunda atılan adımları Çin'de kirliliği artıran bir faktör haline getirmektedir.

3. Yöntem

Elhorst (2001) ile Lesage ve Pace (2009) mekânsal bağımlılık ve heterojenlik durumlarında bunları göz önüne almamanın sapmalı tahminlere neden olabileceğini göstermişlerdir. Bu sebeple mekânsal ekonometri modelleri bu ilişkiler altında ampirik çalışmalarda sıklıkla tercih edilmektedir. Bölgeler arası bağımlılık ilişkilerinin araştırılması mekânsal ekonometrinin temel inceleme alanıdır. Bu incelemelerin konusunu bir ülke içinde iller arası ilişkiler oluşturabileceği gibi küresel ölçekte ülkeler arası ilişkiler de oluşturabilir. Bölgesel ekonomi, ekonomideki mekân, mesafe ve bölgesel farklılıklar ile ilgilenmektedir ve bölgeler arasındaki ekonomik performans farklılıklarının nedenleri ve bunlarla ilgili olarak uygulanan politikalar incelenmektedir. Mekânsal bağımlılık ise bu ekonomik bölgelerin çeşitli nitelikleri ile coğrafi uzayda ortaya çıkan doğal bir durumdur. Bu bölgesel özellikler mekânsal modellerde incelenen bölgesel nitelikli verilerin içinde yer almaktadır (Haining, 2004: 24). Bizim örneğimizde bölgelerin farklı ekonomik, demografik ve coğrafi özellikleri farklı düzeyde çevre koruma harcamalarına neden olmaktadır. Bunun temeli Tobler' in (1970) hiçbir bölgenin izole veya başka bir ifadeyle yalıtılmış olmadığı ve bu nedenle birbiri ile bağlantılı olduğu görüşüne dayanmaktadır. Coğrafi olarak birbirine komşu ya da yakın gözlemlerin birbirinden uzak gözlemelere göre daha benzer olma eğilimleri mekânsal veri analizinin rolünü ortaya koymaktadır. Bu sebeple Haining (2004) ve Getis (2007) başta çevresel ve kentsel konularda olmak üzere tüm sosyal bilim alanlarında mekânsal etkilerin analiz edilmesinin ve mekânsal otokorelasyonun incelenmesinin önemine dikkat çekmektedir. Ayrıca Haining'e (2004) göre belli tematik alanlarda bu konunun vurgulanması bu alanların önüne coğrafi, mekânsal, çevresel veya bölgesel gibi tanımlar ilave edilerek ortaya konulmaktadır. Bu tematik konularda bu nedenle yer ve mekân etkilerinden ve ilişkilerinden faydalanılmaktadır. Bu mekânsal ilişkiler bağımlı değişken ile

ifade ediliyorsa mekânsal bağımlılık, ilişkili fakat modelden dışlanmış değişkenler yer alıyorsa mekânsal heterojenlik söz konusudur (Anselin & Florax, 1995; Anselin & Rey, 1991; De Graaff et al., 2001).

Mekânsal modeller birimler arasındaki bağımlılık ilişkilerini tanımlamak için konum (komşuluk ilişkileri) ya da mesafeye dayalı veriler üretmektedirler. Mekânsal ilişkileri inceleyen herhangi bir mekânsal modelin uygulamasındaki ilk yapılması gereken bu mekânların seçimidir (Conley & Molinari, 2007). Mekânsal analizlerde bu ilişkiler için W ile temsil edilen mekânsal ağırlık matrisleri kullanılmaktadır. Lesage ve Pace (2014) ağırlık matrislerini bu yaklaşımın "en büyük efsanesi" olarak görmektedir. Bu matrislerden komşuluk matrisi iki bölgenin birbirlerine sınır komşusu olmalarını ifade eder. Paylaşılan sınırın biçimine göre bu komşuluk çeşitli şekiller alabilmektedir. Burada komşuluk ikili şekildedir. Bölgeler komşu ise $w_{ij} = 1$, değilse de 0 değerini alacaktır. Ayrıca kendi kendine komşu olunamayacağından matrislerde köşegen elemanları da sıfır olur. Uzaklık matrisi ise iki bölgenin arasındaki mesafeyi ölçmektedir (Anselin & Bera, 1998). Mekânsal ağırlık matrislerinin seçimi mekânsal dağılımda yüksek derecede heterojenlik olduğunda oldukça kritik hale gelmektedir. Bu nedenle pratikte mekânsal ağırlık matrislerinin hangisini doğru olacağına yönelik seçim için bir yöntem bulunmamaktadır (Anselin, 2002). Mekânsal etkileri dikkate almak için ağırlık matrislerini dâhil ederek kurgulanan mekânsal ekonometri modeli regresyon biçiminde ifade edilebilir:

$$y = \rho W_1 y + W_2 Z \gamma + X\beta + \epsilon, \quad \epsilon = \lambda W_3 \epsilon + \mu \tag{1}$$

1 numaralı denklemde y içsel değişkenler vektörü, X ise dışsal değişkenler matrisidir. ρ, γ, β, λ parametre vektörleridir. μ ise normal dağılıma sahip hata terimleri vektörüdür. W1, W2 ve W3 denk varsayılan ağırlık matrislerdir. Ağırlık matrisleri kullanılırken analizlerde genellikle satır standartlaştırması yapılmaktadır. Satır standartlaştırmasında matristeki hücreler hücrenin bulunduğu satırın toplamına $(w_{ij}/\sum_i w_{ij})$ bölünmektedir. Bu uygulama matristeki tüm satırların toplamlarını bire eşit hale getirir. Anselin'e (1988, 1992) göre bu mekânsal ekonometride "standart" bir uygulamadır. Mekânsal analiz sonuçları ρ, γ, λ parametreleri ile ortaya konmaktadır. X ve Z dışsal değişkenler kümesidir. ρ=γ=λ=0 eşitliği gerçekleşirse model çok 2 numaralı denklemde gösterilen çok değişkenli regresyon modeli haline gelecektir:

$$y = X\beta + \mu \tag{2}$$

Lesage ve Pace (2009) Mekânsal Durbin Modeli (SDM) en etkin model olarak kabul etmektedirler. 3 numaralı denklem ile gösterilen Durbin modelde $\rho W_1 y$ mekânsal gecikmeli bağımlı değişken, (Xβ) açıklayıcı değişkenler vektörü ve $\gamma W_2 Z$ ise mekânsal gecikmeli açıklayıcı değişkeni gösterir. Burada mekânsal bağımlılığa sahip bir hata teriminin varlığı (λ=0) araştırılmaktadır:

$$y = \rho W_1 y + \gamma W_2 Z + X\beta + \mu$$

$$\mu \sim N(0, \sigma^2 I) \tag{3}$$

Anselin (Anselin, 1988) tarafından Mekânsal Durbin Modeli' nin çeşitli kısıtlamalar altında diğer mekânsal modellere göre daha etkin sonuçlar verdiğini ifade etmektedirler. Elhorst (2010) da bu modelin mekânsal ilişkileri elde etme konusunda en verimli yöntem olduğunu vurgulamaktadır. Lesage ve Pace (2009) bu model ile birlikte küresel ve yerel ilişkilerin bir arada elde edilebileceğini belirtmektedirler. Küresel ilişkilerde bir bölgedeki bir değişkendeki değişikliklerin komşulara, komşuların komşularına vd. etkisi yayılırken, yerel ilişkilerde ise komşulara etki söz konusu iken komşuların komşularına etki yayılmadan ortadan kalkmaktadır. Geri bildirim etkileri bu küresel yayılmalar ile ortaya çıkmaktadır (LeSage & Pace, 2013: 1551). Bu model bağımlı ve bağımsız değişkenler üzerinde mekânsal bir gecikme içerdiğinden farklı değişkenlerden kaynaklanan dışsallık ve saçılım etkilerinin elde edilebilmesini sağlamaktadır (Anselin, 1988). Bu nedenle bölgesel çalışmalarda oldukça yaygın olarak kullanılmaktadır. Mekânsal Durbin Model ile mekânsal olarak gecikmeli bozulmalara sahip modeller arasında ayrım yapılabilmekte, mekânsal dışsallıkların ve şokların etkileri yorumlanabilmektedir (Beer & Riedl, 2012).

4. Veri Seti ve Model

Çalışmada 2007-2016 yılları arasında Türkiye'de belediyelerin çevre koruma harcamaları iller düzeyinde incelenmiştir. Bu amaçla İstatistiki Bölge Birimleri Sınıflaması 3. Düzey (NUTS 3) olan 81 il bazında veriler elde edilmiş ve 10 yıl için dengeli panel veri modelleri kurulmuştur. Bu modellerin kurulmasındaki temel motivasyon Türkiye'de belediyelerin çevre koruma harcamalarında bölgesel farklılıklar olup olmadığını ve bunun farklı değişkenler ile ilgisini test etmektir. Kullanılan değişkenler Türkiye İstatistik Kurumu Merkezi Dağıtım Sistemi (TÜİK, 2020b) ve Bölgesel Göstergeler (TÜİK, 2020a) veri tabanlarından elde edilmiştir. Analizde kullanılan değişkenlere ait tanımlayıcı istatistikler Tablo 1'de verilmektedir.

Tablo: 1
Betimleyici İstatistikler (Gözlem Sayısı: 810)

Değişkenler	Kısaltma	Ortalama	Standart Sapma	Minimum	Maksimum
Çevre Koruma Harcamaları	reeltotselenvexptopop	75.178	50.462	2.747	324.114
Çevre Gelirleri	reeltotselenvrevtopop	42.551	44.086	1.011	381.920
Yüzölçümü	acre	9501.284	6310.822	847.000	38873.000
Nüfus Yoğunluğu	popdens	118.758	292.045	10.000	2849.000
Kişi Başı Gelir	gdppcap	15808.780	7804.422	3662.000	54933.000
Sanayinin Elektrik Tüketimi	induseleccon	1088032.000	1924650.000	283.000	11065915

Çalışmada ampirik düzeyde faydalanılacak modelin temel spesifikasyonu 4 no'lu denklemde gösterilmektedir. Çalışmada bağımlı değişken olarak il belediyelerine ait verilerle kişi başı çevre koruma harcamaları kullanılmıştır. Modelde t-zaman i-bölge göstergesi ve ε ise hata terimini ifade etmektedir. Model il belediyelerinin komşu illerden etkilendikleri düşüncesiyle mekânsal ekonometriye uygun hale getirilerek tahmin edilmektedir. Modellerde çevre koruma harcamaları ve çevre gelirleri ait olduğu ilin nüfusuna bölünerek ve 2009 yılına göre deflate edilerek kişi başı olarak kullanılmaktadır. 2009 yılının seçilmesinin sebebi kişi başı gelir değişkeninin TÜİK tarafından 2009 bazlı olarak sunulmasıdır. Yerel yönetimlerin çevreye verdikleri önemin etkisini görmek için de

Zhao vd.'ne (2022) benzer şekilde bu değişkenlerin doğal logaritmaları da alınmaktadır. Nüfus yoğunluğu, kişi başı gelir, yüzölçümü ve sanayi elektrik tüketimi değişkenleri de doğal logaritmaları alınarak kullanılmışlardır. Aynı zamanda zamana bağlı değişikliklerin etkisi de hesaba katılmak istendiğinden yıllara göre sabit etkiler de modelde varsayılmaktadır.

$$lnreeltotselnvexptopop_{it} = \alpha_0 + \alpha_1 lnreeltotselnvrevtopop_{it} + \alpha_2 lnacre_{it} + \alpha_3 lnpopdens_{it} + \alpha_4 lngdppcap_{it} + \alpha_4 lninduseleccon_{it} + \epsilon_{it} \tag{4}$$

Tablo 1'de yer alan kişi başı çevre koruma harcamaları değişkeni bağımlı değişken olarak modelde yer almaktadır. Bu değişken Türkiye'de il düzeyinde belediyeler için olmak üzere TÜİK Merkezi Dağıtım Sistemi Kamu Sektörü Çevresel Harcama İstatistikleri'nden (TÜİK, 2020b) elde edilmiştir. Bu harcamalar, belediyelerin çeşitli isimler altında yaptıkları çevre harcamalarından oluşur[1]. Örneğin analiz döneminde ortalama olarak belediyeler düzeyinde kişi başı 75.178 TL çevre koruma harcaması yapılmıştır. En az harcama 2012 yılında Bingöl'e, en çok harcama ise 2016 yılında Denizli'ye aittir.

Bağımsız değişken olarak modele dâhil edilen çevre gelirleri ise yine belediyeler düzeyinde çevresel anlamda elde edilen tüm gelirlerin toplamının ait olduğu ilin nüfusuna oranıdır. Kamu sektörü çevre koruma harcamaları bu gelir kalemleri dikkate alınarak seçilmişlerdir. Belediye çevre gelirleri "Atık su Yönetimi Hizmetleri", "Atık Yönetimi Hizmetleri", "Sınıflandırmaya Girmeyen Çevre Koruma Hizmetleri" ve "Su Temini İşleri ve Hizmetleri'nden" elde edilen gelirleri kapsamaktadır. Bu gelirler TÜİK açıklamasına göre çevre temizlik vergisi, çevre ve temizlik vergisinden alınan paylar, kaynak suları harcı, kanalizasyon ve su tesisleri harcamalarına katılma payları ile diğer çevresel gelirleri ifade etmektedir. TÜİK tarafından çevresel harcama ve çevresel gelir istatistikleri 2007-2010 ve 2012-2016 yıllarına ait olarak yayınlanmıştır ve de güncellenmemektedir. Bu nedenle çalışmamızda 2016 yılına kadar verilerle analiz yapılmıştır. Ayrıca bu değişkenlerde 2011 yılına ait eksik veriler için ise Wu vd. (2019), Huang vd. (2020) ve Yang vd. (2022) takip edilerek doğrusal enterpolasyon yöntemi kullanılmıştır. Bu değişken için de en düşük gelir 2016 yılında Şırnak'a ait iken en yüksek gelir ise 2009 yılında Mersin'e aittir. Ortalama olarak ise Türkiye'de belediyelerce 2007-2016 yılları için yıllık 42.551 TL kişi başı çevre geliri elde edilmektedir.

Yüzölçümü değişkeni literatür takip edilerek (Broietti et al., 2018) modele dahil edilmiştir. Nüfus yoğunluğu değişkeni il düzeyinde kilometrekareye düşen kişi sayısını vermektedir. Bu hesaplamada göl hariç alanların kullanılması tercih edilmiştir. Daha yoğun büyük alana sahip ve daha yoğun nüfusun yaşadığı bölgelerde daha fazla çevre koruma harcaması yapılması beklenmektedir. Analiz döneminde illerde kilometrekare başına

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[1] *Atık su Yönetimi Hizmetleri ve Cari Harcama, Atık su Yönetimi Hizmetleri ve Yatırım Harcaması, Atık Yönetimi Hizmetleri ve Cari Harcama, Atık Yönetimi Hizmetleri ve Yatırım Harcaması, Sınıflandırmaya Girmeyen Çevre Koruma Hizmetleri ve Cari Harcama, Sınıflandırmaya Girmeyen Çevre Koruma Hizmetleri ve Yatırım Harcaması, Su Temini İşleri ve Hizmetleri ve Cari Harcama, Su Temini İşleri ve Hizmetleri ve Yatırım Harcaması.*

ortalama 118.758 kişi yaşamaktadır. Nüfus yoğunluğu açısından iller arasında önemli farklılıklar bulunmaktadır. Örneğin Tunceli'de analiz döneminde kilometrekareye düşen insan sayısı ortalama 11.30 iken, bu rakam İstanbul için 2635.10'dur. Çalışmamızda yer alan gayrisafi yurtiçi hâsıla verisi 1000 TL cinsinden ifade edilmektedir. Bu değişken yine TÜİK Bölgesel Göstergeler veri tabanında yer almaktadır. Çalışmamızda yer alan son değişken ise yine TÜİK Bölgesel Göstergeler veri tabanından elde edilen sanayi işletmelerinin toplam elektrik tüketimidir. Bu değişken modele illerde sanayinin büyüklüğünün bir temsilcisi olarak ilave edilmiştir.

5. Analiz Sonuçları

Mekânsal analizler mekânsal otokorelasyon ölçümü için kullanılan Moran's I endeksi ile başlamaktadır. Moran's I ölçümü gözlem vektörü x ile bu x değerlerinin komşu değerlerinin mekânsal ağırlıklı ortalamaları vektörünü ifade eden mekânsal ağırlık matrisi (Wx) arasındaki ilişkiyi ölçmektedir. Pozitif ve istatistiki olarak anlamlı Moran's I değerleri mekânsal kümelenme; negatif ve istatistiki olarak anlamlı Moran's I değerleri ise mekânsal saçılım göstermektedir Moran's I endeksinin 0 değerini alması ise mekânsal otokorelasyon olmadığını gösterir (Anselin & Florax, 1995; Gallo & Ertur, 2003). Çevre koruma harcamaları için mekânsal bağımlılık ilişkileri hem her yıl için hem de ortalama olarak teste tabi tutulmuş ve Tablo 2'de rapor edilmiştir. Tablo 2'de görüldüğü üzere Moran's I endeksi pozitif ve istatistiki olarak anlamlıdır. Bunun anlamı kişi başı çevre koruma harcamalarının anlamlı pozitif mekânsal otokorelasyon göstermesidir. Bu sonuç analize mekânsal ekonometri yöntemleri ile devam edilmesine işaret etmektedir.

Tablo: 2
Belediyelerin Çevre Koruma Harcamalarına Ait Moran's I Değerleri

Dönem	I	z	P değeri
2007	0.198	2.948	0.002
2008	0.214	3.167	0.001
2009	0.141	2.141	0.016
2010	0.127	1.951	0.026
2011	0.156	2.369	0.009
2012	0.139	2.188	0.014
2013	0.260	3.773	0.000
2014	0.241	3.562	0.000
2015	0.250	3.637	0.000
2016	0.338	4.848	0.000
2007-2016 Ortalama	0.280	4.078	0.000

Not: Moran's I analizinde kullanılan mekânsal ağırlık matrisleri mekânsal analizlerde yaygın olarak uygulanan vezir komşuluğuna dayanmaktadır ve bu matrislerde satır standartlaştırması yapılmıştır.

Tahmin aşamasına geçilmeden önce bağımlı değişkenin mekânsal bir örüntü gösterip göstermediğine yönelik bir analizde de bulunulacaktır. Bu analizin Moran's I analizini desteklemesi beklenmektedir. Bu nedenle yapılan analizde Şekil 1'in a kısmında yer alan haritada kişi başı çevre koruma harcamaları 2007-2016 ortalaması olarak doğal logaritması alınarak verilmektedir. Bu harita incelendiğinde İstanbul, Ankara, İzmir ve çevresinde beklentiler ölçüsünde harcamaların yoğunlaştığı görülmektedir. Türkiye için önemli bir özellik olan doğu-batı bölgeleri arasındaki ekonomik farklılıklar çevre koruma harcamaları için de geçerliliğini korumaktadır. Şekil 1'in b kısmında yine 2007-2016 ortalaması olarak

ve doğal logaritması ile Moran's I kesit diyagram ve c kısmında ise yerel Moran's I LISA haritaları gösterilmiştir. Moran's I kesit diyagramları Tablo 2'de yer alan Moran's I sonuçlarının işaret ettiği pozitif mekânsal ilişkiyi kesit diyagram olarak da ortaya koymaktadır. Bu diyagramlar mekânsal bağımlılıktan aykırı noktaları temsil etmektedir (Anselin, 1995; 1996). Moran kesit diyagram açısından en sağ uçta yer alan il beklenildiği gibi İstanbul ve çevresindeki Kocaeli, en sol alt uçta yer alan il ise Bingöl'dür. Sağ üst bölge çevre koruma harcamaları açısından yüksek değerlerin bir arada yer alarak yoğunlaşmasını göstermekte iken, sol alt bölge ise düşük değerlerin bir arada toplandığına işaret etmektedir. Şekil 1'in c kısmında yer alan LISA dağılımı ise harcamalar açısından düşük-düşük ve düşük-yüksek bölgeleri harita üzerinde göstermektedir. Mekânsal yoğunlaşmanın anlamlılığı hakkında bilgi sağlayan "Mekânsal İlişkilerin Yerel Göstergeleri (LISA) testi" benzer değerlerin birlikte bulunarak pozitif otokorelasyon oluşturduğu veya benzemeyen değerlerin birlikte bulunarak yoğunlaştığı ve negatif otokorelasyon oluşturduğu anlamına gelmektedir (Anselin, 2003: 99-101).

Şekil: 1
Belediyelerin Kişi Başı Çevre Koruma Harcamalarının Mekânsal Dağılımı, Kesit Diyagramı ve Lisa Dağılımı
a. Belediyelerin Kişi Başı Çevre Koruma Harcamalarının Mekânsal Dağılımı

b. Belediyelerin Kişi Başı Çevre Koruma Harcamalarının Moran Kesit Diyagramı
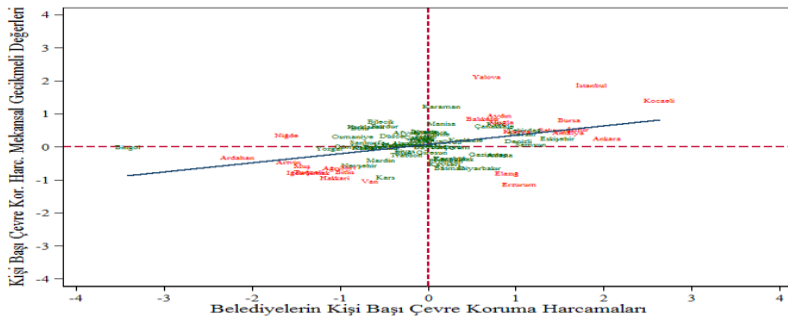
c. Belediyelerin Kişi Başı Çevre Koruma Harcamalarının Lisa Dağılımı

Belediyelerin Kişi Başı Çevre Koruma Harcamaları
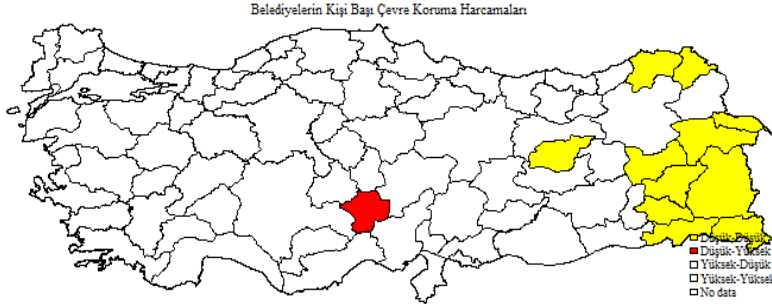
Not: Moran's I ve LISA analizlerinde kullanılan mekânsal ağırlık matrisleri mekânsal analizlerde yaygın olarak uygulanan vezir komşuluğuna dayanmaktadır ve bu matrislerde satır standartlaştırması yapılmıştır.
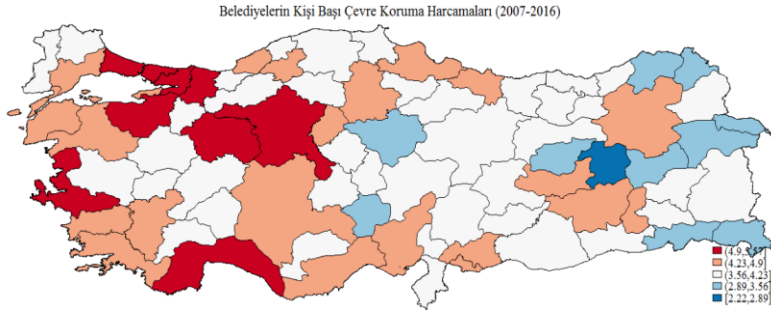
Ön analiz sonuçları mekânsal analiz kullanılması gerektiğini gösterdiğinden Lesage ve Pace (2009), Anselin (1988) ve Elhorst (2010) ile Wu vd. (2019) takip edilerek analize mekânsal ekonometri yöntemlerinden Mekânsal Durbin Model ile devam edilmiştir. Bunun nedeni çalışmada ana katsayı sonuçlarına ek olarak doğrudan, dolaylı ve toplam mekânsal etkilerin de görülmek istenmesidir. Bu sayede Lesage ve Pace'in (2009, 2013) belirttiği gibi yerel ve küresel mekânsal ilişkiler bütüncül bir şekilde elde edilebilecektir. Zaten Getis (2007) de bölgesel veriler ile çalışılıyorsa ve birimler arasında mekânsal bağımlılık söz konusu ise sapmalı sonuçlardan kaçınmak için mekânsal modellerin tercih edilmesini önermektedir. Çalışmada bulguların sağlamlığını sınamak için alternatif olarak Mekânsal Hata Modeli ve Mekânsal olmayan Havuzlanmış En Küçük Kareler modeli de tahmin edilmiştir. Ayrıca ters uzaklık matrisi ile yapılan mekânsal modellerin tahmin sonuçları da Ek Tablo 1 ve Ek Tablo 2.'de yer almaktadır.

Mekânsal modelin seçimi için Akaike Bilgi Kriterleri (AIC) kullanılmaktadır. En küçük AIC değerine sahip olan modelin seçilmesi gerekmektedir. Bu şekilde Tablo 3'te AIC değerleri Mekânsal Durbin Model'in seçilmesi gerektiğini göstermektedir. Mekânsal modelin anlamlı olduğunu gösteren ρ katsayısı Mekânsal Durbin Modeli (SDM) için %1 düzeyinde anlamlı ve negatif etkiye sahiptir. Mekânsal Hata Modeli (SEM) ise %5 düzeyinde anlamlı ve yine negatif bir etkiye sahiptir. Bu negatif mekânsal ilişki bir ildeki kişi başı çevre koruma harcamasının komşu bölgeler üzerindeki olumsuz etkisini gösterir. Kişi başı çevre koruma harcamalarının Şekil 1a'da gösterildiği gibi İstanbul, Ankara ve İzmir gibi kentlerde yoğunlaşması Blanc-Brude vd. (2014) ile Kao ve Bera (2016) tarafından da gösterilen negatif mekânsal ilişkiye yol açmaktadır. Büyük şehirlerde yapılan kamu çevre harcamalarının yayılma etkisi bir tür bedavacılık problemine yol açmaktadır. Harcama olanakları daha kısıtlı olan diğer yerel yönetimler komşularının çevre koruma harcamalarındaki artışına karşılık olarak çevre harcamalarını azaltmaktadırlar (Deng et al., 2012).

Karbon emisyonlarının yayılımı ve hava kirliliği ülke içinde hatta ülkenin komşuları üzerinde etkilere sebep olmaktadır (Burnett et al., 2013). Komşu belediyelerin harcamaları

arasında ilişkinin olması Revelli (2002) ve Foucault vd. (2008) tarafından gösterilen bu ilişkiler ile de tutarlıdır. Bu aynı zamanda şehirler arasında karşılıklı bağımlılık olduğunun da bir göstergesidir. Brueckner'in (2003) ifade ettiği gibi bu negatif mekânsal bağımlılık bir belediyenin komşu belediyelerin bütçelerindeki farklılıklardan nasıl etkilendiğini gösterir. Bir belediye komşu belediyelerin çevreye yönelik harcamalarına bütçesindeki çeşitli düzenlemeler ile oldukça stratejik bir karşılık verebilmektedir (López et al., 2017). Belediyelerin kişi başı çevre gelirleri mekânsal olmayan model dâhil olmak üzere tüm modellerde kişi başı çevre koruma harcamaları üzerinde pozitif ve %1'de anlamlı etkilere sahiptir. Bu beklenen bir durumdur ve bir ölçüde kamu gelirleri ile kamu harcamaları arasındaki pozitif nedensellik ilişkisine işaret etmektedir (Akbulut & Yereli, 2016). Nüfus yoğunluğu açısından yine pozitif ve %1 düzeyinde anlamlı etki görülmektedir. Nüfusun yoğun olduğu bölgelerde kişi başı olarak daha fazla çevre harcaması yapılması ihtiyacı doğmaktadır. Kişi başı gelir de pozitif bir etkiye sahiptir. Yüzölçümü büyük bölgelerde de beklentiler ölçüsünde daha fazla kişi başı çevre koruma harcaması yapılması ihtiyacı ortaya çıkmaktadır. Bu değişken tüm modellerde %1'de anlamlı pozitif etkilere sahiptir.

Anahtar değişkenimiz açısından konuya bakılırsa; sanayi etkisini gösteren sanayi işletmelerinin elektrik tüketimi açısından pozitif ve anlamlı etkileri söz konusudur. Bu durum sanayinin çevre harcamaları üzerindeki baskıcı etkisini ortaya koyar. Nüfus yoğunluğu ile beraber düşünülürse nüfusun fazla, sanayileşmenin yüksek olduğu il belediyelerinin bu yoğunluğun ve baskının yarattığı çevre kirliliği ile mücadele edebilmek için çok daha fazla gelire sahip olmaları gerektiği açıktır. Sanayileşme sürecinin devam ettiği düşünülürse bu ihtiyaç gelecekte daha da şiddetlenecektir. Ancak Arbolino vd.'nin (2020) sanayileşmiş bölgelerde yüksek çevre harcaması yapılmasının bu bölgelerdeki kirliliklerin azaltılmasında etkisi olmayabileceği sonucu da göz önüne alınarak çevre politikalarının daha planlı yürütülmesi gerektiği düşünülmektedir. Örneğin çevre koruma harcamalarına yönelik planlar enerji verimliliği önlemleri ile birlikte ele alınmalıdır.

Tablo: 3
Mekânsal Olmayan ve Mekânsal Model Tahmin Sonuçları
(Bağımlı değişken: lnreeltotselenvexptopop)

	Havuzlanmış En Küçük Kareler (POLS)	Mekânsal Durbin Model (SDM)	Mekânsal Hata Modeli (SEM)
lnreeltotselenvrevtopop	0.156*** (0.020)	0.168*** (0.020)	0.151*** (0.020)
lninduseleccon	0.035** (0.015)	0.044*** (0.017)	0.028* (0.015)
lnpopdens	0.250*** (0.028)	0.239*** (0.032)	0.260*** (0.028)
lnacre	0.147*** (0.030)	0.126*** (0.036)	0.157*** (0.029)
lngdppcap	0.334*** (0.070)	0.244** (0.096)	0.364*** (0.067)
Wx			
lnreeltotselenvrevtopop	-	-0.015 (0.041)	-
lninduseleccon	-	-0.106*** (0.032)	-
lnpopdens	-	0.253*** (0.067)	-
lnacre	-	0.228*** (0.068)	-

lngdppcap	-	0.460*** (0.154)	-
ρ (rho)	-	-0.153*** (0.058)	-
lambda	-	-	-0.129** (0.058)
sigma2_e	-	0.195*** (0.010)	0.199*** (0.010)
Log likelihood		-488.2512	-496.9106
Gözlem Sayısı	810	810	810
R² (toplam)	0.536	0.531	0.526
Wald testi / Prob > F	-	38.59 Prob > chi2 = 0.0000	54.96 Prob > chi2 = 0.0000
Hausman χ2	-	23.57 Prob>=chi2 = 0.0147	11.98 Prob>=chi2 = 0.0624
AIC	-	1000.502	1007.821

Not: Tahminlerde kullanılan mekânsal ağırlık matrisleri vezir komşuluğuna dayanmaktadır ve bu matrislerde satır standartlaştırması yapılmıştır. ***, ** ve * %1, %5 ve %10'da istatistiki olarak anlamlılığı ifade etmektedir.

İlginç bir sonuç doğrudan, dolaylı ve toplam etkiler için ortaya çıkmaktadır. Mekânsal Durbin Modelinin tahmin modeli olarak tercih edilmesinin nedenlerinden birisi de zaten bu doğrudan ve dolaylı etkileri ayrıştırmaktır. Doğrudan etkiler, odaklanılan il belediyelerindeki kişi başı çevre koruma harcaması üzerindeki bağımsız değişkenlerden kaynaklanan etkiler iken, dolaylı etkiler ise o illerdeki çevre koruma harcamaları üzerinde komşu il belediyelerinin bağımsız değişkenlerindeki değişikliklerden kaynaklanan etkilerdir. Toplam etkiler ise bu iki etkinin toplamından oluşmaktadır (Lesage & Pace, 2009). Tablo 4 incelendiğinde tüm değişkenler açısından doğrudan etki katsayıları ana katsayı tahmininde olduğu gibi aynı işarete sahiptirler ve de kişi başı gelir hariç %1'de anlamlı etkilere sahiptirler. Kişi başı gelir doğrudan etki katsayısı ise %5'te anlamlı etkiye sahiptir. Aynı zamanda değişkenlerin tümünün doğrudan etki değerlerinin, katsayı tahminlerine oldukça yakın oldukları da gözlenmiştir. Bu durum yani doğrudan etki ile katsayı tahminleri arası farkın düşük olması geri bildirim etkilerinin ihmal edilebilir düzeyde olduğunu göstermektedir. Bu durum LeSage ve Pace'in (2013: 1551) ifade ettiği mekânsal yayılma etkilerinin yerel düzeyde kaldığına, yani küresel boyuta yani komşuların komşularına düşük seviyede etki ettiğine işaret etmektedir. Dolaylı etkiler ile elde edilen saçılım etkilerine bakıldığında ise çevre gelirleri anlamlı bir etkiye sahip değildir. Sanayileşme değişkeninin dolaylı etkileri ise %1'de anlamlı ve negatif bir etkiye sahiptir. Toplam etkiler açısından ise sanayi elektrik tüketimi %10'da negatif diğer değişkenler ise %1'de anlamlı ve pozitif etkilere sahip olmuşlardır.

Tablo: 4
Mekânsal Durbin Modeli Doğrudan, Dolaylı ve Toplam Etki Sonuçları

Katsayı	Doğrudan Etkiler	Dolaylı Etkiler	Toplam Etkiler
lnreeltotselenvrevtopop	0.170*** (0.021)	-0.035 (0.036)	0.135*** (0.037)
lninduseleccon	0.047*** (0.017)	-0.101*** (0.030)	-0.054* (0.029)
lnpopdens	0.236*** (0.032)	0.191*** (0.057)	0.427*** (0.052)
lnacre	0.119*** (0.037)	0.193*** (0.059)	0.312*** (0.052)
lngdppcap	0.228** (0.091)	0.381*** (0.137)	0.610*** (0.103)

Not: Tahminlerde kullanılan mekânsal ağırlık matrisleri vezir komşuluğuna dayanmaktadır ve bu matrislerde satır standartlaştırması yapılmıştır. ***, ** ve * %1, %5 ve %10'da istatistiki olarak anlamlılığı ifade etmektedir.

Doğrudan, dolaylı ve toplam etki sonuçları beraber değerlendirildiğinde, tüm sonuçlar sanayileşmenin yüksek oranda olduğu bölgeler ile çevrili bölgelerde çevre koruma harcamalarının da yüksek düzeyde olduğuna işaret etmektedir. Yani bir il belediyesi tarafından yapılan çevre koruma harcamasının hem yapıldığı il hem de bu ile komşu iller üzerinde sanayileşme ve nüfus yoğunluğu gibi faktörler açısından ortaya çıkan baskı nedeniyle önemli etkileri söz konusudur. Bu dışsallık etkisinin bir sonucudur ve sanayi kümelenmesinin yarattığı çevresel kirliliği azaltma açısından belediye harcamalarının etkin olduğunu göstermektedir. Bu durum çevre kirliliği ile mücadelede iller arası koordinasyonun önemine vurgu yapmaktadır. Çünkü bir il belediyesinin çevresel kirlilikle etkin mücadele edebilmesi için o ile komşu belediyeler ile ortak projeler gerçekleştirmesi gerekmektedir. Büyük metropollerde yoğunlaşan çevre harcamalarının negatif mekânsal ilişki yaratarak diğer bölgeleri olumsuz etkilemesinin önüne geçilecek şekilde çevre harcamalarının koordine edilmesi bu açıdan oldukça kritiktir.

6. Sonuç ve Politika Önerileri

Analiz sonuçları sanayileşme ile birlikte çevre korumaya yönelik harcamalardaki artışı açıkça ortaya koymaktadır. Sanayileşme düzeyi artan illerde yaşanan değişim her yönüyle komşu illerde de değişime yol açmaktadır. Sanayileşmeye bağlı olarak doğal çevrenin bu süreçten olumsuz olarak etkilendiği gerçeğinden hareketle doğal çevrenin korunmasına yönelik kamusal talebin arttığı söylenebilir. Bu talebe cevap verebilmek için yerel yönetimler kendi hizmet alanlarına uygun çevre koruma politikalarını belirleyecekler ve uygulayacaklardır. Bu açıdan çalışmamızın sonuçları şu şekilde özetlenebilir;

İlk olarak Türkiye'de belediyelerin çevre korumaya yönelik harcamaları üzerinde yapılan analizler bize göstermektedir ki, bu harcamalar sonucu elde edilen kamusal fayda komşu belediyelerin sorumluluk sahalarına kadar yayılan olumlu bir etkiye yol açmaktadır. Kirliliğin sınır aşan boyutunu dikkate aldığımızda bu tür harcamaların olumlu etkilerinin de sınır aşan düzeyde olması son derece doğaldır. Sanayileşen bölgelerde yaşayanların refah düzeyi artarken kötüleşen doğal çevre, sanayileşme sürecinde daha yavaş olan bölgelere de yayılmakta, bu bölgelerde yaşayanların refah düzeyi artmadan onların doğal çevrelerinin zarar görmesine yol açmaktadır. Dolayısıyla sanayileşmiş bölgelere komşu bölgelerin kaybı daha fazla olmaktadır. Bu kaybı telafi etmek için fazladan harcama yapılması gerekeceği için komşu bölgelerin bütçelerinde ekstra bir yük oluşacaktır. Olumsuz dışsallıkların bu karmaşık yapısı nedeniyle çoğu zaman doğal çevreyi korumaya yönelik politikalar merkezi yönetim tarafından koordine edilmekte ya da bizzat yürütülmektedir. Yerel yönetimlerin çevreye yönelik harcamalarında sürdürülebilir bir çevre yönetimi için ek kaynaklara ihtiyaç duydukları On Birinci Kalkınma Planı (2019-2023) Çevre ve Doğal Kaynakların Sürdürülebilir Yönetimi Çalışma Grubu Raporu'nda da (T.C. Kalkınma Bakanlığı, 2018) vurgulanmaktadır. Çevre politikalarında yerel düzeyde mekânsal ilişkilerin dikkate alınması gerektiği de ayrıca belirtilmektedir. Bölgesel özelliklerin dikkate alınarak politikalar geliştirilmesi ulusal düzeyde hedeflenen düşük karbon emisyonlu ekonomiye geçişte yerel yönetimlerin rolünü ve bu sebeple çevre harcamalarının artışını da beraberinde getirecektir.

İkinci olarak, kapsayıcı büyümenin belki de en can alıcı noktasını çevreye duyarlı büyüme stratejileri oluşturmaktadır. Çevreye rağmen büyüme stratejileri, çevresel tahribat ile sağlığın bozulması arasındaki ilişki yoğunlaştıkça yerini kapsayıcı büyüme anlayışına bırakmıştır. Kapsayıcı büyüme stratejilerinin özünde çevreye duyarlı büyüme önceliği ile birlikte yerel yönetimlerin idari ve mali yönden güçlendirilmesi tercihi yer almaktadır. Konuya bu bakış açısıyla yaklaşıldığında belediyelerin çevreye daha duyarlı büyüme stratejilerinin önemli bir paydaşı olacağı daha iyi anlaşılmakta ve kapsayıcı büyüme politikalarında belediyelere önemli sorumluluklar atfedilmektedir. Ancak bölgeler arası farklılıklar ve eşitsizlikler çevresel politikalarda ve düzenlemelerde verimsizliklere yol açan stratejik komşuluk ilişkilerine sahip olabilir. Bu politikalar kapsayıcı büyümeye de elverişli olmayabilirler (Ge et al., 2020). Bu nedenle belediyelerin kendi sorumluluk sahalarında daha rasyonel politikalar belirleyebilecekleri ve bölgesel düzeyde de komşu belediyeler ile ortak stratejiler geliştirebilecekleri bir anlayış çerçevesinde kapsayıcı büyüme önceliklerinin ortaya konulacağı bir orta vadeli program kapsamında çevre politikalarının oluşturulması kaynak kullanımında etkinliğin sağlanması açısından yerinde bir uygulama olarak düşünülebilir. Yerel istişare mekanizmalarının doğru planlanması ve işletilmesi hem bölgesel ölçekte sanayileşmenin koordine edilmesi hem de işbölümü ve uzmanlaşma stratejilerinin geliştirilmesi açısından daha faydalı sonuçlar üretebilecektir. Bu süreçte çevre ve sanayi ilişkileri de doğru kurgulanabilirse ulusal sağlık politikalarını destekleyecek daha akılcı stratejiler hayata geçirilebilecektir. Sonuç olarak bireysel ve toplumsal refah açısından müspet katkı sağlayacak uygulamaların anahtarı bu mekanizmaların kurulmasına ve işletilmesi bağlı bulunmaktadır.

Çalışmada belli kısıtlar da mevcuttur. Örneğin çevrenin korunmasına yönelik olarak merkezi yönetimin önemli miktarda harcamaları ve çabaları da söz konusudur. Çevre politikalarına karar verilirken merkezi yönetimin attığı adımların da ele alınması gerekmektedir. Aksi takdirde yerel politikaların ve yerel düzeyde çevreyi korumak için yapılan harcamaların etkisi sınırlı kalacaktır. Bu nedenle bölgesel ayrımı da olan merkezi yönetim verilerinin artması ile beraber bu alanda yapılacak çalışmalarda artış olacaktır. Bu da daha etkin çevre politika kararları için bir bilgi birikimi sağlayacaktır. Çevreye yönelik analizlerin artması, çevre açısından oluşabilecek riskli alanların belirlenmesi ile birlikte çevre politikalarının daha etkin ve kalkınma-çevre dengesini sağlayacak şekilde yürütülmesine olanak verecektir. Bu nedenle bu alanda yapılan çalışmaların artması gerektiği düşünülmektedir.

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Ekler

Ek Tablo: 1
Ters Uzaklık Matrisi ile Mekânsal Model Tahmin Sonuçları
(Bağımlı değişken: lnreeltotselenvexptopop)

	Mekânsal Durbin Model (SDM)	Mekânsal Hata Modeli (SEM)
lnreeltotselenvrevtopop	0.157***	0.148***
	(0.020)	(0.019)
lninduseleccon	0.040**	0.035***
	(0.016)	(0.013)
lnpopdens	0.264***	0.247***
	(0.029)	(0.026)
lnacre	0.127***	0.163***
	(0.032)	(0.028)
lngdppcap	0.279***	0.376***
	(0.084)	(0.059)
Wx		
lnreeltotselenvrevtopop	-0.124	-
	(0.219)	
lninduseleccon	0.120	-
	(0.139)	
lnpopdens	-0.071	-
	(0.296)	
lnacre	0.865***	-
	(0.321)	
lngdppcap	1.661***	-
	(0.495)	
ρ (rho)	-1.497***	-
	(0.267)	
lambda	-	-1.401***
		(0.267)
sigma2_e	0.183***	0.188***
	(0.009)	(0.010)
Log likelihood	-476.3526	-484.2693
Gözlem Sayısı	810	810
R² (toplam)	0.512	0.526
Wald testi / Prob > F	52.55	53.26
	Prob > chi2 = 0.0000	Prob > chi2 = 0.0000
Hausman χ2	54.64	37.27
	Prob>=chi2 = 0.0000	Prob>=chi2 = 0.0000
AIC	976.7053	982.5386

Not: Tahminlerde kullanılan mekânsal ağırlık matrisleri ters uzaklığa dayanmaktadır ve bu matrislerde satır standartlaştırması yapılmıştır. ***, ** ve * %1, %5 ve %10'da istatistiki olarak anlamlılığı ifade etmektedir.

Ek Tablo: 2
Ters Uzaklık Matrisi ile Mekânsal Durbin Modeli Doğrudan, Dolaylı ve Toplam Etki Sonuçları

Katsayı	Doğrudan Etkiler	Dolaylı Etkiler	Toplam Etkiler
lnreeltotselenvrevtopop	0.165***	-0.146	0.020
	(0.021)	(0.091)	(0.089)
lninduseleccon	0.038**	0.022	0.060
	(0.016)	(0.060)	(0.058)
lnpopdens	0.276***	-0.197*	0.079
	(0.029)	(0.116)	(0.113)
lnacre	0.114***	0.301**	0.414***
	(0.034)	(0.139)	(0.133)
lngdppcap	0.252***	0.532**	0.784***
	(0.084)	(0.226)	(0.192)

Not: Tahminlerde kullanılan mekânsal ağırlık matrisleri ters uzaklığa dayanmaktadır ve bu matrislerde satır standartlaştırması yapılmıştır. ***, ** ve * %1, %5 ve %10'da istatistiki olarak anlamlılığı ifade etmektedir.

Gelişmekte Olan Ülkelerde Kapalı Çember Teorisinin Test Edilmesi: Türkiye Üzerine Bir İnceleme (1980-2019)

İbrahim AYTEKİN (https://orcid.org/0000-0002-3574-1007), Bitlis Eren University, Türkiye; ibrahimaytekin63@gmail.com

Muhammed Veysel KAYA (https://orcid.org/0000-0001-9322-1694), Ankara Hacı Bayram Veli University, Türkiye; muhammed-kaya@hbv.edu.tr

Testing the Closed Circle Theory in Developing Countries: A Review on Turkey (1980-2019)

Abstract

This study aims to test whether the closed circle theory was valid in Turkey between 1980-2019. For this purpose, the autoregressive distributed lag-bound test approach analysed investment, savings, income, consumption, and productivity variables. Three models were established in the analysis. A cointegration relationship was found between the variables in the first model, in which investment was considered the dependent variable. Therefore, according to the first model, it was understood that the closed circle theory was not valid in Turkey, but no cointegration relationship was found between the variables in the second model, in which consumption was considered as the dependent variable, and the third model, in which productivity was regarded as the dependent variable. Therefore, according to the second and third models, it has been understood that the vicious circle of poverty is valid in Turkey.

Keywords : Closed Circle, Turkey, Investment, Savings, Income.

JEL Classification Codes : C32, E21, E22, I30.

Öz

Bu çalışmanın amacı; 1980-2019 yılları arasındaki dönem için Türkiye'de kapalı çember teorisinin geçerli olup olmadığının test edilmesidir. Bu amaçla çalışmada yatırım, tasarruf, gelir, tüketim ve verimlilik değişkenleri otoregresif dağıtılmış gecikme sınır testi yaklaşımıyla analiz edilmiştir. Yapılan analizde üç model kurulmuştur. Bağımlı değişken olarak yatırımın ele alındığı birinci modelde değişkenler arasında eşbütünleşme ilişkisine rastlanmıştır. Dolayısıyla birinci modele göre, Türkiye'de kapalı çember teorisinin geçerli olmadığı anlaşılmıştır fakat bağımlı değişken olarak tüketimin ele alındığı ikinci model ile bağımlı değişken olarak verimliliğin ele alındığı üçüncü modelde değişkenler arasında eşbütünleşme ilişkisine rastlanmamıştır. Dolayısıyla ikinci ve üçüncü modele göre Türkiye'de yoksulluk kısır döngüsünün geçerli olduğu anlaşılmıştır.

Anahtar Sözcükler : Kapalı Çember, Türkiye, Yatırım, Tasarruf, Gelir.

1. Giriş

Gelişmekte olan ülkelerin en önemli iktisadi özelliklerinden bir tanesi düşük bir gelir seviyesine sahip olmalarıdır. Bu ülkelerin düşük gelir seviyesine sahip olmaları ise bu ülkelerde tasarruf oranlarının düşük olmasına, bunun sonucunda da bu ülkelerde yatırımların ve beraberinde üretimin düşük seviyelerde kalmasına neden olmaktadır. Nurkse bu durumu "yoksul ülkeler yoksul oldukları için yoksuldurlar" şeklinde açıklamaktadır. Kalkınma literatüründe ise bu ifade "Yoksulluk Kısır Döngüsü" veya "Kapalı Çember Teorisi" olarak tanımlanmaktadır (Altunç & Almalı, 2016: 634). Nihayetinde yoksulluk kısır döngüsünün bileşenlerini oluşturan gelir, yatırım ve tasarruf değişkenleri birbirlerini önemli derecede etkileyebilen makro iktisadi göstergeler olmalarının yanında bir ülkenin kalkınmasında, iktisadi olarak büyümesinde ve dolayısıyla yoksullukla mücadelede önemli rollere sahiptirler.

Literatürde gerek Türkiye gerekse de diğer ülkeleri yoksulluk kısır döngüsü özelinde ele alan çalışma sayısı yok denecek kadar azdır. Ancak literatürde ağırlıklı olarak gelir, tasarruf, büyüme ve yatırım değişkenleri analiz edilmiştir. Bu bağlamda literatürde; Altunç & Almalı, (2016), Türkiye'de yoksulluk kısır döngüsünün kırılmasında kalkınma ajanslarının büyük bir katkısının olacağını, Li & Ma (2015), Çin'in kuzeybatı bölgesi üzerine yaptıkları analizde bu bölgede yoksulluk kısır döngüsünün geçerli olduğu yönünde sonuçlara ulaşmışlardır. Ayrıca literatürde; Katona (1949), Miller (1988), Baxter & Crucini (1993), Attanasio vd. (2000), Gökten vd. (2008), Mishra vd. (2010), Esso & Keho (2010), Göçer vd. (2013), Barış & Uzay (2015), Adelakun (2015), Şengür & Taban (2016) ve Aka & Arıcan (2019) tarafından yapılmış olan çalışmalarda ulaşılan genel sonuçlar; gelir, yatırım, tasarruf, iktisadi büyüme ve kalkınma değişkenleri arasında anlamlı ilişkilerin olduğu ve bu değişkenlerin birbirlerini etkiledikleri yönündedir. Literatürde yer alan bu çalışmalara yönelik detaylı bilgiler bu çalışmanın literatür incelemesi başlığı altında verilmiştir.

Bu çalışmanın amacı; Türkiye'de 1980-2019 dönemini kapsayan gelir, tasarruf, yatırım, tüketim ve verimlilik değişkenleri arasındaki ilişkiyi analiz edip, bu dönemde Türkiye'de yoksulluk kısır döngüsünün geçerli olup olmadığının test edilmesidir. Çalışmada yöntem olarak ekonometrik zaman serisi analiz yöntemlerinden olan otoregresif dağıtılmış gecikme (ARDL) sınır testi yaklaşımı kullanılmıştır. Yapılan analizde ulaşılan sonuçlar literatürde yer alan bazı çalışmaların sonuçlarını destekler nitelikteyken; bazı çalışmaların sonuçlarını desteklememektedir. Bu farklılıkların temel nedeni bu çalışmada kullanılan analiz yöntemi, analiz dönemi ve literatürde bu konuya yönelik ampirik çalışma sayısının sınırlı sayıda olmasıdır. Bu durum ise bu çalışmayı, literatürde yer alan çalışmalardan ayrıştırmakta ve literatüre bu yönden büyük katkı sunmasını sağlamaktadır.

Çalışmada ilk olarak kapalı çember teorisinin teorik temelleri üzerine kısaca değinilmiştir. Ardından literatürde bu konuya yönelik olarak yapılmış olan çalışmalar incelenmiştir. Literatür incelemesinin ardından analizde kullanılan veri setleri ile analiz modellerine yönelik metodoloji üzerinde durulmuştur. Metodolojiden sonra ekonometrik

analiz bulguları değerlendirilmiştir. Son olarak çalışmada elde edilen bulgular doğrultusunda sonuç ve değerlendirmeler yapılmıştır.

2. Kapalı Çember Teorisi

Yoksulluğun fazla olduğu ülkelerin önemli özelliklerinden bir tanesi de yoksulluk kısır döngüsü olarak ifade edilen düşük gelir tuzağında yer almalarıdır. Bu duruma bağlı olarak da tasarruflar ve talepler yeterli olmamakta, istihdam ve üretim için ihtiyaç duyulan yatırımlar yetersiz kalmaktadır. Bu ülkelerde yatırımların düşük seviyelerde olması ise sermaye birikiminin az olmasına neden olmaktadır. Sermaye birikiminin düşük seviyelerde olması ise mevcut fiziki ve beşerî sermaye kaynaklarının etkin bir şekilde kullanılmasına ve geliştirilmesine engel olmaktadır. Bunun sonucunda toplum iktisadi, sosyal, kültürel ve politik açıdan yeterli seviyede gelişim gösterememektedir. Nihayetinde ekonomi düşük verim ve gelir seviyelerinde kalarak kapalı bir çember sarmalında kalmaktadır (Altunç & Almalı, 2016: 636). Buradan hareketle Ragnar Nurkse tarafından geliştirilen "Kapalı Çember Kuramı" veya "Yoksulluk Kısır Döngüsü" bir ülke fakir olduğu için fakirdir tezine dayanmaktadır. Bu kurama göre bir ülke ekonomisinin gelişememesinin ya da geri kalmasının nedenini, o ülke ekonomisinin düşük gelir, düşük tasarruf ve düşük yatırıma sahip olmasından dolayı tekrarlayan düşük gelir seviyesinden kaynaklandığını açıklamaktadır (Nurkse, 1952: 571-583).

Kapalı çember kuramını destekleyen görüşlere göre yoksulluk temelde üç kısır çember yaratmaktadır. Bunlardan birincisi tasarruf ve yatırım ilişkisine aittir. Bir ülkede gelir düzeyinin düşük olması tasarrufun düşük seviyelerde gerçekleşmesine neden olurken, düşük tasarruf oranı da yatırımların düşük seviyelerde geçekleşmesine neden olur. Dolayısıyla düşük yatırım, gelir artışının da düşük seviyelerde kalmasına neden olmaktadır. İkinci kısır çember, talep ve yatırım ilişkisine yöneliktir. Yoksul ülkelerde gelir düzeyinin düşük olması, toplam talebin miktar ve çeşit bakımından sınırlı olmasına neden olur. Bu durumun ekonomide yer alan girişimcileri yatırıma sevk ve teşvik etme gibi bir özelliği bulunmamaktadır. Dolayısıyla yeterli olmayan talepler yatırımları sınırlı bir şekilde artıracak ve bu durum gelir seviyesinin de sınırlı bir şekilde artmasına neden olacaktır. Son olarak üçüncü kısır çember, gelir ve verimsizlik ilişkisine yöneliktir. Gelir düzeyi düşük olan ülkelerde insanlar yeteri kadar beslenemezler. İyi beslenemeyen emek gücünün çalışma verimi düşük seviyelerde kalır. Bu nedenle üretim istenilen seviyeye ulaşamaz ve ülke yine düşük gelir düzeyinde kalır (Solmaz, 2008). Kapalı çember kuramının özet niteliğindeki gösterimi Şekil 1'deki gibi görselleştirilebilir (Solmaz, 2008; Altunç & Almalı, 2016: 636);

Şekil 1, Nurkse tarafından geliştirilmiş olan kapalı çember kuramı (yoksulluk kısır döngüsü) olarak ifade edilmektedir. Nurkse'nin kapalı çember kuramına göre Şekil 1'de görüleceği üzere döngü bir noktadan başlar ve zorunlu olarak yine aynı noktaya döner (Altunç & Almalı, 2016: 636-637). Bu bağlamda Şekil 1'deki döngü şu şekilde işlemektedir; bireyler düşük bir gelir düzeyine sahiptirler ve bu nedenle bireyler birikim yapamazlar. Bireyler birikim (tasarruf) yapamadıkları için alım güçleri olmaz ve bu nedenle piyasada bir talep oluşturamazlar. Piyasada da artış yönlü bir talep oluşmayınca üreticiler üretim

kapasitelerini artıramadıkları gibi daha çok üretim yapmak için yeni yatırımlar yapmazlar. Yeni yatırımlar olmayınca veya yeni yatırımlar düşük düzeylerde kalınca yeni sermaye birikimi oluşmamakta ve sermaye birikimi yetersiz kalmaktadır. Bunların sonucunda ülkede üretim artışı olmayacak ve verimlilik düşük seviyelerde kalacaktır. Üretim ve verimlilik düşük seviyelerde kaldığı için de istihdam artmayacak ve çalışanların gelirleri düşük seviyelerde kalmaya devam edecektir (Öztürk & Öztürk, 2012: 44). Sonuç olarak Şekil 1'de görüleceği üzere düşük gelir düzeyiyle başlayan döngü tekrar düşük gelir düzeyine dönerek tamamlanmıştır.

Şekil: 1
Kapalı Çember Döngüsü
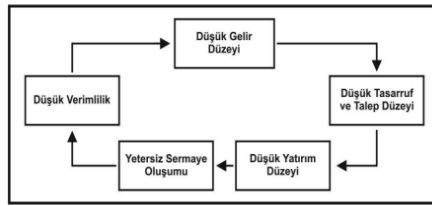
Kaynak: Solmaz, 2008; Altunç & Almalı, 2016.

3. Literatür Taraması

Yoksulluk kısır döngüsü yatırım, tasarruf ve gelir üzerinden kurgulandığı ve literatürde bu döngüyü bir ülke veya ülkelere uygulayan çalışmaların neredeyse yok denecek kadar az olmasından dolayı bu çalışmanın literatür incelemesi, ulaşılabilen yoksulluk kısır döngüsü çalışmalarının yanı sıra tasarruf, gelir, büyüme ve yatırımı ele alan çalışmalardan oluşmaktadır. Yapılan literatür incelemesi sonucunda literatürde yer alan çalışmaların farklı ve benzer sonuçlara ulaştıkları gözlemlenirken, bu çalışmalarda elde edilen bulgu ve sonuçlara detaylı olarak aşağıda yer verilmiştir.

Katona (1949), çalışmasında gelirde görülen bir düşüşün tasarruf edilen miktarı azalttığını, fakat gelirde düşüşün olacağı beklentisinin ise tasarruf edilen miktarı artırdığı sonucuna ulaşmıştır. Ayrıca gelirde görülen artışlar ve özellikle de büyük artışlar tasarruf edilen miktarın azalmasına neden olurken, bu durumun temel nedeni insanların mali durumlarının kalıcı olarak düzeldiğine inanmalarıdır.

Murthy & Pradesh (1981), çalışmalarında Almanya'nın 1960-1976 dönemini ele almışlardır. Ele alınan bu dönem için ulaşılan sonuçlar Almanya'da Engel Yasasının varsayımlarının geçerliliğini destekler niteliktedir.

Miller (1988), çalışmasında Amerika Birleşik Devletleri'nin (ABD) yatırım ve tasarruf değişkenlerini eşbütünleşme yöntemiyle analiz etmiştir. Yapılan analiz sonucunda ABD'de 1971 yılı öncesinde ulusal tasarruf ile yerli yatırımlar arasında eşbütünleşme ilişkisine rastlanırken, 1971'den sonrasında ise bu değişkenler arasında eşbütünleşme ilişkisine rastlanmamıştır.

Baxter & Crucini (1993), çalışmalarında 16 OECD ülkesinin yatırım ve tasarruf değişkenleri üzerine korelasyon analizi yapmışlardır. Analizde elde edilen bulgular, ulusal tasarruf ve yatırım oranları arasında pozitif yönlü bir korelasyon ilişkisinin olduğu yönündedir. Ayrıca ulaşılan sonuçlar tasarruf-yatırım korelasyonlarının daha büyük ülkeler için daha yüksek olduğu gerçeğiyle tutarlı çıkmıştır.

Attanasio vd. (2000), çalışmalarında 123 ülke ve 1961-1994 dönemini kapsayan tasarruf, yatırım ve büyüme değişkenleri arasındaki uzun ve kısa dönemli korelasyonların betimleyici bir analizini yapmışlardır. Çalışmada tasarruf ile yatırım oranları arasında pozitif yönlü bir ilişkiye rastlanırken, yatırım oranlarından büyümeye doğru negatif yönlü, büyümeden yatırımlara doğru ise pozitif yönlü bir nedensellik ilişkisine rastlanmıştır.

Gökten vd. (2008), çalışmalarında gelişmekte olan ülkeler ile Kırgızistan açısından tasarrufların iktisadi büyüme ve kalkınmayı destekleyecek nitelikteki yatırımlara dönüşmesinden banka ve piyasa bazlı olan, ayrıca paydaşları hukuki yönden destekleyen bir finansal sistemin son derece önemli olduğu sonucuna ulaşmışlardır.

Vergil & Abasız (2008), çalışmalarında Türkiye'nin 1968-2006 dönemi toplam faktör verimliliğinin tahmini ve toplam faktör verimliliğinin büyüme üzerine etkisi çerçevesinde incelemişlerdir. Ulaşılan sonuçlara göre Türkiye'de toplam faktör verimliliğinin büyümeyi pozitif yönde etkilediği tespit edilmiştir.

Mishra vd. (2010), çalışmalarında Hindistan'ın 1950-1951 ile 2008-2009 dönemlerinin yatırım ve tasarruf değişkenlerini eşbütünleşme ve nedensellik yöntemleriyle analiz etmişlerdir. Yaptıkları analiz sonucunda, Hindistan'da belirtilen dönemler arasında tasarruf ve yatırım değişkenleri arasında eşbütünleşme ile nedensellik ilişkisinin olduğunu tespit etmişlerdir.

Esso & Keho (2010), çalışmalarında Batı Afrika Ekonomik ve Parasal Birliği (UEMOA) üyesi yedi ülkenin tasarruf ve yatırım değişkenleri arasındaki ilişkiyi panel veri tahmin yöntemiyle incelemişlerdir. Yaptıkları panel veri incelemesinde; yedi ülkeden sadece Benin, Fildişi Sahili ve Nijer'de yatırımın yurtiçi tasarruflarla pozitif ilişkili olduğu gözlemlenirken, diğer dört ülke olan Burkina Faso, Mali, Senegal ve Togo içinse yatırım ile tasarruflar arasında bir ilişkiye rastlanmamıştır.

Göçer vd. (2013), OECD'nin 20 kurucu ülkesini ele aldıkları çalışmalarında, 1980-2012 dönemini kapsayan yatırım ve tasarruf verilerini kullanılarak bir panel veri analizi yapmışlardır. Yaptıkları analiz sonucunda bu ülkelerin birinde meydana gelen bir yatırım ya da tasarruf şokunun diğer 19 ülkeyi de etkilediği sonucuna ulaşmışlardır. Ayrıca kümülatif olarak bu ülkelerde yatırımların %27'sinin iç tasarruflarla finanse edildiği gözlemlenmiştir.

Altunöz (2014), çalışmasında Türkiye'nin 1987-2012 dönemi için tüketim ve gelir ilişkisini incelemiştir. Uzun dönemli ilişkiler ve kısa dönem dinamikleri incelendiğinde gelir ve tüketim değişkenlerinin birlikte hareket etmedikleri ve birbirlerini etkilemedikleri gözlemlenmiştir.

Barış & Uzay (2015), çalışmalarında Türkiye'nin 1960-2012 yılları arasındaki döneme ait iktisadi büyüme, tasarruf, enflasyon, reel faiz ve cari açık değişkenleri arasındaki ilişkiyi vektör otoregresif modeli (VAR) yöntemiyle analiz etmişlerdir. Yaptıkları analiz sonucunda, iktisadi büyümenin geliri artırdığı ve buna bağlı olarak da tasarrufların artığı sonucuna ulaşılmıştır. Bu doğrultuda politika yapıcıları, yurtiçi tasarrufları artırabilmek için sürdürülebilir iktisadi büyümeye yönelik politikaları desteklemeleri gerektiği tespit edilmiştir.

Li & Ma (2015), çalışmalarında Çin'in kuzeybatı bölgesine ait tüketim, gelir, yatırım ve bölge GSYİH'nı ampirik olarak analiz etmişlerdir. Yaptıkları analiz sonucunda, bu bölgenin ekonomik kalkınma seviyesinin hala düşük seviyelerde olduğunu ve yoksulluk kısır döngüsünün bu bölgede geçerli olduğunu gözlemlemişlerdir. Ayrıca bu yoksulluk kısır döngüsünün nasıl kırılacağı hakkında bazı önerilerde bulunmuşlardır.

Adelakun (2015), çalışmasında Nijerya'nın tasarruf, yatırım ve ekonomik büyüme değişkenleri arasındaki ilişkiyi Johansen eşbütünleşme yöntemiyle incelenmiştir. Yapılan incelemede Nijerya'da tasarruf, yatırım ve ekonomik büyüme arasında pozitif bir ilişki olduğu sonucuna ulaşılmıştır. Ayrıca çalışmada ele alınan tasarruf belirleyicilerinden olan enflasyon, tasarrufu olumsuz; faiz ise tasarrufu olumlu yönde etkilemektedir.

Altunç & Almalı (2016), yaptıkları çalışmalarında Türkiye'de kalkınma ajanslarının kapalı çember döngüsünün kırılmasındaki rollerini incelemişlerdir. Çalışmalarında bölgesel kalkınmanın temel dinamiklerini oluşturan Kalkınma Ajanslarının dış kaynakları çekme konusunda önemli bir görev üstlendiklerini tespit etmişlerdir. Dolayısıyla tabandan tavana kalkınma politikalarının bir ürünü olarak kurulan bu ajansların, bölgesel kaynakların harekete geçirilmesi ve etkin bir şekilde kullanılmasıyla yoksulluk kısır döngüsünün kırılmasında katkı sunabilecekleri sonucuna ulaşmışlardır.

Işık (2016) çalışmasında, Türkiye'nin 1990-2014 dönemini ele almıştır. Yapılan incelemede Türkiye'de toplam faktör verimliliği ve ekonomik büyüme arasında anlamlı bir ilişkiye rastlanmıştır. Fakat 1990'dan 2014 yılına kadar Türkiye'de toplam faktör verimliliği düzenli ve sürdürülebilir olmayan bir pozitif bir büyümeyi desteklemektedir.

Şengür & Taban (2016), çalışmalarında Türkiye'nin 2002-2013 yılları arasındaki hanehalkı gelir türünün tasarruflar üzerindeki etkisini regresyon analiz yöntemiyle incelemişlerdir. Analiz sonucunda Türkiye'de hanehalkı gelir türlerinden olan ücret-prim, faiz ve kira gelirleriyle, emekli maaşı ve diğer maaşların tasarrufları pozitif yönde etkilediği gözlemlenmiştir. Gelir grupları açısından ise tasarruf oranları arasında büyük farklılıkların olduğu tespit edilmiştir.

Aykaç (2018), çalışmasında Türkiye'de 2003-2013 yılları arasında gıda harcamalarının Engel Yasası sınaması ve gıda talebinin gelir esnekliğini incelemiştir. Yapılan incelemede Türkiye'de anılan dönemde gıda talebinin gelir esnekliğinin 0,62-0,79 aralığında olduğu sonucuna ulaşılmıştır. Hane halklarının gıdaya ayırdıkları bütçe payının,

hanehalkı reisinin yaşı, sosyal güvence durumu ve eğitim düzeyinin yanı sıra, hanenin yerleşim yeri ile ilişkili olduğu ortaya konulmaktadır.

Aka & Arıcan (2019), çalışmalarında Türkiye'nin 1996-2017 yıllarını kapsayan döneme ait gelir, enflasyon, para arzı ve genç bağımlılık oranı değişkenlerini kullanarak Türkiye'de hanehalkı tasarruf davranışlarının belirleyicilerini en küçük kareler (EKK) yöntemiyle incelemişlerdir. Yaptıkları inceleme sonucunda, gelir ile enflasyonun tasarruf oranları üzerine anlamlı ve pozitif; para arzı ve genç bağımlılık oranlarının ise tasarruf oranları üzerinde anlamlı ve negatif etkilerinin olduğu sonucuna ulaşılmıştır.

4. Veri Seti ve Model

Bu çalışmanın analizinde Türkiye'nin 1980 ile 2019 yılları arasındaki gelir, yatırım, tasarruf, tüketim ve verimlilik değişkenleri kullanılmıştır. Burada değişkenlerden yatırım ile tasarruf için Gayri Safi Yurtiçi Hasıladan (GSYİH) aldıkları payın değerleri, gelir için ABD doları cinsinden kişi başına düşen gelir, tüketim için hane halkının satın alma gücü paritesine göre tüketim harcamaları ve son olarak verimlilik için toplam faktör verimliliği değerleri kullanılmıştır. Analiz döneminin bu yıllar arasında seçilmesinin temel gerekçesi ise ortak veri oluşturma gayesi ve özellikle tüketim ve verimlilik değişkenlerinin kısıtlı olmasındandır. Çalışmada değişkenler hem bağımlı hem de bağımsız değişkenler şeklinde kullanılmıştır. Yatırım, tasarruf ve gelir değişkenleri Uluslararası Para Fonu (IMF) veri tabanından, tüketim ve verimlilik değişkenleri ise www.ggdc.net/pwt veri tabanından temin edilmiştir. Bu doğrultuda çalışmada analize dahil edilen değişkenler için tahmin edilen regresyon modelleri aşağıda gösterilen üç denklem şeklinde kurgulanmıştır.

$$\text{Yatırım}_t = \beta_0 + \beta_1 \text{Gelir} + \beta_2 \text{Tasarruf} + \varepsilon_t \tag{1}$$

$$\text{Tüketim}_t = \beta_0 + \beta_1 \text{Gelir} + \beta_2 \text{Yatırım} + \varepsilon_t \tag{2}$$

$$\text{Verimlilik}_t = \beta_0 + \beta_1 \text{Gelir} + \beta_2 \text{Yatırım} + \varepsilon t \tag{3}$$

Birinci modelde yatırım bağımlı değişken olarak ele alınırken, gelir ve tasarruf bağımsız değişkenler olarak ele alınmıştır. İkinci modelde tüketim bağımlı değişken olarak ele alınırken gelir ve yatırım bağımsız değişkenler olarak ele alınmıştır. Son olarak üçüncü modelde verimlilik bağımlı değişken olarak ele alınırken gelir ve yatırım bağımsız değişkenler olarak ele alınmıştır. Ayrıca değişkenlere yönelik olarak zaman yolu grafiği oluşturulmuş olup Şekil 2'deki gibidir.

Şekil 2'de görüleceği üzere Türkiye'de tasarruf ve yatırımda 1980'li yılların başından itibaren bazı yıllarda kırılma ve dalgalanmalar olsa dahi, tasarruf, yatırım ve gelirde genel eğilimin artış yönlü bir trend şeklinde olduğu anlaşılmaktadır. Tüketim ve verimlilik kanadına bakıldığında ise tüketimin 1995 yılından sonra azalan bir trende girdiği, verimliliğin ise artış yönlü trendinin 1994 ve 1999 yılında yaşanan kırılmaların ardından yaşanan V tipi bir toparlanmadan sonra eski seviyelerine dönmüş fakat 2002 yılından tekrar tüketimde olduğu gibi azalan yönlü bir trende girdiği görülmektedir. Bazı değişkenlerde

görülen bu tip dalgalanma ve kırılmaların ise Türkiye'de yaşanan, ekonomik, siyasi, güvenlik ve benzer gelişmelerden kaynaklandığını söylemek mümkündür.

Şekil: 2
Değişkenlerin Zaman Yolu Grafiği
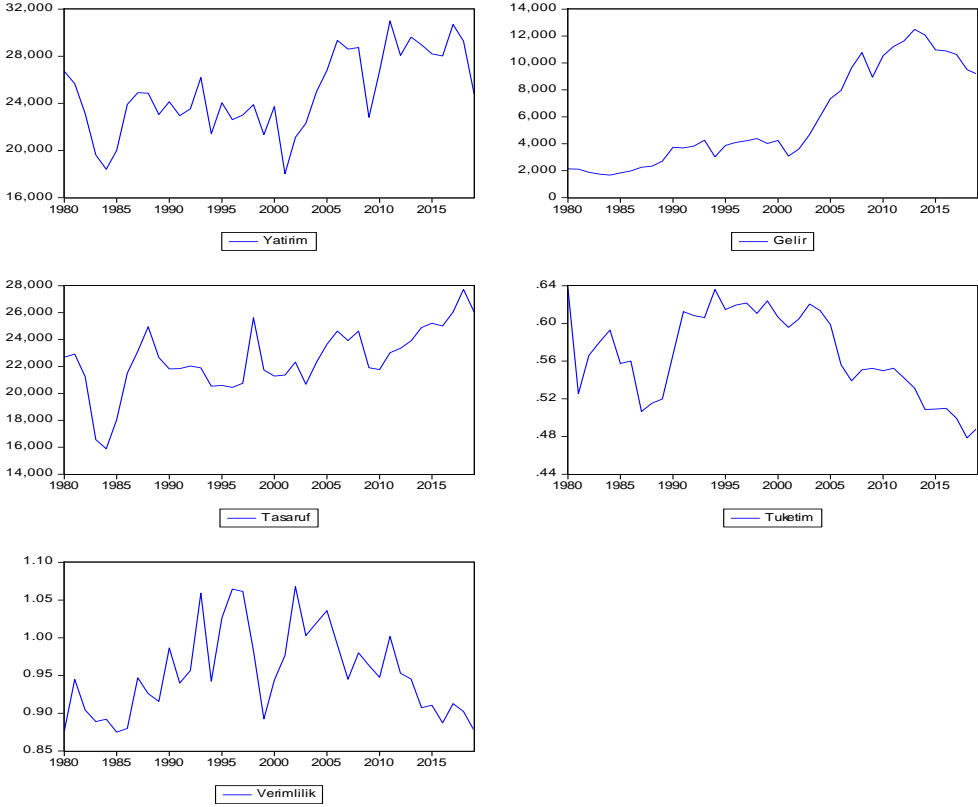
5. Yöntem

Bu çalışmada yöntem olarak zaman serisi analiz yöntemi kullanılmıştır. Analizin ilk basamağında analize dahil edilen değişkenler için tanımlayıcı istatistikler ile korelasyon matrisi oluşturulmuştur. Ardından değişkenlerin birim kök içerip içermediklerini test etmek için değişkenlere Artırılmış Dickey Fuller (ADF) ve Philips-Perron (PP) birim kök testleri uygulanmıştır. Birim kök testlerinin sonucunda ise değişkenlerin farklı mertebelerde birim kök içermedikleri (durağan oldukları) anlaşılmıştır. Değişkenlerin farklı mertebelerde durağan olması ise analizde Otoregresif Dağıtılmış Gecikme (ARDL) sınır testi modelinin tercih edilmesinin daha sağlıklı olacağını ifade etmektedir. Bu nedenle analizde ARDL sınır testi modeli tercih edilmiştir. ARDL sınır testi ile değişkenler arasındaki eşbütünleşme

ilişkisi tespit edilirken, uzun dönem katsayıları tahmin edilmektedir. Ayrıca bu test aracılığıyla hata düzeltme katsayısı da hesaplanmaktadır.

5.1. Birim Kök (Durağanlık) Testleri

Bir zaman serisinin ortalaması ve varyansı zaman içinde sabitse ve iki zaman periyodu arasındaki kovaryansın değeri kovaryansın hesaplandığı gerçek zamana değil, sadece iki zaman periyodu arasındaki mesafeye bağlıysa bu durum serinin birim kök içermeyen yani durağan bir seri olduğunu gösterir. Dolayısıyla zaman serisi analizlerinde sahte regresyonun ortaya çıkmasını önlemek, doğru tahmin ve genellemeler yapabilmek için analizde kullanılan değişkenlerin birim kök içermemeleri yani durağan bir yapıya sahip olmaları gerekmektedir (Gujarati, 2011: 207-218). Bu nedenle bu çalışmada değişkenlerin durağan bir yapıya sahip olup olmadıklarının tespit edilmesinde literatürde en çok tercih edilen Artırılmış Dickey-Fuller (ADF) ve Philips-Perron (PP) birim kök testleri kullanılmıştır (Aytekin & Kaya, 2022: 151).

5.1.1. Artırılmış Dickey-Fuller (ADF) Birim Kök Testi

ADF birim kök testi, Dickey ve Fuller (1981) tarafından modellenmiştir. Bu test modeli yine Dickey ve Fuller (DF) tarafından 1979 yılında oluşturulan Dickey-Fuller birim kök testi modelinin revize edilmiş ve geliştirilmiş bir versiyonudur. Dickey ve Fuller, 1981 yılında yayınladıkları çalışmalarında DF birim kök testinin regresyon denklemlerine gecikme kalıntılarını ekleyerek ADF birim kök testi modelini oluşturmuşlardır. Burada Y_t'nin bir zaman serisi olarak kabul edildiği ADF birim kök testi için test regresyonu aşağıda verilen üç denklem şeklinde modellenmektedir (Dickey & Fuller, 1979: 427-431; Dickey & Fuller, 1981: 1057-1072):

$$\Delta Y_t = \alpha Y_{t-1} + \sum_{i=1}^{n} \theta_i \Delta Y_{t-i} + e_t \text{ (sabitsiz \& trendsiz)} \tag{4}$$

$$\Delta Y_t = \rho + \alpha Y_{t-1} + \sum_{i=1}^{n} \theta_i \Delta Y_{t-i} + e_t \text{ (sabitli)} \tag{5}$$

$$\Delta Y_t = \rho + \beta T + \alpha Y_{t-1} + \sum_{i=1}^{n} \theta_i \Delta Y_{t-i} + e_t \text{ (sabitli \& trendli)} \tag{6}$$

Bu denklemlerde yer alan Y_t t zamandaki değişken zaman serisini, e_t hata terimini, T deterministik zaman eğilimini, α, β, Θ ve ρ tahmin edilecek parametreleri, n gecikme uzunluğunu ve Δ fark işlemcisi vektörünü ifade etmektedir (Narayan & Smyth, 2004: 708).

5.1.2. Philips-Perron (PP) Birim Kök Testi

PP birim kök testi, Phillips ve Perron (1988) tarafından modellenmiştir. PP birim kök testi, ADF birim kök testi denklemlerindeki hatalarda (şoklarda) belirtilmemiş olan otokorelasyon ve değişen varyans sorunuyla (heteroskedastik) nasıl başa çıkıldığını açıklaması bakımından önemli bir birim kök testidir. İşte PP birim kök testi bu özelliğiyle ADF birim kök testinden ayrışmaktadır. ADF birim kök testinin test regresyonundaki hataların ARMA yapısına yaklaşmak için parametrik bir otoregresyon kullanıldığı durumlarda PP birim kök testi, test regresyonlarında herhangi bir serisel korelasyonu göz

ardı etmektedir. Buna ilaveten PP birim kök testi, ADF test denkleminde regresör olarak yer alan t test istatistiğinde parametrik olmayan bir düzeltme yapmaktadır. Burada Y_t'nin bir zaman serisi olarak kabul edildiği PP birim kök testi için test regresyonu aşağıda verilen üç denklem şeklinde modellenmektedir (Phillips & Perron, 1988: 335-338):

$$Y_t = \alpha Y_{t-1} + e_t \ (t = 1,2,\ldots.) \text{ ve } \alpha = 1 \tag{7}$$

$$Y_t = \mu + \alpha Y_{t-1} + e_t \ (sabit) \tag{8}$$

$$Y_t = \mu + \alpha Y_{t-1} + \beta(t - \tfrac{T}{2}) + e_t \ (sabit \ ve \ trendli) \tag{9}$$

Bu denklemlerde yer alan μ, β ve α parametreleri geleneksel en küçük kareler regresyonunun tahmin edilecek katsayılarını, T gözlem sayısını ve e_t hata terimlerinin dağılımlarını göstermektedir. Burada T parametresi örneklem büyüklüğünden bağımsız ve bir sabit içeren rastgele bir değişkendir (Phillips & Perron, 1988: 337-338).

ADF ve PP birim kök test istatistiklerinin asimptotik dağılımları aynıdır. Bu sebepten dolayı ADF ve PP birim kök testlerinin sınamalarında kullanılan kritik test değerleri MacKinnon (1996) tarafından tablolaştırılan kritik test değerlerinden oluşmaktadır. Böylece ADF ve PP birim kök testlerinin sınamalarında kullanılan hipotez testleri aşağıda gösterilen testler şeklinde oluşturulmaktadır (Mackinnon, 1996: 602-618):

H$_0$: α=0 Birim kök vardır (seri durağan değildir).

H$_1$: α<0 Birim kök yoktur (seri durağandır).

5.2. Otoregresif Dağıtılmış Gecikme (ARDL) Modeli

ARDL sınır testi, Pesaran & Shin (1995) ve Pesaran vd. (2001) tarafından geliştirilmiş olup, bu testte değişkenler arasında eşbütünleşme (uzun dönemli ilişki) ilişkisinin olup olmadığı test edilmektedir (Pesaran & Shin, 1995; Peseran et al., 2001). Pesaran vd., 2001 yılında yayınladıkları çalışmalarında bu sınır testinde analize dahil edilecek değişkenlerin tamamının aynı mertebede durağan yani tamamının I(0) veya I(1) olabileceği gibi bu değişkenlerin farklı mertebelerde durağan yani değişkenlerin bir kısmının I(0), bir kısmının ise I(1) olması durumunda da bu testin uygulanabilir bir test olduğunu ifade etmişlerdir. Ayrıca Pesaran vd. (2001) bu test için biri alt sınır I(0), biride üst sınır I(1) olmak üzer iki sınır değer oluşturmuşlardır. Bu doğrultuda analize dahil edilen değişkenler için hesaplanan F istatistik (Wald Testi) değeri eğer belirlenen I(0) alt sınır değerinin altındaysa bu değişkenler arasında bir eşbütünleşme ilişkisinin olmadığına karar verilmektedir. Fakat hesaplanan F istatistik değeri eğer belirlenen I(1) üst sınır değerinin üzerindeyse bu sefer bu değişkenler arasında bir eşbütünleşme ilişkisinin olduğuna karar verilmektedir. Son olarak hesaplanan F istatistik değeri eğer belirlenen alt sınır değer I(0) ile üst sınır değer I(1) arasında kalıyorsa bu sefer bu değişkenler arasında eşbütünleşmeye yönelik herhangi bir karar verilmemektedir (Pesaran et al., 2001: 289-301). Bu bağlamda bu

çalışma için ARDL sınır testi aşağıda verilen denklemler şeklinde modellenmektedir (Özyılmaz, 2021: 190):

$$\Delta \text{Yatırım}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \text{Yatırım}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \text{Gelir}_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta \text{Tasarruf}_{t-i} + \beta_4 \text{Yatırım}_{t-1}$$
$$+ \beta_5 \text{Gelir}_{t-1} + \beta_6 \text{Tasarruf}_{t-1} + u_t \tag{10}$$

$$\Delta \text{Tüketim}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \text{Tüketim}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \text{Gelir}_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta \text{Yatırım}_{t-i} + \beta_4 \text{Tüketim}_{t-1}$$
$$+ \beta_5 \text{Gelir}_{t-1} + \beta_6 \text{Yatırım}_{t-1} + u_t \tag{11}$$

$$\Delta \text{Verimlilik}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \text{Verimlilik}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \text{Gelir}_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta \text{Yatırım}_{t-i} + \beta_4 \text{Verimlilik}_{t-1} + \beta_5 \text{Gelir}_{t-1} + \beta_6 \text{Yatırım}_{t-1} + u_t \tag{12}$$

Modellerde yer alan denklemde β_0 sabit katsayıyı, β_1, β_2 ve β_3 kısa dönem katsayılarını, β_4, β_5 ve β_6 uzun dönem katsayılarını, Δ fark işlemcisini ve u_t ise hata terimini ifade etmektedir (Acar & Sever, 2022: 43). ARDL sınır testi modelinde ilk olarak değişkenler arasındaki eşbütüneleşme ilişkisinin tespiti yukarıda da bahsedildiği gibi F istatistiği veya Wald testi kullanılarak yapılmaktadır. Bu sınama ise aşağıda gösterilen boş ve alternatif hipotez testlerinin yardımıyla yapılmaktadır (Özyılmaz, 2021: 190):

H$_0$: $\beta4 = \beta5 = \beta6 = 0$; değişkenler arasında eşbütünleşme ilişkisi yoktur.

H$_1$: $\beta4 \neq \beta5 \neq \beta6 \neq 0$; değişkenler arasında eşbütünleşme ilişkisi vardır.

ARDL sınır testi tahmin modelleri kurulduktan sonra, değişkenler arasındaki uzun dönemli katsayı hesaplamaları için gerekli olan denklemler ise aşağıdaki gibi modellenmektedir (Acar & Sever, 2022: 44):

$$\text{Yatırım}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \text{Yatırım}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \text{Gelir}_{t-i} + \sum_{i=0}^{n} \beta_{3i} \text{Tasarruf}_{t-i} + u_t \tag{13}$$

$$\text{Tüketim}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \text{Tüketim}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \text{Gelir}_{t-i} + \sum_{i=0}^{n} \beta_{3i} \text{Yatırım}_{t-i} + u_t \tag{14}$$

$$\text{Verimlilik}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \text{Verimlilik}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \text{Gelir}_{t-i} + \sum_{i=0}^{n} \beta_{3i} \text{Yatırım}_{t-i} + u_t \tag{15}$$

ARDL sınır testi yaklaşımında son olarak değişkenler arasındaki kısa dönemli ilişkilerin tespit edilmesinde hata düzeltme modelleri aşağıdaki gibi tahmin edilmektedir (Akel & Gazel, 2014: 32):

$$\Delta \text{Yatırım}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \text{Yatırım}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \text{Gelir}_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta \text{Tasarruf}_{t-i} + \beta_4 \text{ECM}_{t-1} + u_t \tag{16}$$

$$\Delta \text{Tüketim}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \text{Tüketim}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \text{Gelir}_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta \text{Yatırım}_{t-i} + \beta_4 \text{ECM}_{t-1} + u_t \tag{17}$$

$$\Delta \text{Verimlilik}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \text{Verimlilik}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \text{Gelir}_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta \text{Yatırım}_{t-i} + \beta_4 \text{ECM}_{t-1} + u_t \tag{18}$$

Bu denklemlerde yer alan ECM$_{t-1}$ değişkeni hata düzeltme terimini ifade etmektedir. Hata düzeltme terimi uzun dönemli ilişkinin elde edildiği modelin kalıntılarının bir gecikmeli değerini ifade etmektedir. Bu bağlamda hata düzeltme katsayısı kısa dönemde meydana gelen dengesizliklerin ne kadar zaman sonra tekrar dengeye döneceğini gösterir.

Ayrıca bu katsayıya yönelik beklenti negatif işaretli ve istatistiki açıdan anlamlı olması yönündedir (Esen vd., 2012: 258).

6. Ampirik Bulgular

Bu çalışmada yapılan zaman serisi analizinin ilk basamağını, değişkenlerin tanımlayıcı istatistikleri ile korelasyon matrisi oluşturmaktadır. Bu doğrultuda değişkenler için hesaplanan tanımlayıcı istatistikler ile korelasyon matrisi aşağıdaki tablolarda verilmiştir.

Tablo: 1
Tanımlayıcı İstatistikler

Değişken	Gözlem	Ortalama	Standart Sapma	Maksimum Değer	Minimum Değer
Yatırım	40	24.881	3.350	31.003	18.025
Gelir	40	5.880	3.747	12.488	1.668
Tasarruf	40	22.513	2.420	27.725	15.887
Tüketim	40	0.567	0.045	0.636	0.478
Verimlilik	40	0.953	0.057	1.067	0.874

Tablo 1'de yer alan tanımlayıcı istatistikler değerlendirildiğinde; Türkiye'de 1980 ile 2019 yılları arasındaki dönemde yatırımın GSYİH'dan aldığı pay ortalama %24.9 iken tasarrufun GSYİH'dan aldığı pay ise ortalama %22.5'tir. Bu dönemde ortalama gelir yaklaşık olarak 5 bin 900 dolar civarındayken, tüketimin ortalama oranı 0.567, verimliliğin ortalama oranı ise 0.953 olarak gerçekleşmiştir. Bu dönemde yatırımın GSYİH'dan aldığı payın ulaştığı en yüksek değer %31 en düşük değer %18; tasarrufun GSYİH'dan aldığı payın ulaştığı en yüksek değer %27.7, en düşük değer %15.9 ve gelirin bu dönemde ulaştığı en yüksek değer 12.500 dolar civarıyken, en düşük değer ise 1.668 dolar olarak gerçekleşmiştir. Ayrıca bu dönemde tüketimin ulaştığı en yüksek oran 0.636 iken en düşük oran 0.478 olarak gerçekleşmiş, verimliliğin ulaştığı en yüksek oran 1.067 en düşük oran ise 0.874 olarak gerçekleşmiştir. Böylece değişkenlerin tanımlayıcı istatistiklerini oluşturan; gözlem sayıları, standart sapmalar, ortalamalar, minimum ve maksimum değerler değişkenlerin analize uygun olduklarını göstermektedir. Analizde tanımlayıcı istatistiklerden sonra değişkenler için korelasyon matrisi oluşturulmuş ve matris aşağıdaki Tablo 2'de verilmiştir.

Tablo: 2
Korelasyon Matrisi

	Yatırım	Gelir	Tasarruf	Tüketim	Verimlilik
Yatırım	1.000				
Gelir	0.780	1.000			
Tasarruf	0.754	0.617	1.000		
Tüketim	-0.542	-0.524	-0.582	1.000	
Verimlilik	-0.004	-0.009	-0.052	0.466	1.000

Değişkenlerin Tablo 2'de verilen korelasyon matrisleri incelendiğinde yatırım, gelir ve tasarruf değişkenleri arasındaki korelasyon katsayılarının tamamının pozitif yönlü olduğu görülmektedir. Tüketim, gelir, yatırım ve tasarruf değişkenleri arasındaki korelasyon katsayılarının negatif yönlü, aynı şekilde verimlilik, gelir, yatırım ve tasarruf değişkenleri arasındaki korelasyon katsayılarının da negatif yönlü oldukları görülmektedir. Ayrıca

verimlilik ile tüketim arasında pozitif yönlü bir korelasyon olduğu görülmektedir. Analizde tanımlayıcı istatistikler ile korelasyon matrisinden sonra değişkenlerin birim kök sınamaları yapılmış ve elde edilen birim kök testi bulguları aşağıdaki Tablo 3'te verilmiştir.

Tablo: 3
Birim Kök Test Sonuçları

Seviye	Değişken Adı	ADF		PP	
		Sabitli	**Sabitli-Trendli**	**Sabitli**	**Sabitli-Trendli**
		t-İstatistiği (Olasılık)	t-İstatistiği (Olasılık)	t-İstatistiği (Olasılık)	t-İstatistiği (Olasılık)
Düzey Değer	Yatırım	-2.631 (0.095)***	-3.808 (0.026)**	-2.593 (0.103)	-3.792 (0.028)**
	Gelir	-0.758 (0.819)	-1.543 (0.796)	-0.875 (0.786)	-1.946 (0.611)
	Tasarruf	-2.165 (0.220)	-3.484 (0.055)***	-2.292 (0.179)	-3.142 (0.111)
	Tüketim	-1.883 (0.336)	-2.076 (0.542)	-1.883 (0.336)	-2.076 (0.542)
	Verimlilik	-3.061 (0.038)**	-2.920 (0.167)	-2.984 (0.045)**	-2.813 (0.201)
Birinci Fark	ΔYatırım	-7.230 (0.000)*	-7.115 (0.000)*	-5.578 (0.000)*	-5.510 (0.000)*
	ΔGelir	-5.494 (0.000)*	-5.421 (0.000)*	-5.578 (0.000)*	-5.510 (0.000)*
	ΔTasarruf	-5.752 (0.000)*	-5.726 (0.000)*	-6.996 (0.000)*	-7.171 (0.000)*
	ΔTüketim	-8.501 (0.000)*	-8.747 (0.000)*	-8.039 (0.000)*	-8.786 (0.000)*
	ΔVerimlilik	-8.314 (0.000)*	-8.296 (0.000)*	-9.930 (0.000)*	-11.744 (0.000)*

*, ** ve *** sırayla %1, %5 ve %10 önem seviyesinde istatistiki açıdan anlamlılığı, Δ vektörü ise fark işlemcisini ifade etmektedir.

Tablo 3'te verilen ADF ve PP birim kök testlerinin sonuçları incelendiğinde, değişkenlerin sabitli ve sabitli-trendli modellere göre farklı düzeylerde durağan oldukları diğer bir ifade değişkenlerin bir kısmının I(0) bir kısmının I(1) oldukları anlaşılmıştır. Değişkenlerin I(0) ve I(1) karışımı şeklinde durağan yapılara sahip olmaları ise istatistiki açıdan kullanılması gereken en uygun modelin ARDL sınır testi modeli olduğunu gösterir. Bu nedenle bu çalışmada birim kök testlerinin sonuçları doğrultusunda ARDL sınır testi tercih edilmiştir.

Birim kök testlerinin ardından yoksulluk kısır döngüsünü test edebilmek için yatırımın bağımlı değişken olarak ele alındığı ARDL(1.1.1); tüketimin bağımlı değişken olarak ele alındığı ARDL(1.1.0) ve verimliliğin bağımlı değişken olarak ele alındığı ARDL(1.0.1) modelleri tahmin edilmiştir. Çalışmada kolaylık sağlaması açısından ARDL(1.1.1) tahmin modeli: Model 1, ARDL(1.1.0) tahmin modeli: Model 2 ve ARDL(1.0.1) tahmin modeli: Model 3 olarak isimlendirilmiştir. Bu üç modelin tahmin edilmesinin ardından bu modellerin sağlıklı bir şekilde çalışıp çalışmadıklarını test etmek için bu modellere birtakım tanısal sınama testleriyle CUSUM testleri uygulanmış ve bu üç model sınama testlerinden başarıyla geçmiştir. Sınama testlerinin ardından bu üç tahmin modeli üzerinden değişkenlere sırasıyla ARDL sınır testi uygulanmış ve ulaşılan sonuçlar bundan sonraki aşamada sırasıyla verilmiştir. Ayrıca tahmin modellerinin sınama testleri çalışmanın sonunda yer alan ekler başlığı altında verilmiştir.

Tahmin edilen Model 1, Akaike Bilgi Kriteri (AIC) ve 1. gecikme uzunluğu sayısına göre tahmin edilmiştir. Burada yatırım değişkeni modele bağımlı değişken olarak dahil edilirken, gelir ve tasarruf değişkenleri modele bağımsız değişkenler olarak dahil edilmiştir. Bu doğrultuda Model 1 üzerinden yapılan ARDL sınır testinin sonuçları aşağıdaki Tablo 4'te verilmiştir.

Tablo: 4
Model 1'in ARDL Sınır Testi Sonuçları

F-istatistik Değeri: 6.252	Kritik Değerler	
	I(0) Bound	I(1) Bound
%1	5.15	6.36
%5	3.79	4.85
%10	3.17	4.14

Tablo 4'te verilen Model 1'in ARDL sınır testi sonuçları incelendiğinde F istatistik değerinin 6.252 olarak hesaplandığı görülmektedir. Hesaplanan bu F istatistik değerinin Tablo 5'te verilen %5 önem sevisinin üst sınır değeri olan 4.85 değerinden büyük olduğu görülmektedir. Bu sonuç Model 1'e göre Türkiye'de yatırım, gelir ve tasarruf değişkenleri arasında bir eşbütünleşme ilişkisinin yani uzun dönemli bir ilişkinin olduğunu göstermektedir. Model 1'e göre değişkenler arasında eşbütünleşme ilişkisinin tespit edilmesinin ardında bu model için uzun dönem katsayıları hesaplanmış ve elde edilen bulgular aşağıdaki Tablo 5'te verilmiştir.

Tablo: 5
Model 1'in Uzun Dönem Test Sonuçları ve Tahmin Denklemi

Değişken	Katsayı	Standart Hata	t-İstatistiği	Olasılık (P)
Gelir	0.523	0.141	3.704	0.000
Tasarruf	0.456	0.235	1.9465	0.060
C	1.092	4.743	2.304	0.027
Tahmin Denklemi				
Yatırım = 0.52*Gelir + 0.46*Tasarruf + 1.092				

Tablo 5'te verilen Model 1'in uzun dönem sonuçları incelendiğinde, bağımlı değişken yatırım ile bağımsız değişkenler olan gelir ve tasarruf arasında uzun dönemde istatistiki açıdan anlamlı ve pozitif yönlü ilişkilere rastlanmıştır. Bu sonuçlara göre uzun dönemde gelirde görülen %1'lik bir artışın yatırımları %0.52 oranında artırdığı; tasarruflarda görülen %1'lik bir artışın ise %0.46'lık kısmının yatırımlara yöneldiği gözlemlenmiştir. Bu bağlamda Model 1'e göre Türkiye'de 1980 ile 2019 yılları arasında uzun dönemde gelir ve tasarrufların bir kısmının yatırıma yöneldiği sonucuna ulaşılmıştır. Bu sonuç ise Model 1'e göre Türkiye'de 1980 ile 2019 yılları arasında yoksulluk kısır döngüsünün uzun dönemde geçerli olmadığını göstermektedir.

Uzun dönem katsayılarının hesaplanmasının ardından Model 1 için hata düzeltme mekanizmasının çalışıp çalışmadığı test edilmiş ve bununla birlikte kısa dönem katsayıları hesaplanmıştır. Elde edilen bulgular aşağıdaki Tablo 6'da verilmiştir.

Tablo: 6
Model 1'in Hata Düzeltme Modeli (HDM) ve Kısa Dönem Test Sonuçları

Değişken	Katsayı	Standart Hata	t-İstatistiği	Olasılık (P)
D(Gelir)	1.635	0.299	5.467	0.000
D(Tasarruf)	0.658	0.144	4.562	0.000
CointEq(-1)	-0.586	0.139	-4.202	0.000

Tablo 6'da verilen sonuçlara göre analizin hata düzeltme katsayısı -0.586 olarak hesaplanmış ve bu katsayının istatistiki açıdan anlamlı olduğu anlaşılmıştır. Bu durum tahmin edilen Model 1 için hata düzletme mekanizmasının sağlıklı bir şekildi çalıştığını göstermektedir. Dolayısıyla bu katsayı değeri kısa dönem dengesinde meydana gelen sapmaların yaklaşık olarak 1/(|-0.586|)=1.7 yıllık diğer bir ifadeyle 1 yıl 7 aylık bir zamanda diliminde yeniden uzun dönem dengesine ulaşacağını ifade etmektedir.

Tablo 6'da verilen bir diğer sonuç kısa dönem sonuçlarıdır. Bu bağlamda Model 1 için uzun dönemde olduğu gibi kısa dönemde de bağımlı ve bağımsız değişkenler arasında istatistiki açıdan anlamlı ve pozitif yönlü ilişkilere rastlanmıştır. Bu sonuçlara göre gelirde görülen %1'lik bir artışın yatırımları kısa dönemde %1.63 oranında artırdığı; tasarruflarda görülen %1'lik artışın ise kısa dönemde %0.65'lik kısmının yatırımlara yöneldiği gözlemlenmiştir. Dolayısıyla Model 1'e göre Türkiye'de 1980 ile 2019 yılları arasında gelir ve tasarrufların kısa dönemde bir kısmının yatırımlara yöneldiği sonucuna ulaşılmıştır. Bu sonuç ise Model 1'e göre Türkiye'de 1980 ile 2019 yılları arasında yoksulluk kısır döngüsünün kısa dönemde de geçerli olmadığını göstermektedir. Sonuç olarak Model 1'e göre Türkiye'de hem kısa ve hem de uzun dönemde yoksulluk kısır döngüsünün geçerli olmadığı anlaşılmıştır. Böylece Model 1'e yönelik analiz sonuçları tamamlanmıştır. Bundan sonraki aşamada Model 2'nin bulguları değerlendirilmiştir.

Tahmin edilen Model 2, Akaike Bilgi Kriteri (AIC) ve 1. gecikmeye göre tahmin edilmiştir. Burada tüketim değişkeni modele bağımlı değişken olarak dahil edilirken gelir ve yatırım değişkenleri modele bağımsız değişkenler olarak dahil edilmiştir. Bu doğrultuda Model 2 üzerinden yapılan ARDL sınır testinin sonuçları aşağıdaki Tablo 7'de verilmiştir.

Tablo: 7
Model 2'nin ARDL Sınır Testi Sonuçları

F-istatistik Değeri: 3.032	Kritik Değerler	
	I(0) Bound	I(1) Bound
%1	5.15	6.36
%5	3.79	4.85
%10	3.17	4.14

Tablo 7'de verilen Model 2'nin ARDL sınır testinin sonuçları incelendiğinde, F istatistik değerinin 3.032 olarak hesaplandığı görülmektedir. Hesaplanan bu F istatistik değerinin Tablo 7'de verilen %5 önem sevisinin alt sınır değeri olan 3.79 değerinden küçük olduğu görülmektedir. Bu sonuç Model 2'ye göre Türkiye'de tüketim, gelir ve yatırım değişkenleri arasında bir eşbütünleşme ilişkisinin yani uzun dönemli bir ilişkinin olmadığını göstermektedir. Dolayısıyla Model 2'ye göre değişkenler arasında bir eşbütünleşme ilişkisinin tespit edilememesi Türkiye'de yoksulluk kısır döngüsünün geçerli olduğunu

göstermektedir. Model 2'ye göre değişkenler arasında eşbütünleşme ilişkisine rastlanmadığı için analizin bundan sonraki aşamalarına geçilmemiş ve Model 2'nin analizleri burada sonlandırılmıştır. Dolayısıyla bundan sonraki aşamada Model 3 için elde edilen bulgu ve sonuçlar değerlendirilmiştir.

Tahmin edilen Model 3, Akaike Bilgi Kriteri (AIC) ve 1. gecikmeye göre tahmin edilmiştir. Burada verimlilik değişkeni modele bağımlı değişken olarak dahil edilirken gelir ve yatırım değişkenleri modele bağımsız değişkenler olarak dahil edilmiştir. Bu doğrultuda Model 3 üzerinden yapılan ARDL sınır testinin sonuçları aşağıdaki Tablo 8'de verilmiştir.

Tablo: 8
Model 3'ün ARDL Sınır Testi Sonuçları

F-istatistik Değeri: 3.767	Kritik Değerler	
	I(0) Bound	I(1) Bound
%1	5.15	6.36
%5	3.79	4.85
%10	3.17	4.14

Tablo 8'de verilen Model 3'ün ARDL sınır testinin sonuçları incelendiğinde F istatistik değerinin 3.767 olarak hesaplandığı görülmektedir. Hesaplanan bu F istatistik değerinin Tablo 8'de verilen %5 önem sevisinin alt sınır değeri olan 3.79 değerinden küçük olduğu görülmektedir. Bu sonuç bağımlı değişkenin verimlilik olarak ele alındığı Model 3'e göre Türkiye'de verimlilik, gelir ve yatırım değişkenleri arasında bir eşbütünleşme ilişkisinin yani uzun dönemli bir ilişkinin olmadığını göstermektedir. Dolayısıyla Model 3'e göre de değişkenler arasında bir eşbütünleşeme ilişkisinin tespit edilememesi Türkiye'de yoksulluk kısır döngüsünün geçerli olduğu göstermektedir. Model 3'e göre değişkenler arasında eşbütünleşme ilişkisine rastlanmadığından Model 3 için yapılan analizin bundan sonraki aşamasına geçilememiş ve analiz burada sonlandırılmıştır.

7. Sonuç ve Tartışma

Ragnar Nurkse tarafından ortaya atılan ve "ülkeler yoksul oldukları için yoksuldurlar" tezine dayanan "Kapalı Çember Teorisi" veya "Yoksulluk Kısır Döngüsü" az gelişmiş ülkeler için kurgulanmış olsa da aslında bu teorinin gelişmekte olan ülkelerde de kısmen olsa da yaşanabileceği yapılan bu çalışmada gözlemlenmiştir. Bu teorinin gelişmekte olan ülkelerde kısmen ya da tamamen görülme ihtimalini güçlendiren temel nedenler ise bu ülkelerde gelir dağılımında adaletin sağlanamadığı, diğer bir ifadeyle alt ve üst gelir grubu arasında gelir uçurumlarının olduğu, işsizlik ve enflasyon sorunun olması, istihdam alanlarının kısıtlı olması, bölgesel gelişmişlik düzeyinin farklı olması ve benzer nedenler şeklinde sıralanabilir.

Bu çalışmada gelişmekte olan ülkeler kategorisinde yer alan Türkiye üzerine yapılan ekonometrik analizde Nurkse'nin kapalı çember teorisinin Türkiye'de geçerli olup olmadığı test edilmiştir. Bunun için bir döngü oluşturabilmek adına yatırım, tasarruf, gelir, tüketim ve verimlilik değişkenlerinden yatırım, tüketim ve verimlilik bağımlı değişkenler olacak şekilde üç regresyon modeli kurulmuş ve bu üç model bir döngü olarak kabul edilmiştir. Bu

bağlamda döngünün birinci halkasını oluşturan ve yatırımın bağımlı değişken olarak kabul edildiği Model 1 için yapılan analizler sonucunda değişkenler arasında eşbütünleşme ilişkisine rastlanmış ve bu değişkenler arasında uzun ve kısa dönemde istatistiki açıdan anlamlı ve pozitif yönlü bir ilişki görülmüştür. Ulaşılan bu sonuç döngünün birinci halkasının başarıyla geçildiğini göstermiştir. Döngünün ikinci halkasını oluşturan ve tüketimin bağımlı değişken olarak kabul edildiği Model 2 için yapılan analizler sonucunda değişkenler arasında eşbütünleşme ilişkisine rastlanmamıştır. Dolayısıyla ulaşılan bu sonuç döngünün ikinci halkasında bir tıkanmanın olduğu ve Model 2'nin döngünün ikinci halkasından geçemediği anlaşılmıştır. Son olarak döngünün üçüncü halkasını oluşturan ve verimliliğin bağımlı değişken olarak kabul edildiği Model 3 için yapılan analizler sonucunda değişkenler arasında yine eşbütünleşme ilişkisine rastlanmamıştır. Dolayısıyla ulaşılan bu sonuca göre döngünün üçüncü halkasında da bir tıkanmanın olduğu ve Model 3'ün de bu döngünün üçüncü halkasından geçemediği anlaşılmıştır.

Sonuç olarak yapılan bu çalışmada kurulan üç modelden her bir modeli döngünün bir parçası olarak dikkate aldığımızda Model 1'in sonuçlarıyla döngüdeki birinci aşamanın geçildiğini, fakat Model 2 ve Model 3'ün sonuçlarına göre değişkenler arasında eşbütünleşme ilişkisinin bulunmaması Türkiye için kurulan bu döngünün tıkanmasına neden olduğunu göstermiştir. Fakat ulaşılan bu sonuçlar Türkiye'de yoksulluk kısır döngüsünün tamamen geçerli olduğu yorumu için tam bir zemin oluşturmadığı gibi bu teorinin tamamen geçersiz olduğu yorumu içinde tam bir zemin oluşturmamaktadır. Dolayısıyla bu sonuçlar çerçevesinde "Yoksulluk Kısır Döngüsü" veya "Fakirlik Kısır Döngüsünün" Türkiye'de kısmen geçerli olduğu söylenebilir.

Yapılan analizlerin sonuçlarından hareketle aslında Türkiye'de tasarrufların yatırıma dönüştüğünü, fakat gelir ve yatırımların ise tüketim ve verimliliği desteklemekte zorlandığını söylemek mümkündür. Bu nedenle Türkiye'de verimliliği artırmak adına kaynakların daha etkin ve verimli bir şekilde kullanılması gerekmektedir. Ayrıca hane halkının tüketim sorununu çözmek için daha dinamik ve istikrarlı makro iktisadi bir yapı oluşturulması gerekmektedir. Buradan hareketle Nurkse tarafından yoksul ülkeler için kurgulanan "Yoksulluk Kısır Döngüsü" veya "Fakirlik Kısır Döngüsünün" aslında gelişmekte olan ülkelerde de kısmen geçerli olabileceğini göstermiştir. Dolayısıyla ulaşılan bu sonuç bu döngünün Türkiye gibi diğer gelişmekte olan ülkeler için de ele alınıp bu teorinin gelişmekte olan ülkelerde kısmen ya da tamamen geçerliliğinin sınanması gerekliliğini göstermiştir. Bu çalışmada ulaşılan sonuçlar ise literatürde yer alan ve Katona (1949), Miller (1988), Baxter & Crucini (1993), Attanasio vd. (2000), Mishra vd. (2010), Esso & Keho (2010), Göçer vd. (2013), Altunöz (2014), Barış & Uzay (2015), Li & Ma (2015), Adelakun (2015) ve Altunç & Almalı (2016) tarafından yapılan çalışmalarda ulaşılan sonuçları destekler niteliktedir.

Türkiye'de yoksulluk kısır döngüsünün kısmen geçerli olmasının altında yatan temel nedenleri; Türkiye'nin yıllardır orta gelir tuzağında yer alması, iktisadi büyümede yaşanan dalgalanma ve kırılmaların kalkınmada sürdürülebilirliğin yakalanmamasını sekteye uğratması, işsizlik ve enflasyon sorunu, ekonomik krizler, döviz şokları, cari açık,

Türkiye'de çalışanların büyük çoğunluğunu oluşturan asgari ücretlilerin almış oldukları asgari ücretin geçinebilecekleri seviyelerde olmaması, ekonomik açıdan bölgeler arasında ciddi farklılıkların olması, göçler, kayıt dışı ekonomi ve benzer nedenler şeklinde sıralanabilir. Bu bağlamda Türkiye'nin bu döngüden kurtulabilmesi için yukarıda bahsedilen bu sorunların kısa sürede minimize edilerek ortadan kaldırılması ve makro iktisadi dinamiklerin güçlendirilerek ekonomide istikrarın yakalanması gerekmektedir.

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Ekler

Model 1 (ARDL (1.1.1) Tahmin Modeli) İçin Tanısak Sınama Testleri

Ek: 1
Tanısal Sınama Test Sonuçları

Sınama Testleri	Değer	Karar	Sonuç
Otokorelasyon LM Testi (BG)	P=0.750 F=0.290	H₀: Kabul	Modelde otokorelasyon sorunu yoktur
Değişen Varyans Testi (BPG)	P=0.600 F=0.738	H₀: Kabul	Modelde değişen varyans sorunu yoktur
Spesifikasyon Testi (RR)	P=0.279 F=1.213	H₀: Kabul	Modelde spesifikasyon hatası yoktur
Normal Dağılım Testi (JG)	P=0.790 JG=0.469	H₀: Kabul	Modelde kalıntılar normal dağılmaktadır.

BG: Breusch-Godfrey, BPG: Breusch-Pagan-Godfrey; RR: Ramsey Reset; JG: Jarque Bera; P: Olasılık değerini; F: F-istatistiğini ifade etmektedir.

Ek: 2
CUSUM ve CUSUM Kare Testleri
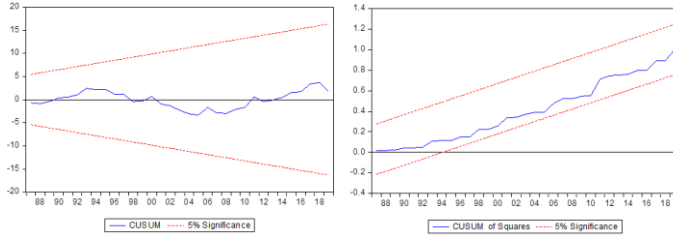
Model 2 (ARDL (1.1.0.) Tahmin Modeli) İçin Tanısal Sınama Testleri

Ek: 3
Tanısal Sınama Test Sonuçları

Sınama Testleri	Değer	Karar	Sonuç
Otokorelasyon LM Testi (BG)	P=0.316 F=1.193	H₀: Kabul	Modelde otokorelasyon sorunu yoktur
Değişen Varyans Testi (BPG)	P=0.032 F=2.995	H₀: Kabul	Modelde değişen varyans sorunu yoktur
Spesifikasyon Testi (RR)	P=0.723 F=0.127	H₀: Kabul	Modelde spesifikasyon hatası yoktur
Normal Dağılım Testi (JG)	P=0.046 JG=6.144	H₀: Kabul	Modelde kalıntılar normal dağılmaktadır.

BG: Breusch-Godfrey, BPG: Breusch-Pagan-Godfrey; RR: Ramsey Reset; JG: Jarque Bera; P: Olasılık değerini, F: F-istatistiğini ifade etmektedir.

Ek: 4
CUSUM ve CUSUM Kare Testleri
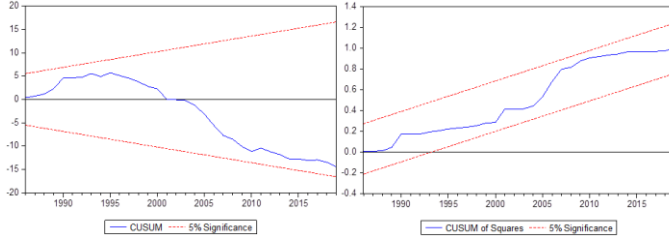
Model 3 (ARDL (1.0.1) Tahmin Modeli) İçin Sınama Testleri

Ek: 5
Tanısal Sınama Test Sonuçları

Sınama Testleri	Değer	Karar	Sonuç
Otokorelasyon LM Testi (BG)	P=0.344 F=1.102	H₀: Kabul	Modelde otokorelasyon sorunu yoktur
Değişen Varyans Testi (BPG)	P=0.042 F=2.780	H₀: Kabul	Modelde değişen varyans sorunu yoktur
Spesifikasyon Testi (RR)	P=0.924 F=0.011	H₀: Kabul	Modelde spesifikasyon hatası yoktur
Normal Dağılım Testi (JG)	P=0.404 JG=1.810	H₀: Kabul	Modelde kalıntılar normal dağılmaktadır.

BG: Breusch-Godfrey, BPG: Breusch-Pagan-Godfrey; RR: Ramsey Reset; JG: Jarque Bera; P: Olasılık değerini, F: F-istatistiğini ifade etmektedir.

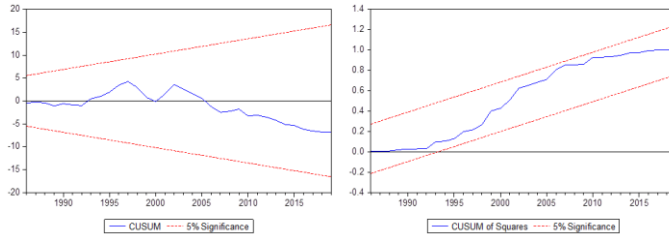**Ek: 6**
CUSUM ve CUSUM Kare Testleri

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İnternet Penetrasyonu, Doğrudan Yabancı Yatırımlar, Dış Ticaret ve Ekonomik Büyüme Arasındaki Nedensellik İlişkileri: BRICS-T Ülkeleri Üzerine Bir Araştırma

Demet YAMAN-SONGUR *(https://orcid.org/0000-0002-9562-4320), Dicle University, Türkiye;*
demet.yaman@dicle.edu.tr

Causality Relationships Between Internet Penetration, Foreign Direct Investments, Foreign Trade and Economic Growth: An Investigation on BRICS-T Countries

Abstract

With the widespread use of the internet, it has become important to examine the relationships between internet penetration and macroeconomic indicators. This study examines the causal relationships between internet penetration, foreign direct investments, foreign trade, and economic growth in BRICS-T (Brazil, Russia, India, China, South Africa, and Turkey) countries from 1993-2019. In this context, panel data analysis techniques were used in the study. The causality relationship between the variables was investigated using the causality test developed by Dumitrescu and Hurlin (2012). The findings showed that there are strong causal relationships between the variables.

Keywords : Internet Penetration, Foreign Direct Investments, Foreign Trade, Economic Growth, Panel Data Analysis.

JEL Classification Codes : B17, F43, L86.

Öz

İnternet kullanımının yaygınlaşmasıyla birlikte internet penetrasyonu ile makroekonomik göstergeler arasındaki ilişkilerin incelenmesi önemli hale gelmiştir. Bu çalışmanın amacı, 1993-2019 dönemi için BRICS-T (Brezilya, Rusya, Hindistan, Çin, Güney Afrika ve Türkiye) ülkelerinde internet penetrasyonu, doğrudan yabancı yatırımlar, dış ticaret ve ekonomik büyüme arasındaki nedensellik ilişkilerini incelemektir. Bu kapsamda çalışmada panel veri analiz tekniklerinden yararlanılmıştır. Değişkenler arasındaki nedensellik ilişkisi, Dumitrescu ve Hurlin (2012) tarafından geliştirilen nedensellik testi kullanılarak araştırılmıştır. Bulgular, değişkenler arasında güçlü nedensellik ilişkilerinin varlığını destekleyen niteliktedir.

Anahtar Sözcükler : İnternet Penetrasyonu, Doğrudan Yabancı Yatırımlar, Dış Ticaret ve Ekonomik Büyüme, Panel Veri Analizi.

1. Giriş

İnternet üretim ve tüketim süreçlerinde önemli bir dönüşümü hızla gerçekleştiren bir teknoloji olarak karşımıza çıkmaktadır. Bu nedenle, ülkelerde internet kullanımının yaygınlaşması ekonomik büyüme için önem arz etmektedir. İnternet ile ekonomi içerisinde yenilikçi faaliyetler teşvik edilmekte ve ağ etkileşimini destekleyen verimli bilgi alışverişi sağlanmaktadır (Kenny, 2003: 99-100). Bunula birlikte, bilgi iletişim teknolojileri bir ekonomide ne kadar ileri boyutta olursa olsun, söz konusu teknolojileri kullanabilecek bireylere ihtiyaç vardır. Dolayısıyla bilgi iletişim teknolojilerinin potansiyel faydaları, bir ekonominin beşerî sermaye oluşumunun boyutuna doğrudan bağlıdır (Teixeira & Fortuna, 2010: 336-337). 1990'lardan bu yana bilgi iletişim teknolojilerine dünya çapında çok önemli yatırımlar yapılmaktadır. Bulut bilişim hizmetleri, büyük veri analitiği, nesnelerin interneti ve dijital platformlar gibi modern bilgi iletişim teknolojisi uygulamalarının kullanımının artması üretim ve tüketim süreçlerini önemli derecede dönüştürmüş ve hali hazırda dönüştürmeye de devam etmektedir. Bu kapsamda bilgi iletişim teknolojilerinin yeni iş türleri ve yeni ekonomik modeller ürettiği de bir gerçektir. Tüm bu gelişmelerin küresel pazarların ve küresel tedarik zincirlerinin daha etkin işlemesine fayda sağladığı ve yatırımların getirisini de artırdığı söylenebilir.

Bilgi ve iletişim teknolojilerindeki gelişmelerin küresel ekonomiyi her geçen gün daha da entegre bir hale dönüştürdüğü görülmektedir. İktisadi büyüme ve kalkınmayı gerçekleştirebilmek için ülkeler hem doğrudan yabancı sermaye yatırımlarını ülkelerine çekmeyi hem de dış ticaret hacimlerini artırmayı hedeflemektedirler. Söz konusu bu iki hedefin gerçekleşebilmesi için çeşitli teşvikler ve politikaların uygulanmasının yanı sıra altyapı hizmetlerinin de sağlanması elzemdir. Bilgi iletişim teknolojilerinde böylesine önemli bir dönüşümün yaşandığı bir dönemde ülkelerin internet kullanımını yaygınlaştırmaları hem doğrudan yabancı sermaye girişlerini artırabilir hem de dış ticaret hacimlerinin artmasını sağlayabilir. Bu nedenle internetin yaygınlaşması yani penetrasyonu ile doğrudan yabancı yatırımlar, dış ticaret ve dolayısıyla da ekonomik büyüme arasındaki ilişkilerin incelenmesi büyük önem arz etmektedir. Bu ilişkiler incelenirken sadece internet penetrasyonu ile diğer değişkenler arasındaki nedensellik ilişkilerinin incelenmesinin yanı sıra, diğer değişkenler (doğrudan yabancı yatırımlar, dış ticaret ve ekonomik büyüme) arasındaki karmaşık ve içsel ilişkilerinde incelenmesi önemli bir gerekliliktir. Bu çerçevede bu çalışmanın amacı, 1993-2019 dönemi için BRICS-T (Brezilya, Rusya, Hindistan, Çin, Güney Afrika ve Türkiye) ülkelerinde internet penetrasyonu, doğrudan yabancı yatırımlar, dış ticaret ve ekonomik büyüme arasındaki nedensellik ilişkilerini incelemektir. Çalışmada BRICS-T ülkelerinin ele alınmasındaki en önemli neden bu ülkelerde ele alınan dönemde ticaretin genişlemesi, bilgi iletişim teknolojilerine yapılan yatırımların artması ve doğrudan yabancı yatırımlara giderek ekonomilerini daha açık hale getirmeleridir. Ayrıca bu ülkeler dünya nüfusunun yaklaşık %45'ini oluşturmakta, Dünya ekonomisinden aldıkları pay özellikle 2000'li yıllardan sonra artmakta dolayısıyla önemli yükselen ekonomiler olarak karşımıza çıkmaktadır. Çalışmada ele alınan ülkelerin ortalaması olarak toplam nüfus içerisinde bireysel internet kullanımı yani internet penetrasyonu Şekil 1'de görüleceği üzere

1993 yılında yaklaşık %0.03 iken, bu oran 2019 yılında %67,38'e ulaşmıştır. Bu nedenle internet penetrasyonunun diğer değişkenler ile ilişkisinin incelenmesi önemlidir.

Şekil: 1
Bireysel İnternet Kullananların Nüfus İçerisindeki Yüzdesi
(BRICS-T Ülkeleri Ortalaması)
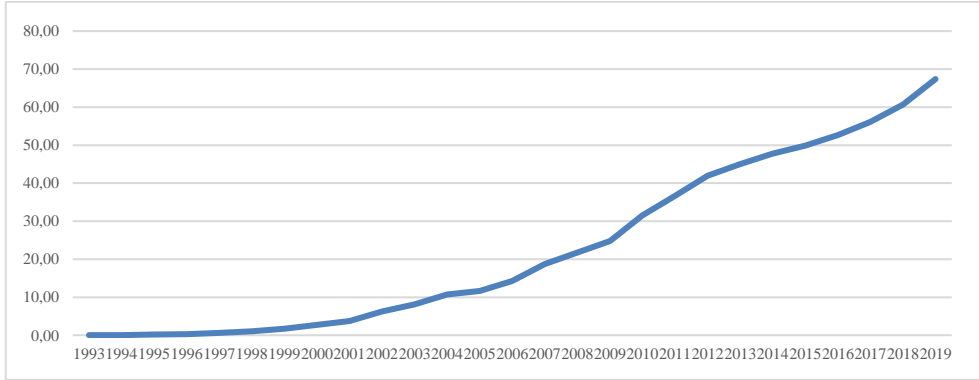
Kaynak: Dünya Bankası Dünya Kalkınma Göstergelerinde yer alan verilerden hesaplanmıştır.

Ele alınan BRICS-T Ülkelerinin zaman içerisinde ayrı ayrı internet kullanım durumları da Şekil 2'de görülmektedir. Buna göre 2000'li yıllarda bireysel internet kullanımının arttığı görülebilir. Bireysel internet kullanımının özellikle Güney Afrika'da nüfusa göre 2009 yılından sonra ivme kazandığını, Hindistan'da ise 2019 yılında ivme kazandığını ifade etmek mümkündür. Güney Afrika'da 2009 yılında internet kullanımının artmasında 2008 yılında geniş bant hizmetinin başlaması ve 2009 yılında ise Telkom şirketinin 8 ve 12 Mbps hızlık paketler sunması gösterilebilir[1]. 2019 yılında Hindistan'da bireysel internet kullanımının 2 kat artmasının nedeni ise kırsal kesimde internetin yaygınlaşması ve bant genişliğinin artırılması ile açıklanmaktadır[2]. 2000'li yıllardan önce internet kullanımının tüm ülkelerde kısıtlı kaldığı ise görülmekte olup bu durum analiz sırasında da ayrıca dikkate alınacaktır.

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[1] *<https://www.news24.com/fin24/timeline-internet-turns-25-in-south-africa-20161111>, 02.03.2022.*

[2] *<https://economictimes.indiatimes.com/tech/internet/internet-users-in-india-to-reach-627-million-in-2019-report/articleshow/68288868.cms?from=mdr>, 02.03.2022.*

Şekil: 2
BRICS-T Ülkelerinde Bireysel İnternet Kullananların Nüfus İçerisindeki Yüzdesi
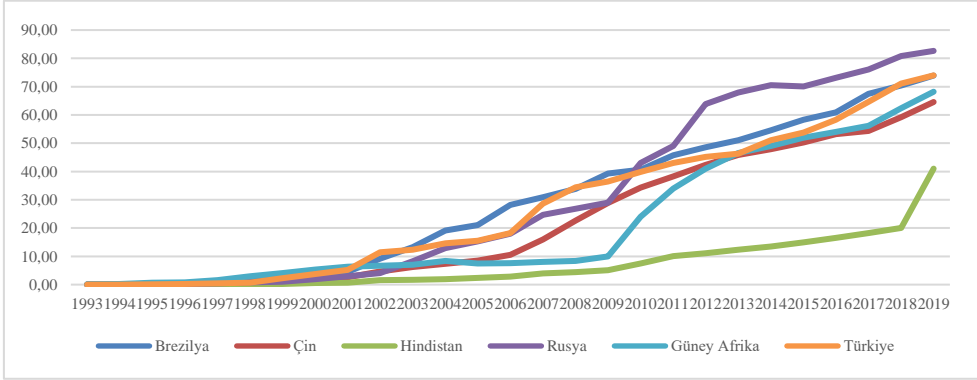
Kaynak: Dünya Bankası Dünya Kalkınma Göstergeleri.

BRICS-T ülkelerinin bireysel internet kullanımı dışında diğer dijital göstergelere ilişkin son durumlarına da bakmakta fayda vardır. Tablo 1'de söz konusu ülkelerin dijital göstergeleri sunulmuştur. Bu göstergelere göre 2020 yılında mobil hücresel ağ tarafından kapsanan nüfusun tüm ülkelerde neredeyse %100'e ulaştığı sadece Brezilya'da %90'da kaldığı görülmektedir. Yine ülkelerin önce 3g daha sonra da 4g altyapılarını 2020 itibari ile tamamladıkları ve nüfusun en az %90'ının 3g ve 4g internet hizmetlerine ulaştığını belirtebiliriz. Bireysel cep telefonu kullanımının da (verileri olmayan Çin ve Hindistan hariç) nüfusun %90'ının üzerinde olduğu sadece Güney Afrika'da 2018 itibari ile %78 düzeyinde kaldığı görülmektedir. Hane halkı internet kullanımında ise Hindistan'ın 2017 itibari ile gerilerde kaldığı hane halkının %24'ünün internete ulaşabildiği ancak son yıllarda bu oranın yukarıda da ifade ettiğimiz gibi kırsal kesimde artan yatırımlarla arttığını ifade edebiliriz. Bilgisayar sahipliğinde ise Hindistan'ın, Güney Afrika'nın ve Brezilya'nın gerilerde kaldığı görülebilmektedir. Bireysel internet kullanımında ise, Hindistan %43 ile gerilerde kalırken diğer ülkelerin %70 üzerinde olduğu görülmektedir. Bu veriler genel olarak incelendiğinde Çin ve Hindistan'da nüfusun fazla olması dijital ürünlerin tabana yayılmasında önemli bir sorun olduğu görülmektedir.

Tablo: 1
BRICS-T Ülkelerinin Dijital Göstergeleri

	Brezilya	Rusya	Hindistan	Çin	Güney Afrika	Türkiye
Mobil hücresel ağ tarafından kapsanan nüfus	%90[5]	%99[5]	%99[5]	%100[5]	%100[5]	%100[5]
En az 3g mobil ağ tarafından kapsanan nüfus	%90[5]	%89[5]	%99[5]	%100[5]	%100[5]	%98[5]
En az 4g mobil ağ tarafından kapsanan nüfus	%88[5]	%89[5]	%98[5]	%100[5]	%96[5]	%92[5]
Bireysel cep telefonu sahipliği	%89[5]	%97[5]	NA	NA	%78[4]	%93[6]
Hane halkı internet ulaşımı	%83[5]	%80[5]	%24[3]	NA	%63[4]	%88[6]
Kırsal kesimde hane halkı internet ulaşımı	%65[5]	%72[5]	NA	NA	%43[2]	%27[1]
Hane halkının bir bilgisayar sahipliği	%45[5]	%72[5]	%11[3]	NA	%23[4]	%78[6]
Bireysel internet kullanımı	%81[5]	%100[5]	%43[5]	%70[5]	%70[5]	%81[6]

Not. Veriler ITU DATABASE'den derlenmiştir. [1] 2012 yılına ait veriler. [2] 2017 yılına ait veriler. [3] 2018 yılına ait veriler. [4] 2019 yılına ait veriler. [5] 2020 yılına ait veriler. [6] 2021 yılına ait veriler.

Bu çalışma literatürdeki diğer çalışmalardan farklı olarak BRICS-T ülkelerini ele almış ve literatürde bu konu için daha önce kullanılmamış olan Dumitrescu ve Hurlin (2012: 1450-60) panel nedensellik analizini kullanmıştır. Ayrıca çalışmada, sadece internet penetrasyonu ile diğer değişkenler arasındaki ilişkileri incelememiş, internet penetrasyonu dışındaki değişkenler arasındaki karmaşık ve içsel ilişkileri de analize dahil ederek literatüre önemli bir katkı sağlamıştır. Bu kapsamda çalışmanın ikinci bölümünde değişkenler arasındaki nedensellik ilişkilerinin teorik çerçevesi ampirik literatür ile birlikte incelenecektir. Üçüncü bölümde, çalışmada kullanılan veri seti ve ekonometrik metodoloji tanıtılacaktır. Dördüncü bölümde ampirik analizden elde edilen bulgular sunulduktan sonra, beşinci bölümde çalışmadan elde edilen bulgular değerlendirilerek politika önerilerine yer verilecektir.

2. Teorik Çerçeve ve Ampirik Literatür

İnternet penetrasyonu, doğrudan yabancı yatırımlar, dış ticaret ve ekonomik büyüme arasındaki olası nedensel bağlantıları çiftler halinde incelemek mümkündür. Bu bağlamda ilk olarak, internet penetrasyonu ile ekonomik büyüme arasındaki ilişkiye baktığımızda, ilk hipotez internet penetrasyonunun ekonomik büyümenin nedeni olduğu hipotezidir. Yani internet penetrasyonunun yönlendirdiği bir ekonomik büyüme durumundan söz edebiliriz. Bu durumda internet penetrasyonunun ekonomik birimlerin üretkenliğini, etkinliğini ve tüketimini artırarak ekonomik büyümeye katkıda bulunduğunu söylemek mümkündür (Dünya Bankası, 2018: 27). Öyle ki internet kullanımının artması firmaların bilgiye ulaşımını kolaylaştırmış, teknoloji temelli firmalar üretim maliyetlerinin düşmesini sağlamıştır. Bu durum firmaların üretkenliğini artırmıştır. Diğer taraftan faaliyetlerin internet temelli olması (örneğin online satış, online sipariş, online eğitim gibi) etkinliği önemli ölçüde artırmaktadır. İnternet tüketicilerin tüketim kalıplarını önemli ölçüde değiştirmiş, alışverişin internet üzerinden olması, internet temelli ürünlere (sosyal medya platformları, mobil uygulamalar vs.) talebi artırmış ve tüketimde öncelikli sıralara gelmesine neden olmuştur. Bilgi iletişim teknolojileri aynı zamanda sanayi ve hizmetler sektöründeki her birimin farklı işlevlerini büyük ölçüde etkilemekte, piyasa araştırma yöntemleri, yeni ürün tasarlama ve geliştirme, makineler-cihazlar, üretim ve dağıtım sistemleri, pazarlama ve perakende işlemleri, özel sektör ve kamu yönetimini fazlasıyla etkilemiştir (Özkan & Çelik, 2018: 2). Bu noktada unutulmaması gereken husus, insanların bilgi iletişim teknolojilerini kullanabilmesi söz konusu teknolojilere ulaşım kolaylığı ile doğrudan ilişkilidir. Bu nedenle, ülkelerin internettin ortaya çıkardığı, üretkenlik, etkinlik ve tüketim artışından yararlanabilmesi için bilgi iletişim teknolojilerine olan yatırımların artırılması önem arz etmektedir. İkinci hipotez, ekonomik büyümenin internet penetrasyonunun nedeni olduğu hipotezidir. Bu ekonomik büyüme odaklı internet penetrasyonunun gerçekleştiği anlamına gelir. Böyle bir durumda ekonomik büyümenin artışı daha ileri teknolojiye sahip bilgi iletişim teknolojilerine olan talebi artıracaktır (Maiti et al., 2020: 7). Üçüncü hipotez, internet penetrasyonu ile ekonomik büyümenin karşılıklı nedensellik ilişkisine sahip olduğu yani birbirini güçlendirdiği geri bildirim hipotezidir. Dördüncü hipotez ise, internet penetrasyonu ile ekonomik büyüme arasında bir nedensellik ilişkisi olmadığını ifade eden tarafsızlık hipotezidir.

İnternet penetrasyonu ile doğrudan yabancı yatırımlar arasındaki ilişki çalışmanın araştırdığı bir diğer konudur. İlk hipotez, internet penetrasyonunun doğrudan yabancı yatırımların nedeni olduğu hipotezidir. Buna göre internet penetrasyonunun arttığı ekonomilerde yatırım getirisinin artması beklendiği için doğrudan yabancı yatırımları çekmesi muhtemeldir. Addison ve Heshmati (2004: 1), bilgi iletişim teknolojilerinin yabancı yatırımcılar için üretim ve diğer işlem maliyetlerini azalttığı için gelişmekte olan ekonomilere doğrudan yabancı yatırım girişlerini artırdığını ileri sürmektedir. Bu kapsamda bilgi iletişim teknolojilerine yatırım yapan ülkelerin daha fazla doğrudan yabancı yatırım çektiğini söylemek mümkündür. Özellikle başta teknoloji temelli olanlar olmak üzere çok uluslu şirketlerin bir ülkeye yatırım yapabilmesinin ön koşullarından birisi olarak internet altyapısının yeterliliği olduğunu ifade etmek yanlış olmayacaktır. İkinci hipotez doğrudan yabancı yatırımların internet penetrasyonunu artırdığı yönündedir. Buna göre doğrudan yabancı yatırımlar gelişmiş ileri teknoloji içeren bilgi iletişim teknolojilerine gereksinim duyarlar bu nedenle de doğrudan yabancı yatırım girişlerinin internet penetrasyonunu artıracağı düşünülmektedir. Üçüncü hipotez, internet penetrasyonu ile doğrudan yabancı yatırımların karşılıklı olarak birbirinin nedeni olduğunu öne süren geri bildirim hipotezidir. Bu durum aslında önceki iki hipotezin varlığını desteklemektedir. Dördüncü hipotez ise internet penetrasyonu ile doğrudan yabancı yatırımların birbirinden bağımsız olduğu tarafsızlık hipotezidir.

İnternet penetrasyonu ile dış ticaret arasındaki ilişki de çalışmada araştırılmıştır. Burada da dört farklı hipotez belirlemek mümkündür. İlk olarak internet penetrasyonunun dış ticaretin nedeni olduğu hipotezidir. İnternet penetrasyonunun gelişmesi başta çevrimiçi ticaret olmak üzere ekonomik faaliyetleri dolayısıyla da dış ticareti artıracaktır. Bilgi iletişim teknolojilerine yapılan yatırımların ticareti kolaylaştırıcı etki yarattığı da bir gerçektir. Özellikle, temelde bir tarife gibi ekonomik etkiler doğuran bilgi ve iletişim maliyetlerinin, bilgi iletişim teknolojilerindeki gelişmeler ile birlikte büyük ölçüde azaldığı ve bu durumun dış ticaret sürecine daha fazla katılımın sağlanmasına imkân tanıyarak ülkelerin ihracat ve ithalatlarını pozitif olarak etkilediği öne sürülmektedir (Artan & Kalaycı, 2009: 176). Diğer taraftan ikinci hipotez ise dış ticaretin internet penetrasyonunun nedeni olduğu hipotezidir. Yabancı firmaların yerel ekonomiye girişi bilgi akışını ve daha iyi teknoloji kullanımını üretkenliği, pazar erişimini ve rekabet gücünü artırarak daha fazla bilgi iletişim teknolojilerine olan talebi artırır (Ma & Rauf, 2019: 3). Üçüncü hipotez, internet penetrasyonu ile dış ticaret arasındaki karşılıklı nedensellik ilişkisini veren geri bildirim hipotezidir. Diğer taraftan dördüncü hipotezde, internet penetrasyonu ile dış ticaret arasında herhangi bir nedensellik ilişkisi olmadığını ileri süren tarafsızlık hipotezidir.

İnternet penetrasyonu ile diğer değişkenler arasındaki nedensellik ilişkisinin incelenmesinin yanı sıra diğer değişkenler arasındaki ilişkilerin incelenmesi de önemlidir. Bu kapsamda ilk olarak ekonomik büyüme ile doğrudan yabancı yatırımlar arasındaki ilişkiler incelenmiştir. Benzer şekilde ilk hipotez ekonomik büyümenin doğrudan yabancı yatırımların nedeni olduğu hipotezidir. Ekonomik büyümenin artması ve bir anlamda altyapı tesislerinin ve ekonomik koşulların iyileştirilmesi daha yüksek doğrudan yabancı yatırımı girişi sağlayabilir (Zhang, 2001: 681-682). İkinci hipotez, doğrudan yabancı yatırımların

ekonomik büyümenin nedeni olduğu hipotezidir. Doğrudan yabancı sermaye yatırımları, beşerî sermayenin gelişimine, verimliliğin yayılmasına neden olmakta ve toplam talebi artırarak ekonomik büyümeye katkı sağlamaktadır (Borensztein et al., 1998: 116; Zhang, 2001: 680-682; Akinlo, 2004: 68-69; Zhao & Du, 2007: 628-629). Üçüncü olarak, doğrudan yabancı yatırımlar ile ekonomik büyüme arasında karşılıklı nedensellik olduğunu ileri süren geribildirim hipotezidir. Dördüncü hipotez ise, iki değişken arasında ilişki olmadığını ileri süren geribildirim hipotezidir.

Çalışmada ekonomik büyüme ile dış ticaret arasındaki nedensellik ilişkileri de incelenmiştir. İlk hipotez ekonomik büyümenin dış ticaretin nedeni olduğu hipotezidir. Ekonomik büyüme üretkenliği artırır ve yatırımcıların getirisini artırmaktadır. Dolayısıyla ülkeler küresel ticaretin bir parçası olmaya başlar ve bu durum hem ihracat hem de ithalatı artırır. İkinci hipotez ise, dış ticaretin ekonomik büyümenin nedeni olduğu hipotezidir. Dış ticaret öncelikle çarpan yoluyla ekonomik büyümeyi artırabilir. Dış ticaret ihracat artışı ile birlikte pazar paylarının genişlemesine, ölçek ekonomilerinden yaralanmaya ve dolayısıyla ekonomik büyümenin artmasına neden olabilir. Üçüncü hipotez iki değişken arasında karşılıklı bir nedensellik ilişkisini öngörmektedir ve geri bildirim hipotezi olarak adlandırılmaktadır. Bu durum önceki iki hipotezin varlığını destekler bir hipotezdir. Dördüncü hipotez ise, iki değişken arasında ilişki olmadığını öne süren tarafsızlık hipotezidir.

Son olarak dış ticaret ile doğrudan yabancı yatırımlar arasındaki nedensellik ilişkisi üzerine dört farklı hipotezden bahsedebiliriz. İlk hipotez, dış ticaretin doğrudan yabancı yatırımların nedeni olduğunu ileri süren hipotezdir. Bu hipotezin arka planında ticaret yasaklarının kalkması ile birlikte dış ticaretin artması ülkeye daha fazla yabancı sermaye girişini desteklediği yönündedir. İkinci hipotez, doğrudan yabancı yatırımların dış ticaretin nedeni olduğu hipotezidir. Doğrudan yabancı sermaye yatırımları ile birlikte bir ülkede daha fazla ara mal ithalatı, daha fazla nihai mal ihracatını destekleyeceği için dış ticareti artıracağı ifade edilebilir. Üçüncü hipotez dış ticaret ile doğrudan yabancı yatırımlar arasında karşılıklı nedensellik ilişkisi olduğu ve birbirini beslediği yönündedir. Dördüncü hipotez ise iki değişken arasında nedensellik ilişkisi olmadığını ileri süren tarafsızlık hipotezidir.

Çalışmada ele aldığımız değişkenler arasındaki ilişkileri inceleyen ampirik literatür oldukça geniştir. Tablo 2'de internet penetrasyonu ile diğer değişkenler arasındaki ilişkileri inceleyen çalışmaların bir özeti sunulmuştur. Söz konusu çalışmalar genel olarak değerlendirildiğinde, internet penetrasyonu ile ekonomik büyüme, doğrudan yabancı yatırımlar ve dış ticaret arasında olumlu ilişkilerin olduğuna yönelik bulguların elde edildiği gözlemlenmektedir.

Tablo: 2
Ampirik Literatür Özeti

Yazar(lar)	Ülke (Dönem)	Yöntem	Bulgular
Röller & Waverman (2001)	21 OECD Ülkesi (1971-1990)	GMM	Telekomünikasyon altyapısındaki artışlar ekonomik büyümeyi artırmaktadır.

Gholami, vd. (2006)	23 Gelişmiş Ülke (1976-1999)	Panel Granger Nedensellik	Bilgi iletişim teknolojilerinden doğrudan yabancı yatırımlara doğru tek yönlü bir nedensellik söz konusudur.
Veeramacheneni vd. (2008)	Hindistan (1970-2005)	Hata Düzeltme Modeli	Bilgi iletişim teknolojilerine yapılan yatırımlar doğrudan yabancı yatırımları artırmaktadır.
Shirazi vd. (2010)	17 Ülke (1996-2005)	Panel Düzeltilmiş Standart Hatalar Yöntemi	Ekonomik büyüme, doğrudan yabancı yatırımlar ve dış ticaretin bilgi iletişim teknolojileri üzerinde olumlu etkileri olduğunu göstermektedir.
Vu (2011)	102 Ülke (1996-2005)	GMM	İnternet penetrasyonundaki artışlar ekonomik büyümeyi artırmaktadır.
Yousefi (2011)	62 Ülke (2000-2006)	Havuzlanmış Panel Veri Analizi	Bilgi iletişim teknolojilerinin yüksek ve üst-orta gelir gruplarının büyümesinde önemli bir rol oynadığı, ancak alt-orta gelir grubu ülkelerinin büyümesine katkıda bulunmadığı
Arvin & Pradhan (2014)	G20 Ülkeleri (1998-2011)	Granger Nedensellik Testi	Geniş bant penetrasyonu ile ekonomik büyüme arasında karşılıklı nedensellik ilişkisi söz konusudur.
Pradhan vd. (2014)	G20 Ülkeleri (1991-2012)	Panel Granger Nedensellik ve Panel VAR	Telekominikasyon altyapısı ve ekonomik büyüme arasında karşılıklı nedensellik ilişkileri söz konusudur.
Jorgenson & Vu (2016)	G7 Ülkeleri (1990-2012)	Projeksiyon	Bilgi iletişim teknolojileri ekonomik büyüme üzerinde olumlu etkilere sahiptir.
Salahuddin & Gow (2016)	Güney Afrika (1991-2013)	ARDL	İnternet kullanımı GSYH'yi artırmaktadır.
Pradhan vd. (2017a)	21 Asya Ülkesi (1965-2012)	Panel VAR	Telekominikasyon altyapısı ve kullanımı ile FDI ve ekonomik büyüme üzerinde olumlu sonuçlara yol açmaktadır.
Pradhan vd. (2017b)	G20 Ülkeleri (1990-2014)	Panel Eşbütünleşme ve Panel Granger Nedensellik Testleri	Ekonomik büyüme, doğrudan yabancı yatırımlar ve bilgi iletişim teknolojileri (cep telefonu kullanımı) arasında karşılıklı nedensellik ilişkileri söz konusudur.
Pradhan vd. (2017c)	32 Yüksek Gelirli OECD Ülkesi (1970-2016)	Panel Eşbütünleşme Testleri	Bilgi iletişim teknolojileri ile ekonomik büyüme arasında uzun dönemli bir ilişki söz konusudur.
Latif vd. (2018)	BRICS (2000-2014)	Fixed Effect OLS, DOLS ve FMOLS	Bilgi iletişim teknolojileri ve doğrudan yabancı yatırımlar ekonomik büyümeyi artırmaktadır.
Niebel (2018)	59 Ülke (1995-2010)	Panel Veri Analizi	Bilgi iletişim teknolojileri ile ekonomik büyüme arasında pozitif bir ilişki söz konusudur.
Haini (2019)	ASEAN (1999-2014)	GMM Methodu	İnternet penetrasyonunda meydana gelen artış ekonomik büyümeyi artırmaktadır.
Mayer vd. (2020)	29 OECD Ülkesi (2008:1-2012:4)	Panel Veri Analizi Treshold Model	Bant genişliği ekonomik büyümeyi olumlu bir şekilde etkilemektedir.
Kurniawati (2020)	31 OECD Ülkesi (1996-2017)	Panel Granger Nedensellik	Bilgi iletişim teknolojileri ekonomik büyümeyi olumlu yönde etkilemektedir.
Arvin vd. (2021)	G20 (1961-2019)	Panel Granger Nedensellik	Bilgi iletişim teknolojileri, ekonomik büyüme, doğrudan yabancı yatırımlar ve dış ticaret arasında nedensel bağlantılar söz konusudur.

Literatürde, internet penetrasyonu dışında yer alan değişkenlere ait ilişkileri sunan çalışmalar da yer almaktadır. Söz konusu çalışmalardan, ekonomik büyüme ile doğrudan yabancı yatırımlar arasındaki ilişkileri inceleyen çalışmalara rastlamak mümkündür[3]. Benzer şekilde ekonomik büyüme ile dış ticaret arasındaki ilişkileri inceleyen çalışmalar[4] ve doğrudan yabancı yatırımlar ile dış ticaret arasındaki ilişkileri inceleyen çalışmalar da[5] literatürde yer almaktadır.

3. Veri Seti ve Yöntem

Çalışmada 1993-2019 dönemi için BRICS-T (Brezilya, Rusya, Hindistan, Çin, Güney Afrika ve Türkiye) ülkelerinde internet penetrasyonu IP_{it} , doğrudan yabancı

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[3] *Luiz and de Mello (1997), Borensztein vd. (1998), Bosworth & Collins (1999), Zhang (1999), Ericsson & Irandoust (2001), Li & Liu (2005), Hansen & Rand (2006), Herzer vd. (2008), Anwar & Nquyen (2010), Belloumi (2014), Seyoum vd. (2015), Sunde (2017), Yaman Songur (2017), Dinh vd. (2019), Yeboua (2021).*

[4] *Baltagi vd. (2009), Menyah vd. (2014), Ulaşan (2014), Pradhan vd. (2015), Pradhan vd. (2016), Huchet-Bourdon vd. (2017), Keho (2017), Roy (2020), Saimul & Darmawan (2020), Qui (2021).*

[5] *Yaoxing (2010), Liargovas & Skandalis (2012), Seyoum vd. (2014), Donghui vd. (2018), Sazali vd. (2018), Niketiah vd. (2019), Tiba & Belaid (2020), Tiwari vd. (2022).*

yatırımlar FDI_{it}, dış ticaret FT_{it} ve ekonomik büyüme GDP_{it} arasındaki nedensellik ilişkilerini incelemek için panel veri analiz tekniklerinden yararlanılmıştır. Analizde kullanılan veriler Dünya Bankası Dünya Kalkınma Göstergelerinden elde edilmiştir. İnternet penetrasyonu değişkeni için bireysel internet kullanıcılarının toplam nüfus içerisindeki payı kullanılmıştır. Doğrudan yabancı yatırımlar değişkeni için net akımların GSYH içerisindeki payı kullanılmıştır. Dış ticaret değişkeni için mal ve hizmet ithalat ve ihracatının GSYH içerisindeki paylarının toplamı kullanılmıştır. Ekonomik büyüme değişkeni için ise GSYH'nın yıllık büyüme hızı alınmıştır. Bu kapsamda değişkenlere ait betimleyici istatistikler Tablo 3'te sunulmuştur.

Tablo: 3
Betimleyici İstatistikler

	IP_{it}	FDI_{it}	FT_{it}	GDP_{it}
Ortalama	22.823	2.032	42.961	4.571
Standart Sapma	24.557	1.419	12.896	4.326
Minimum Değer	0.000	0.010	15.640	-12.570
Maksimum Değer	82.64	6.190	69.390	14.230

Panel veri analiz tekniklerinden yararlanılan çalışmada öncelikle ülkeler arasındaki bağımlılığın tespiti araştırılmıştır. Ülkelerden birisinde meydana gelen bir şokun diğer ülkeleri de etkilemesi yatay kesit bağımlılığı testleri ile araştırılmaktadır. Testlerden elde edilen bulgular doğrultusunda ele alınan ülke grubunda yatay kesit bağımlılığı söz konusu ise analizin ilerleyen aşamalarında söz konusu durumun özellikle dikkate alınması ve yatay kesit bağımlılığı sorununu dikkate alan analiz tekniklerinin kullanılması doğru olacaktır. Bu kapsamda çalışmada dört farklı yatay kesit bağımlılığı testi kullanılmıştır. İlk olarak Breusch-Pagan (1980: 239-253) tarafından geliştirilen CD_{BP} testi kullanılmıştır. Test zaman boyutunun sonsuza gittiği durumda kullanılmaktadır ve yokluk hipotezi "yatay kesit bağımlılığı yoktur" şeklinde kurulmuştur. İkinci olarak, Pesaran (2004: 1-39)'ın önerdiği CD_{LM1} testi kullanılmıştır. Test veri setinin zaman ve eşit boyutu sonsuza giderken kullanılmaktadır ve yokluk hipotezi "yatay kesit bağımlılığı yoktur" şeklinde kurulmuştur. Üçüncü olarak, yine Pesaran (2004: 1-39)'ın önerdiği CD_{LM} testi kullanılmıştır. Söz konusu test kesit boyutunun sonsuza gittiği ve zaman boyutunun sabit olduğu durumda kullanılmaktadır ve yokluk hipotezi benzer şekilde "yatay kesit bağımlılığı "yoktur şeklinde kurulmuştur. Son olarak Pesaran vd. (2008: 105-127)'nin önerdiği CD_{adj} testi olup, bu test Breusch ve Pagan (1980: 239-253)'ın önerdiği testin düzeltilmiş versiyonudur. Pesaran vd. (2008)'ne göre CD_{BP} testi grup ortalaması sıfır ancak bireysel ortalamalarda sıfırdan farklı iken sapmalı olmaktadır. Pesaran vd. (2008: 105-127) bu sapmayı, test istatistiğine varyans ve ortalama dahil ederek düzeltmiştir. CD_{adj} testinde de yokluk hipotezi "yatay kesit bağımlılığı yoktur" şeklinde kurulmuştur.

Çalışmada serilerin durağanlık özellikleri yatay kesit bağımlılığını da dikkate alan Pesaran (2007: 256-312)'ın CIPS panel birim kök testi ile araştırılmıştır. Pesaran (2007: 256-312)'ın geliştirdiği CADF birim kök testi (1) numaralı modele dayanmaktadır.

$$\Delta y_{it} = a_i + b_i y_{it-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + \varepsilon_{it} \tag{1}$$

Yukarıdaki modelde, durağanlığı araştırılacak seri için $\bar{y}_t$, yatay kesit ortalamasını; $(\bar{y}_{t-1}, \bar{y}_{t-2}, \ldots)$, yatay kesit ortalamasının gecikmeli değerlerini ifade etmektedir. $\Delta \bar{y}_t$ ise genel faktör yapısına bağlı olarak yatay kesit bağımlılığını dikkate alan kukla (proxy) değişkendir (Pesaran, 2007: 269). Pesaran (2007) tarafından geliştirilen CADF panel birim kök testinde yokluk hipotezi, "paneli oluşturan her bir yatay kesite ait serinin birim kök içerdiği", alternatif hipotez ise "paneli oluşturan yatay kesitlerin belirli bir bölümünün birim kök içermediği" şeklinde kurulmuştur (Pesaran, 2007: 267-269). Modelde yer alan b_i katsayıları CADF istatistiğini vermektedir. Elde edilen t-istatistikleri Pesaran (2007: 256-312)'ın sunduğu mevcut kritik değerler ile karşılaştırılır ve her bir yatay kesite ait serinin birim kök içerip içermediğine karar verilir. Panel veri setinin durağanlığının testi için CADF istatistiklerinin ortalaması (2) numaralı eşitlikteki gibi alınmaktadır. Bu değer kesit açısından genişletilmiş IPS (Cross-sectionally augmented IPS-CIPS) test istatistiğidir.

$$CIPS = N^{-1} \sum_{i=1}^{N} CADF_i \sim N(0,1) \tag{2}$$

Elde edilen CIPS değerleri Pesaran (2007: 256-312)'de verilen kritik değerlerle karşılaştırılır ve değişkenlerin durağan olup olmadıkları sınanır.

Çalışmada ele alınan değişkenler arasındaki nedensellik ilişkisi, Dumitrescu ve Hurlin (2012: 1450-60) tarafından geliştirilen nedensellik testi kullanılarak araştırılmıştır. Bu test, Granger (1969: 424-38) nedensellik testine dayanmakta olup, söz konusu testten farklı olarak yatay kesit bağımlılığını dikkate almaktadır. Ayrıca test eşbütünleşme ilişkisinin varlığından bağımsız olarak kullanılabilir bir testtir. Dumitrescu ve Hurlin (2012: 1450-60) x ve y'nin durağan olduğu varsayımı altında (3) numaralı denklemi takip etmişlerdir:

$$y_{it} = \alpha_i + \sum_{k=1}^{K} \gamma_i^{(k)} y_{it-k} + \sum_{k=1}^{K} \beta_i^{(k)} x_{it-k} + \varepsilon_{it} \tag{3}$$

Burada k, optimal gecikme uzunluğunu ifade etmektedir. Ayrıca bu testte, otoregresif katsayılar olan $\gamma_i^{(k)}$'nın ve regresyon eğim katsayıları olan $\beta_i^{(k)}$'ların zaman içinde sabit oldukları kabul edilerek gruplar arası değişimlere izin verilmektedir. Testin yokluk hipotezi "bütün yatay kesitlerde x'ten y'ye nedensellik ilişkisi yoktur $[\beta_i = 0 \ \forall_i = 1, \ldots, N]$" şeklinde, alternatif hipotez ise "bazı yatay kesitlerde x'ten y'ye nedensellik ilişkisi vardır $[\beta_i = 0 \ \forall_i = 1, \ldots, N_1 ; \ \beta_i \neq 0 \ \forall_i = N_1 + 1, N_1 + 2, \ldots, N]$" şeklinde kurulmuştur.

Dumitrescu ve Hurlin (2012: 1450-60) panel nedensellik testinde her bir yatay kesit için bireysel Wald istatistikleri $(W_{i,T})$ hesaplanmakta ve bireysel Wald istatistiklerinin aritmetik ortalamasını alarak panele ait Wald istatistiği $\left(W_{N,T}^{HNC} = \left(\frac{1}{N}\right) \sum_{i=1}^{N} W_{i,T}\right)$ elde etmektedir. Dumitrescu ve Hurlin (2012: 1450-60) panel nedensellik testinde zaman boyutu kesit boyutundan büyük olduğunda (T>N) (4) numaralı eşitlikte sunulan asimptotik dağılıma sahip $Z_{N,T}^{HNC}$ test istatistiği kullanılmaktadır.

$$Z_{N,T}^{HNC} = \sqrt{\frac{N}{2K}}\left(W_{N,T}^{HNC} - K\right) \tag{4}$$

Bu kapsamda çalışmada T>N olduğu için Dumitrescu ve Hurlin (2012: 1450-60)'in önerdiği $Z_{N,T}^{HNC}$ test istatistiği kullanılmış olup, bu test istatistiği çerçevesinde değişkenler arasındaki nedensellik ilişkisinin varlığına karar verilmiştir.

4. Bulgular

Çalışmada 1993-2019 dönemi için BRICS-T ülkelerinde internet penetrasyonu, doğrudan yabancı yatırımlar, dış ticaret ve ekonomik büyüme arasındaki nedensellik ilişkilerini incelemek için öncelikle ele alınan panel veri setinde yer alan değişkenlere ait yatay kesit bağımlılığı testleri yapılmış olup, bulgular Tablo 4'te sunulmuştur. Bulgulara göre, internet penetrasyonu, doğrudan yabancı yatırımlar ve dış ticaret değişkenlerinde tüm testlerde yatay kesit bağımlılığı söz konusudur. Ekonomik büyüme değişkeninde ise sadece Pesaran (2004: 1-39)'ın CD_{LM} testinde yatay kesit bağımlılığı söz konusudur. Bulgular bir arada değerlendirildiğinde ele alınan değişkenlerde yatay kesit bağımlılığının olduğu ve analizin ilerleyen aşamalarında bu durumun dikkate alınması gerektiği ifade edilebilir.

Tablo: 4
Yatay Kesit Bağımlılığı Test Sonuçları

	IP_{it}	FDI_{it}	FT_{it}	GDP_{it}
CD_{BP}	31.917(0.007)***	31.696(0.007)***	32.376(0.006)***	21.537(0.121)
CD_{LM1}	3.089(0.001)***	3.048(0.001)***	3.172(0.001)***	1.193(0.116)
CD_{LM}	-3.419(0.000)***	-2.598(0.005)***	-2.819(0.002)***	-1.776(0.038)**
CD_{adj}	5.086(0.000)***	8.214(0.000)***	3.056(0.001)***	0.845(0.199)

*Not. Parantez içerisindeki değerler olasılık değerlerini göstermektedir. ***, ** ve * sırasıyla %1, %5 ve %10 anlamlılık düzeylerini ifade etmektedir.*

Analizin bir sonraki aşamasında değişkenlerin durağanlık özellikleri incelenmiştir. Yatay kesit bağımlılığının varlığından dolayı çalışmada bu sorunu dikkate alan Pesaran (2007: 256-312)'ın CIPS (yani CADF) panel birim kök testi kullanılmıştır. Elde edilen bulgular Tablo 5'te sunulmuştur. Bulgulara göre, doğrudan yabancı yatırımlar ile dış ticaret değişkenleri düzeyde durağan iken internet penetrasyonu ile ekonomik büyüme değişkenleri birinci farkta durağan hale gelmektedir. Buna göre değişkenler arasındaki nedensellik ilişkileri incelenirken, öncelikle düzeyde durağan olmayan seriler durağan hale getirilmiş daha sonra nedensellik analizi gerçekleştirilmiştir.

Tablo: 5
CIPS Birim Kök Sınaması Sonuçları

Düzey	CIPS Test İstatistiği	Birinci Fark	CIPS Test İstatistiği
IP_{it}	0.256	ΔIP_{it}	-2.545**
FDI_{it}	-2.757***	ΔFDI_{it}	-5.354***
FT_{it}	-3.285***	ΔFT_{it}	-5.547***
GDP_{it}	-2.200	ΔGDP_{it}	-3.884***

*Not. Sabit içeren modeller için gecikme uzunlukları maksimum 4 olarak alınmıştır. ***, ** ve * sırasıyla %1, %5 ve %10 anlamlılık düzeylerini ifade etmektedir. CIPS testi için kritik değerler %1, %5 ve %10 anlamlılık düzeyleri için sırası ile -2.57, -2.33 ve -2.21'dir.*

Çalışmada ele alınan değişkenler arasındaki nedensellik ilişkisi, Dumitrescu ve Hurlin (2012: 1450-60) tarafından geliştirilen nedensellik testi kullanılarak araştırılmış olup, 1993-2019 dönemine ait bulgular Tablo 6'de sunulmuştur. Bulgulara baktığımızda ilk olarak internet penetrasyonu ile doğrudan yabancı yatırımlar arasında karşılıklı bir nedensellik ilişkisi olduğu söylenebilir. İkinci olarak, internet penetrasyonu ile dış ticaret arasındaki nedensellik ilişkisine bakıldığında, nedenselliğin internet penetrasyonundan dış ticarete doğru olduğu görülmektedir. Benzer şekilde internet penetrasyonu ile ekonomik büyüme arasındaki nedensellik ilişkisine bakıldığında ilişkinin internet penetrasyonundan ekonomik büyümeye doğru olduğu görülmektedir.

Tablo: 6
Dumitrescu ve Hurlin (2012) Nedensellik Testi Sonuçları (1993-2019)

Hipotez	W-stat	Z-stat	Olasılık	Gecikme Uzunluğu	Karar
$IP_{it} \nRightarrow FDI_{it}$	14.199	5.798	0.000***	6	H_0: Red
$FDI_{it} \nRightarrow IP_{it}$	7.475	3.009	0.003***	4	H_0: Red
$IP_{it} \nRightarrow FT_{it}$	4.573	6.189	0.000***	1	H_0: Red
$FT_{it} \nRightarrow IP_{it}$	7.876	1.327	0.185	6	H_0: Kabul
$IP_{it} \nRightarrow GDP_{it}$	2.522	2.637	0.008***	1	H_0: Red
$GDP_{it} \nRightarrow IP_{it}$	0.921	-0.138	0.890	1	H_0: Kabul
$FDI_{it} \nRightarrow FT_{it}$	1.245	0.424	0.671	1	H_0: Kabul
$FT_{it} \nRightarrow FDI_{it}$	8.326	2.576	0.010**	5	H_0: Red
$FDI_{it} \nRightarrow GDP_{it}$	2.812	3.139	0.002***	1	H_0: Red
$GDP_{it} \nRightarrow FDI_{it}$	0.694	-0.530	0.596	1	H_0: Kabul
$FT_{it} \nRightarrow GDP_{it}$	6.976	6.072	0.000***	2	H_0: Kabul
$GDP_{it} \nRightarrow FT_{it}$	4.415	5.915	0.000***	1	H_0: Kabul

*Not. Maksimum gecikme uzunluğu 6 olarak alınmıştır. ***, ** ve * sırasıyla %1, %5 ve %10 anlamlılık düzeylerini ifade etmektedir. ⇏ notasyonu nedeni olmadığını ifade etmektedir.*

İnternet penetrasyonundan farklı olarak diğer değişkenler arasındaki nedensellik ilişkisine bakıldığında, dış ticaretten doğrudan yabancı yatırımlara doğru ve doğrudan yabancı yatırımlardan ekonomik büyümeye doğru bir nedensellik ilişkisi olduğu görülmektedir. Ayrıca dış ticaret ile ekonomik büyüme arasında da karşılıklı bir nedensellik ilişkisi söz konusudur. Çalışmadan elde edilen bulgular çerçevesinde değişkenler arasındaki nedensellik ilişkilerine ait bulgular toplu olarak Şekil 3'te gösterilmiştir.

Şekil: 3
Nedensellik İlişkileri (1993-2019)

Ülkelerde 2000 yılından sonra internet kullanımındaki artışla beraber bu dönemin ayrıca incelemesi önem arz etmektedir. Bu kapsamda 2000-2019 dönemine ait bulgular Tablo 7'de verilmiştir Bulgulara baktığımızda ilk olarak bu özel dönemde doğrudan yabancı yatırımların internet penetrasyonunun nedeni olduğu görülmektedir. İkinci olarak, internet penetrasyonunun dış ticaretin nedeni olduğu sonucuna ulaşılmıştır. Üçüncü olarak internet penetrasyonu ile ekonomik büyüme arasındaki nedensellik ilişkisine bakıldığında ilişkinin karşılıklı bir nedensellik ilişkisi olduğu görülmektedir. 1993-2019 döneminden farklı olarak 2000-2019 döneminde, internet penetrasyonu doğrudan yabancı yatırımların nedeni değilken, ekonomik büyüme internet penetrasyonunun nedeni olarak karşımıza çıkmaktadır.
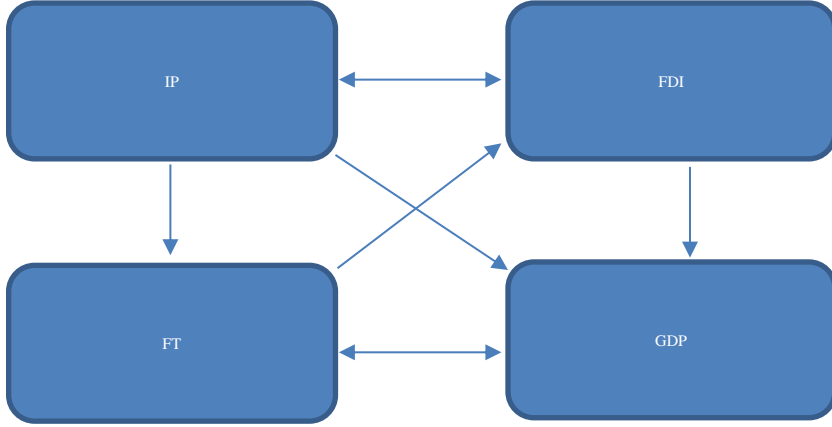
Tablo: 7
Dumitrescu ve Hurlin (2012) Nedensellik Testi Sonuçları (2000-2019)

Hipotez	W-stat	Z-stat	Olasılık	Gecikme Uzunluğu	Karar
$IP_{it} \nRightarrow FDI_{it}$	1.105	0.182	0.856	1	H_0: Kabul
$FDI_{it} \nRightarrow IP_{it}$	7.903	3.380	0.001***	4	H_0: Red
$IP_{it} \nRightarrow FT_{it}$	4.021	5.232	0.000***	1	H_0: Red
$FT_{it} \nRightarrow IP_{it}$	0.466	-0.925	0.355	1	H_0: Kabul
$IP_{it} \nRightarrow GDP_{it}$	2.534	2.656	0.008***	1	H_0: Red
$GDP_{it} \nRightarrow IP_{it}$	6.744	3.744	0.000***	3	H_0: Red
$FDI_{it} \nRightarrow FT_{it}$	7.075	2.663	0.008***	4	H_0: Red
$FT_{it} \nRightarrow FDI_{it}$	1.886	1.534	0.125	1	H_0: Kabul
$FDI_{it} \nRightarrow GDP_{it}$	2.413	2.448	0.0144**	1	H_0: Red
$GDP_{it} \nRightarrow FDI_{it}$	0.884	-0.202	0.840	1	H_0: Kabul
$FT_{it} \nRightarrow GDP_{it}$	17.493	14.494	0.000***	3	H_0: Kabul
$GDP_{it} \nRightarrow FT_{it}$	7.052	10.482	0.000***	1	H_0: Kabul

*Not. Maksimum gecikme uzunluğu 4 olarak alınmıştır. ***, ** ve * sırasıyla %1, %5 ve %10 anlamlılık düzeylerini ifade etmektedir. ⇏ notasyonu nedeni olmadığını ifade etmektedir.*

İnternet penetrasyonundan farklı olarak diğer değişkenler arasındaki nedensellik ilişkisine bu alt dönem için bakıldığında, doğrudan yabancı yatırımlardan dış ticarete doğru

ve doğrudan yabancı yatırımlardan ekonomik büyümeye doğru bir nedensellik ilişkisi olduğu görülmektedir. Ayrıca dış ticaret ile ekonomik büyüme arasında da karşılıklı bir nedensellik ilişkisi söz konusudur. Çalışmadan elde edilen bulgular çerçevesinde 2000-2019 dönemi için değişkenler arasındaki nedensellik ilişkilerine ait bulgular toplu olarak Şekil 4'te gösterilmiştir.

Şekil: 4
Nedensellik İlişkileri (2000-2019)
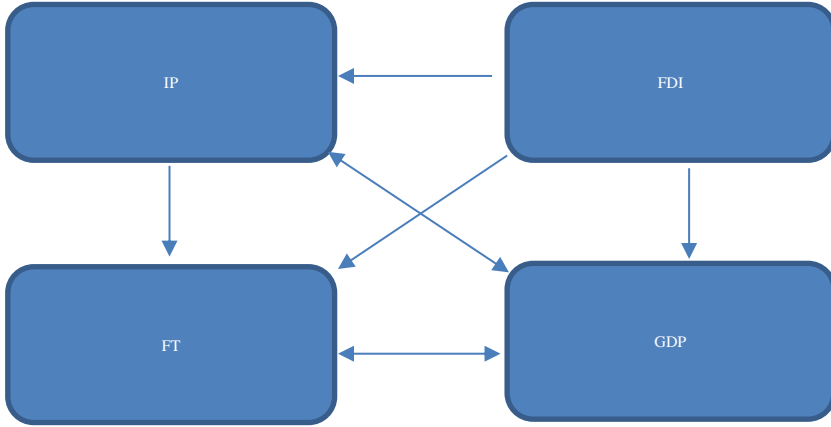
5. Sonuç

Bu çalışmada, BRICS-T ülkelerinde internet penetrasyonu, doğrudan yabancı yatırımlar, dış ticaret ve ekonomik büyüme arasındaki nedensellik ilişkileri incelenmiştir. Bu çalışma literatürdeki diğer çalışmalardan farklı olarak BRICS-T ülkelerini ele almış ve literatürde bu konu için daha önce kullanılmamış olan Dumitrescu ve Hurlin (2012: 1450-60) panel nedensellik analizini kullanmıştır. Ayrıca çalışmada, sadece internet penetrasyonu ile diğer değişkenler arasındaki ilişkileri incelememiş, diğer değişkenler arasındaki karmaşık ve içsel ilişkileri de analize dahil ederek literatüre önemli bir katkı sağlamıştır. Çalışmada en geniş kapsamlı veri seti olan 1993-2019 dönemi için nedensellik analizi yapılmasının dışında, 2000 yılından sonra internet kullanımının artması ile bu durum 2000-2019 dönemine ait veriler yardımıyla ayrıca incelenmiştir.

Bulgular, internet penetrasyonu ile doğrudan yabancı yatırımlar arasında 1993-2019 döneminde karşılıklı bir nedensellik ilişkisi olduğunu göstermektedir. Bu kapsamda iki değişken arasında geri bildirim hipotezinin geçerli olduğu söylenebilir. Bu bağlamda, internet penetrasyonundaki artışların doğrudan yabancı yatırımları çekmede önemli bir faktör olduğu söylenebilir. Diğer taraftan doğrudan yabancı yatırımların internet penetrasyonunun bir nedeni olması giriş yapan doğrudan yabancı yatırımların bilgi iletişim teknolojilerine gereksinim duyduklarını göstermektedir. Bununla birlikte, 2000-2019

döneminde internet penetrasyonundan doğrudan yabancı yatırımlara doğru olan nedensellik ilişkisi kaybolmuştur. Bunun olası nedenleri içerisinde ülkelerin 2000'li yıllarda internetin tüm dünyada hızla yaygınlaşmasının ve bu konudaki yatırımların bir gereklilikten ziyade bir zorunluluğa dönüşmesinden kaynaklanması olarak gösterilebilir. Zira ülkelerin bilgi iletişim teknolojilerine yatırımlar söz konusu dönemde hızla artırdıkları bir gerçektir.

Ayrıca bulgulara göre hem geniş hem de alt dönem için internet penetrasyonu dış ticaretin bir nedenidir. Bu durum başta çevrimiçi ticaret olmak üzere internet penetrasyonunun dış ticareti artırdığını göstermektedir. Söz konusu ilişkinin tek yönlü olmasının temel nedeni bilgi iletişim teknolojilerine yapılan yatırımların daha çok ticareti kolaylaştırıcı etkisinin olmasından kaynaklıdır. Dış ticaretin internet penetrasyonunun nedeni olmaması ise ticarete konu olan ürünlerin önemli bir kompozisyonunun internetin yaygınlaşmasını artıran ürünler olmamasından kaynaklı olabilir. Diğer taraftan, 1993-2019 döneminde internet penetrasyonu ekonomik büyümenin nedenidir. 2000-2019 alt döneminde ise internet penetrasyonu ile ekonomik büyüme arasındaki nedensellik ilişkisinin karşılıklı olduğu görülmüştür. Bu durumun gerçekleşmesinin temel nedeni 2000 sonrasında bilgi iletişim teknolojilerine yapılan yatırımların daha da artmasından kaynaklanmakta olup, internet penetrasyonu ile ekonomik büyüme birbirini beslemektedir.

Çalışmada elde edilen bir diğer bulgu, ekonomik büyüme ile dış ticaret arasında karşılıklı bir nedensellik ilişkisinin tespit edilmiş olmasıdır. Ekonomik büyüme ile ithalat ve ihracat arasında geri bildirim hipotezinin geçerli olması özellikle veri setinin ele alındığı dönem dikkate alındığında (küreselleşmenin ve dış ticaretin arttığı dönem) beklenen bir durumdur. Diğer taraftan dış ticaretin doğrudan yabancı yatırımların nedeni olduğu sonucuna da ulaşılmıştır. Ele alınan dönemde, ticaret yasaklarının kalkması birlikte dış ticaretin artması ülkeye daha fazla doğrudan yabancı yatırımcı girişini destekleyen bir unsur olmuştur. Ayrıca doğrudan yabancı yatırımların ekonomik büyümenin nedeni olduğu sonucuna da ulaşılmıştır. Doğrudan yabancı yatırımlar beşerî sermayenin gelişmesine ve verimliliğin artmasına neden olarak toplam talebin artmasını sağlamış ve dolayısıyla da ekonomik büyümenin artışına neden olmuştur denilebilir. Çalışmadan elde edilen bulgular, literatürde yer alan Röller ve Waverman (2001), Shirazi vd. (2010), Vu (2011), Yousefi (2011), Arvin ve Pradhan (2014), Pradhan vd. (2014), Pradhan vd. (2017c), ve Arvin vd. (2021)'nin çalışmalarından elde edilen bulguları desteklemektedir.

Tüm sonuçlar bir arada değerlendirildiğinde, BRICS-T ülkelerindeki politika yapıcılar doğrudan yabancı yatırımları, dış ticareti ve ekonomik büyümeyi artırmayı amaçlıyorlarsa, internet penetrasyonunu artırmaları yani bilgi iletişim teknolojisi yatırımlarını artırmaları gerektiği söylenebilir. Dahası ilgili değişkenlere ait bir politika belirlenirken politika yapıcıların koordinasyon halinde söz konusu politikaları geliştirmeleri önemlidir. Dijital bağlantı kalitesindeki artışlar ekonomik göstergeleri olumlu anlamda doğrudan etkileyebilir. Dijital platformların artışı ve erişimin önündeki engellerin kalkması tedarik zincirlerini dolayısıyla da dış ticareti olumlu anlamda etkileyeceğini ifade edebiliriz. Dijital altyapının ayrıca finansal ekosistemi de destekleyici bir unsur olacağı bu noktada unutulmamalıdır. Diğer taraftan bilgi iletişim teknolojilerine ihtiyaç duyulan ve neredeyse

tüm ülkelerin ilgili sektördeki strateji ve hedefleri arasında yer alan yapay zekâ, bulut bilişim, dijital gerçeklik, blokzincir, nesnelerin interneti ve veri bilimi ilerleyen süreçlerde daha fazla önem kazanacaktır. Bu kapsamda internet penetrasyonunun artması ilgili strateji ve hedeflere ulaşılmasında dolayısıyla elde ettiğimiz bulgular kapsamında ekonomik büyümenin, bilgi iletişim teknolojilerini içeren doğrudan yabancı yatırımların ve dış ticaret hacminin artmasında önemli bir rol oynayabilir.

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Terörizmin Zamanla Değişen Ekonomik Sonuçları: Türkiye Örneği

Ergün AKTÜRK *(https://orcid.org/0000-0001-6925-1850), Atatürk University, Türkiye; eakturk@atauni.edu.tr*

Muhammet DAŞTAN[1] *(https://orcid.org/0000-0001-6067-8946), Ağrı İbrahim Çeçen University, Türkiye; mdastan@agri.edu.tr*

Ömer YALÇINKAYA *(https://orcid.org/0000-0002-1210-2405), Atatürk University, Türkiye; oyalcinkaya@atauni.edu.tr*

Time-Varying Economic Consequences of Terrorism: The Case of Turkey

Abstract

This study aims to analyse the economic consequences of terrorism in Turkey over the period of 1970q1-2020q4. For this purpose, the study constructs two different terrorism indices using equal and impact-weighted values of the data belonging to all measurable dimensions of terrorist acts. In addition, the study considers the effects of terrorism on economic growth and its components may vary in different periods (specific periods and short-middle-long terms) and investigates these time-varying effects by employing the TVP-SVAR model. Empirical evidence suggests that time is an important factor in the emergence of the economic consequences of terrorism and/or that these outcomes vary significantly over the sampling period.

Keywords : Terrorism Index, Turkey, Economic Growth, TVP-SVAR Model.

JEL Classification Codes : C32, F50, O40.

Öz

Bu çalışma, Türkiye'de terörizmin ekonomik sonuçlarını 1970q1-2020q4 dönemi için incelemeyi amaçlamaktadır. Bu amaçla çalışmada, terör eylemlerinin ölçülebilen bütün boyutlarına ait verilerin eşit ve etki-ağırlıklı değerleri kullanılarak iki farklı terörizm endeksi oluşturulmaktadır. Çalışmada ayrıca, terörizmin ekonomik büyüme ve bileşenleri üzerindeki etkilerinin farklı zaman dilimlerinde (belirli dönemlerde ve kısa-orta-uzun vadede) değişkenlik gösterebileceği hususu dikkate alınmakta ve zamanla değişen söz konusu etkiler TVP-SVAR modelinden faydalanılarak araştırılmaktadır. Ampirik kanıtlar, terörizmin ekonomik sonuçlarının ortaya çıkmasında zamanın önemli bir faktör olduğunu ve/veya bu sonuçların analiz döneminde önemli ölçüde değiştiğini ortaya koymaktadır.

Anahtar Sözcükler : Terörizm Endeksi, Türkiye, Ekonomik Büyüme, TVP-SVAR Modeli.

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[1] *Corresponding Author.*

1. Giriş

İktisat literatüründe savaş ve çatışmaların ekonomik sonuçlarını anlama ve açıklama konusundaki çabaların Birinci Dünya Savaşı sonrasında gelişim gösterdiği ve uzunca bir geçmişinin bulunduğu genel olarak kabul edilmektedir. İkinci Dünya Savaşı sürecinde Pigou (1940), Meade (1940) ve Robbins (1942) tarafından savaşların, Soğuk Savaş sürecinde ise Garfinkel (1990), Grossman (1991), ve sonrasında Skaperdas (1992) ve Hess ve Orphanides (1995) tarafından çatışmaların ekonomik sonuçlarını anlamak üzere çalışmaların yapıldığı ve politika önerilerinin geliştirildiği bilinmektedir (Blomberg et al., 2004: 1008). Bu konudaki çabaların zamanla savaşların-çatışmaların yanında terörizme yöneldiği ve/fakat iktisat literatüründe terörizmin ekonomik sonuçlarını anlama ve açıklama konusundaki çalışmaların 11 Eylül 2001 (9/11) saldırılarıyla birlikte önem kazandığı kabul edilmektedir (Shahbaz et al., 2013: 21). Yeni milenyumun hemen başında gerçekleştirilen 9/11 saldırıları, çatışmaların bir türü olarak terörizmin dünyanın herhangi bir ülkesinde herhangi bir zamanda meydana gelebileceğini göstermekte ve terörizmi küresel bir boyuta taşımaktadır (Procasky & Ujah, 2016: 254).

Bu küresel boyutunda terörizm; sosyolojik, psikolojik, politik, jeopolitik, ekonomik vb., kazanımlar sağlamak amacıyla günlük hayatın normal akışını bozmak üzere (Enders et al., 2011: 321) örgütlü-sistemli olarak gerçekleştirilen tehdit-şiddet eylemleri (Nasir et al., 2008: 193) şeklinde yeniden tanımlanmakta ve terörizmin ekonomik sonuçlarına ayrı bir önem atfedilmektedir (Estrada et al., 2015: 1066). Bu önem, genellikle dini, etnik, bölücü, ideolojik, ekonomik vb., birtakım faktörlerin eşliğinde gerçekleştirilmesine rağmen (Estrada et al., 2018: 78) terörizmin bu faktörlere dayalı olarak temelde ekonomiyi hedef almasından (Shahzad et al., 2016: 180) ve ekonomi üzerinde doğrudan (kısa dönemli) ve dolaylı (uzun dönemli) sonuçlar ortaya çıkarmasından kaynaklanmaktadır (Zakaria et al., 2019: 1799). Terörizm bu ekonomik sonuçlarını ise tahribat (destruction), karışıklık (disruption), saptırma (diversion), caydırma (dissaving) ve portföy ikamesi (portfolio substitution) şeklinde birbirini besleyen ve üretim faktörlerinin birikimini veya dağılımını etkileyen kanallar üzerinden hissettirmektedir (Gries et al., 2011: 495). Bu kanallardan tahribat, terörizmin fiziki-beşerî sermaye stoğunda doğrudan ve karışıklık, saptırma, caydırma ile portföy ikamesi ise terörizmin iktisadi aktörlerin kararlarında dolaylı ortaya çıkardığı ekonomik sonuçları göstermektedir (Cevik & Ricco, 2015: 3). Nitekim terörizm ekonomideki, can kayıplarıyla, mülk zararlarıyla vb., fiziki-beşeri sermaye stokunu tahrip etmekte (tahribat), kamusal düzeni bozup belirsizlik yaratarak üretim-işlem maliyetlerini artırmakta (karışıklık), güvensizlik yaratarak kaynakları savunma harcamaları gibi görece verimsiz alanlara kaydırmakta (saptırma), tasarruf eğilimini azaltarak yatırım kapasitesini-finansmanını sınırlandırmakta (caydırma) ve fiziksel-finansal yatırımların getirisini azaltarak sermaye çıkışlarını hızlandırmaktadır (portföy ikamesi) (Meierrieks & Gries, 2012: 92).

Birbirini besleyen bu kanallarla terörizm ekonomik sonuçlarını; hane halkı, iş alemi, kamu ve dış ticaret kesimlerinden oluşan iktisadi aktörlerin tüketim, yatırım, kamu ve ticari harcamalarına ilişkin kararlarını etkileyerek ortaya çıkarmaktadır. Zira terörizm, hane

halklarının ve iş aleminin beklentilerini bozarak tüketim ve yatırım harcamalarının azalmasına (Bardwell & Iqbal, 2021: 228), kamunun harcama bileşimini bozarak güvenlik-savunma harcamalarının artmasına (Koh, 2007: 131) ve dış ticaretteki üretim-işlem maliyetlerini artırarak ticari harcamaların-hacmin azalmasına (Malik & Zaman, 2013: 1106) neden olmaktadır. Terörizmin iktisadi aktörlerin tüketim, yatırım, kamu ve ticari harcamalarına ilişkin kararlarında (ekonomik büyümenin bileşenlerinde) dolaylı olarak ortaya çıkardığı bu değişimler ise uzun vadede üretim (hasıla) düzeyine yansımakta ve nihai etkilerini ekonomik büyüme üzerinde göstermektedir (Sezgin vd., 2008: 4-5; Meierrieks & Schneider, 2021: 2-3).

Bu noktadan hareketle çalışmada 1960'lı yılların sonlarından itibaren yaklaşık yarım asırdır dini, etnik, bölücü, ideolojik, ekonomik vb., gerekçelerle farklı kimlikteki terör örgütlerinin hedef aldığı Türkiye'de, terörizmin ekonomik sonuçlarının (ekonomik büyüme ve bileşenleri üzerindeki etkilerinin) zaman serisi analiziyle incelenmesi amaçlanmaktadır. Bu amaçla çalışmada, Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkileri, Zamanla Değişen Parametreli Yapısal Vektör Oto-Regresif (Time-Varying Parameter Structural Vector Auto-Regression-TVP-SVAR) modeliyle 1970:q1-2020:q4 dönemi için ampirik açıdan incelenmektedir. TVP-SVAR modeli, değişkenlerin inceleme dönemindeki doğrusal dışı eğilimlerini dikkate almakta ve Türkiye'de terörizmin farklı zaman dilimlerinde (belirli dönemlerde ve kısa-orta-uzun vadelerde) değişkenlik gösterebilen ekonomik sonuçlarının incelenebilmesine imkân vermektedir. Bu etkilerin incelenmesinde ise Türkiye'de analiz döneminde gerçekleştirilen terör eylemlerinin ölçülebilen bütün boyutlarını (terör olaylarının sayısı, terör olaylarında hayatını kaybedenlerin sayısı ve terör olaylarında yaralananların sayısı) kapsayan sayısal verilerin eşit ve etki ağırlıklı değerleri üzerinden endeks biçiminde hesaplanan terörizm değişkenleri kullanılmaktadır.

Küresel ve ulusal düzeyde terörizmin bilinen bütün türlerine maruz kalan ve terör örgütlerinin hedefinde bulunan Türkiye'de, terörizmin ekonomik büyüme ve bileşenleri üzerinde teorik açıdan öngörülen ekonomik sonuçlarını ortaya çıkarıp çıkarmadığının ampirik açıdan sınanması, bu çalışmanın temel amacını ve motivasyonunu oluşturmaktadır. Çalışmanın terörizmin ekonomik sonuçlarını konu edinen iktisat literatürüne muhtemel katkıları üç başlık altında sıralanabilmektedir. Bu katkılardan ilkini terörizmin terör eylemlerinin ölçülebilen bütün boyutlarını kapsayan sayısal verilerin eşit ve etki- ağırlıklı değerleri üzerinden endeks biçiminde hesaplanan değişkenlerle temsil edilmesi oluşturmaktadır. Böylece ampirik literatürde genellikle terör olaylarının sayısal verileriyle temsil edilen terörizm, ölçülebilen bütün boyutları ve etki dereceleri gözetilerek daha kapsayıcı değişkenlerle ekonometrik analizlerde kullanılabilmektedir. İkincisini, terörizmin ekonomik sonuçlarını ekonomik büyümenin yanı sıra ekonomik büyümenin bileşenleri üzerinde ortaya çıkardığı etkileri dikkate alarak incelemesi oluşturmaktadır. Böylece ampirik literatürde terörizmin ekonomik sonuçlarını çoğunlukla ekonomik büyüme açısından incelemeye yönelen ilgi alanı, ekonomik büyümenin tüm bileşenlerini de kapsayarak genişletilebilmektedir. Üçüncüsünü, ampirik literatürde terörizmin ekonomik sonuçlarını zaman serisi analizi kapsamında genellikle doğrusal modellerle araştıran

çalışmalardan farklı olarak terörizm, ekonomik büyüme ve bileşenlerinin doğrusal ve doğrusal dışı eğilimlerini dikkate alan modellerle incelemesi oluşturmaktadır. Böylece, terörizm, ekonomik büyüme ve bileşenlerinin inceleme dönemindeki doğrusal dışı eğilimleri gözetilebilmekte ve TVP-SVAR modeliyle terörizmin ekonomik sonuçlarını ortaya çıkarmasında zamanlamanın, belirli dönemlerin ve kısa-orta-uzun vadelerin, etkili olup olmadığı incelenebilmektedir.

Çalışmanın ikinci bölümünde, terörizmin ekonomik sonuçlarını konu edinen literatürün gelişim süreci ile ampirik çalışmalar özetlenmekte ve çalışmanın literatürdeki konumu belirtilmektedir. Üçüncü bölümde, çalışmanın verileri tanıtılmakta ve veri dönüştürme süreci ile ekonometrik metodolojisi açıklanmaktadır. Dördüncü bölümde, Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkileri TVP-SVAR modeliyle incelenmekte ve çalışmanın ampirik bulguları tartışılmaktadır. Sonuç bölümünde ise çalışmanın ampirik bulguları ile politika çıkarımları değerlendirilerek, gelecek çalışmalar için öneriler sunulmaktadır.

2. Literatür Özeti

İktisat literatürü incelendiğinde, terörizm ve ekonomik sonuçlarını açıklama konusundaki çalışmaların İkinci Dünya Savaşı ile Soğuk Savaş sürecinde sırasıyla savaşların ve çatışmaların ekonomik sonuçlarını açıklamaya yönelen çalışmaların ardından gelişim gösterdiği görülmektedir. Bununla birlikte, terörizm ve ekonomik sonuçlarını açıklama konusundaki bu çalışmaların zamanla birbirini tamamlayan iki boyutlu bir gelişim süreci izlediği anlaşılmaktadır. Bunlardan birincisini Soğuk Savaş sonrasında (1990'lı yıllarda) terörizmin ekonomik sonuçlarını genellikle teorik düzeyde açıklamaya yönelen çalışmalar oluştururken, ikincisini 9/11 sonrasında (2000'li yıllarda) terörizmin ekonomik sonuçlarını ampirik düzeyde sınamak üzere yapılan çalışmalar oluşturmaktadır. Literatür incelendiğinde terörizmin ekonomik sonuçlarını teorik düzeyde açıklamaya yönelen öncü çalışmaların Enders vd. (1990), Lapan ve Sandler (1993) ve Enders ve Sandler (1996) tarafından yapıldığı görülmektedir. Bu çalışmalarda terörizmin ekonomik sonuçlarını ortaya çıkardığı doğrudan ve dolaylı kanallar üzerinde durulmakta ve bu kanalların ekonomik büyüme ve bileşenleri üzerindeki etkileri açıklanmaktadır. Literatür incelendiğinde terörizmin ekonomik sonuçlarını ampirik düzeyde sınamaya yönelen öncü çalışmaların ise Gupta vd. (2002), Blomberg vd. (2004) ve Eckstein ve Tsiddon (2004) tarafından yapıldığı görülmektedir. Bu çalışmalarda terörizmin teorik düzeyde öngörülen ekonomik sonuçlarını ampirik açıdan ortaya çıkarıp çıkarmadığı, ekonomik büyüme ve/veya bileşenleri üzerindeki etkileri itibarıyla incelenmektedir.

Gupta vd. (2002), çalışmalarında düşük ve orta gelirli 60 ülkede terör olaylarının sayısal verileriyle temsil edilen terörizmin, ekonomik büyüme üzerindeki etkilerini panel veri analizi kapsamında 1980-1999 dönemine ait verilerle incelemişlerdir. Yazarlar, doğrusal Genelleştirilmiş Momentler Metodu (Generalized Method of Moments-GMM) modellerine dayalı analizlerinin sonucunda, ilgili ülkelerde terörizmin ekonomik büyümeyi azalttığını tespit etmişlerdir. Blomberg vd. (2004), çalışmalarında OECD, Afrika, Orta Doğu

ve Asya ülkelerinden oluşan 177 ülkede terör olaylarının sayısal verileriyle temsil edilen terörizmin, ekonomik büyüme ile bileşenleri üzerindeki etkilerini panel veri analizi kapsamında 1968-2000 dönemine ait verilerle incelemişlerdir. Blomberg vd. (2004), Sıradan En Küçük Kareler (Ordinary Least Squares-OLS), GMM ve Yapısal Vektör Oto-Regresyon (Structural Vector Auto-Regression-SVAR) şeklindeki doğrusal modellere dayalı analizlerinin sonucunda, ilgili ülkelerde terörizmin ekonomik büyümeyi ve yatırım harcamalarını azalttığını ve kamu harcamalarını artırdığını tespit etmişlerdir. Eckstein ve Tsiddon (2004), çalışmalarında İsrail'de terörizm eylemlerinin (terör olaylarının sayısı, terör olaylarında ölenlerin sayısı ve terör olaylarında yaralananların sayısı) sayısal verileri üzerinden hesaplanan endeksle temsil edilen terörizmin, ekonomik büyüme ile bileşenleri üzerindeki etkilerini zaman serisi analizi kapsamında 1980-2003 dönemine ait verilerle incelemişlerdir. Eckstein ve Tsiddon (2004), doğrusal VAR modeline dayalı analizlerinin sonucunda, İsrail'de terörizmin ekonomik büyüme ile tüketim, yatırım ve ticari harcamaları azalttığını belirlemişlerdir.

Gupta vd. (2002), Blomberg vd. (2004) ve Eckstein ve Tsiddon (2004) çalışmalarının ardından oluşmaya başlayan ampirik literatür incelendiğinde, terörizmin ekonomik sonuçlarını ampirik düzeyde sınamaya yönelen çok sayıda çalışmanın yapıldığı ve bu konudaki literatürün son yıllarda önemli bir gelişim gösterdiği görülmektedir. Bu çalışmalarda terörizmi temsilen Gupta vd. (2002) ve Blomberg vd. (2004) çalışmalarında olduğu gibi genellikle terör olaylarının sayısı veya terör olaylarında ölenlerin sayısı ile terör olaylarında yaralananların sayısı şeklindeki değişkenler kullanılmaktadır (Nitsch & Schumacher, 2004; Crain & Crain, 2006; Gaibulloev & Sandler, 2008, 2009, 2011; Nasir et al., 2008; De Sousa et al., 2009; Llussá & Tavares, 2011; Gries et al., 2011; Blomberg et al., 2011; Malik & Zaman, 2013; Shahbaz et al., 2013; Cevik & Ricco, 2015; Bukhari & Masih, 2016; Çimen vd., 2016; Mehmood & Mehmood, 2016; Ilyas et al., 2017; Şimşek & Özkaya, 2018; Sana & Mariuam, 2018; Zakaria et al., 2019; Saleem et al., 2020; Sekrafi et al., 2020; Meierrieks & Schneider, 2021). Bu çalışmaların bazılarında ise terörizmi temsilen Eckstein ve Tsiddon (2004) çalışmasında olduğu gibi terörizm eylemlerinin sayısal verileri üzerinden endeks biçiminde hesaplanan değişkenler kullanılmaktadır (Araz-Takay et al., 2009; Öcal & Yıldırım, 2010; Mehmood, 2014; Khan et al., 2016; Chuku et al., 2019; Khan & Yusof, 2017; Vorsina et al., 2017; Bayar & Gavriletea, 2018; Şit & Karadağ, 2019).

Zaman serisi veya panel veri analizi kapsamında farklı ülkeler üzerine yapılan bu çalışmaların ağırlıklı bir bölümünde terörizmin ekonomik sonuçları, Gupta vd. (2002), çalışmasında olduğu gibi sadece ekonomik büyüme üzerindeki etkileri itibarıyla araştırılmıştır. Zaman serisi analizi kapsamındaki çalışmalarında Nasir vd. (2008), Pakistan'da terörizmin ekonomik büyüme üzerindeki etkilerini, 1972-2006 dönemi için doğrusal VAR modeliyle incelemişler ve inceleme döneminde terörizmin Pakistan'ın ekonomik büyümesini azalttığını belirlemişlerdir. Terörizmin ekonomik büyüme üzerinde olumsuz sonuçlar ortaya çıkardığı yönündeki bu sonuçlara, zaman serisi analizi kapsamında doğrusal VAR, Vektör Hata Düzeltme (Vector Error Correction-VEC), Gecikmesi Dağıtılmış Oto-Regresif (Auto-Regressive Distributed Lag-ARDL) ile doğrusal olmayan Yumuşak Geçişli VAR (Smooth Transition VAR-STVAR) modellerini kullanan diğer

çalışmalarda ulaşmışlardır. Araz-Takay vd. (2009; STVAR/Türkiye), Gries vd. (2011; VAR/7 Batı Avrupa Ülkesi), Çimen vd. (2016; VAR/Türkiye), Khan vd. (2016; VEC/Pakistan), Khan ve Yusof (2017; VAR/Pakistan), Sana ve Mariuam (2018; ARDL/Pakistan), Saleem vd. (2020; ARDL/Pakistan) çalışmalarında ilgili ülkelerde terörizmin ekonomik büyümeyi azalttığını tespit etmişlerdir.

Panel veri analizi kapsamındaki çalışmalarında Öcal ve Yıldırım (2010) tarafından Türkiye'de terörizmin ekonomik büyüme üzerindeki etkileri, 1987-2001 dönemi için bölgesel düzeyde doğrusal Coğrafi Ağırlıklı Regresyon (Geographically Weighted Regression-GWR) modeliyle araştırılmıştır. Öcal ve Yıldırım (2010) çalışmalarının sonucunda inceleme döneminde terörizmin Türkiye'nin ekonomik büyümesini azalttığını ve terörizmin ekonomik büyüme üzerindeki azaltıcı etkilerinin doğu ve güneydoğu bölgelerinde daha fazla olduğunu belirlemişlerdir. Terörizmin ekonomik büyüme üzerinde olumsuz etkiler ortaya çıkardığı yönündeki bu sonuçlara, panel veri analizi kapsamında doğrusal OLS, GMM, ARDL, FMOLS (Tam Değiştirilmiş Sıradan En Küçük Kareler/Fully Modified Least Squares) modellerini kullanan diğer çalışmalarda ulaşmışlardır. Farklı sayıda Afrika ülkesini kapsayan Gaibulloev ve Sandler (2011; OLS), Blomberg vd. (2011; GMM), Ilyas vd. (2017; ARDL), Bayar ve Gavriletea (2018; FMOLS), Sekrafi vd. (2020; GMM) çalışmalarında ilgili ülkelerde terörizmin ekonomik büyümeyi azalttığını tespit etmişlerdir. Şit ve Karadağ (2019), OLS modelini kullanarak Türkiye, Suudi Arabistan, Mısır ve İran'ı içeren 4 Ortadoğu ülkesi üzerindeki çalışmalarında, terörizmin ekonomik büyüme üzerindeki etkilerini 2003-2016 dönemi için incelemişler ve ilgili ülkelerde terörizmin ekonomik büyümeyi azalttığı sonucuna ulaşmışlardır. Vorsina vd. (2017), çalışmalarında ise 117 ülkede terörizmin ekonomik büyüme üzerindeki etkilerini 2006-2011 dönemi için doğrusal SUR (Görünürde İlişkisiz Regresyon/Seemingly Unrelated Regressions) modeliyle incelemişler ve ilgili ülkelerde terörizmin ekonomik büyüme üzerinde etkili olmadığını belirlemişlerdir.

Bununla birlikte bu çalışmaların sınırlı bir bölümünde terörizmin ekonomik sonuçları, Blomberg vd. (2004) ve Eckstein ve Tsiddon (2004) çalışmalarında olduğu gibi ekonomik büyümenin bileşenleri üzerindeki etkileri gözetilerek incelenmiştir. Zaman serisi analizi kapsamındaki çalışmasında Mehmood (2014) tarafından Pakistan'da terörizmin ekonomik büyümenin bileşenleri üzerindeki etkileri, 1973-2010 dönemi için doğrusal Quasi-Structural VAR ve VEC modelleriyle araştırılmıştır. Mehmood (2014) çalışmasının sonucunda terörizmin inceleme döneminde Pakistan'da tüketim, yatırım, kamu ile ticari harcamaları ve ekonomik büyümeyi azalttığını belirlemiştir. Benzer bir şekilde De Sousa vd. (2009; OLS/US), Shahbaz vd. (2013; ARDL/Pakistan), Malik ve Zaman (2013; VAR/Pakistan) ve Bukhari ve Masih (2016; ARDL/Pakistan) zaman serisi analiz kapsamındaki çalışmalarında terörizmin ticari harcamaları ve ekonomik büyümeyi azalttığını belirlemişlerdir. Şimşek ve Özkaya (2018; VAR/Türkiye), Chuku vd. (2019; SVAR/Nijerya), Zakaria vd. (2019; GMM/Pakistan) ise çalışmalarında terörizmin yatırım harcamaları ile ekonomik büyümeyi azalttığını ve kamu harcamalarını artırdığını tespit etmişlerdir. Ayrıca Feridun ve Sezgin (2008), Türkiye'nin Güneydoğusunun bölgesel azgelişmişliğinin ülkede devam eden terörizm üzerindeki rolünü Temel Bileşenler ve Logit

analizleri kapsamında araştırmışlardır. Çalışma sonucunda yazarlar, GSYİH'nin Türkiye'deki terörizmi açıklamada önemli bir rolü olduğunu ve yine terörizmi açıklamada ticaret, inşaat, imalat ve ulaşım gibi diğer faktörlere kıyasla tarım ve devlet hizmetlerinin GSYİH'nin daha önemli bileşenleri olduğunu saptamışlardır. Terörizm-dış ticaret ilişkisini Orta Doğu ve Kuzey Afrika (MENA) ülkeleri özelinde inceleyen Sezgin ve Sezgin (2018) ise esneklik hesaplamalarına dayalı olarak yürüttükleri çalışmalarında dış ticaretin teröre karşı genellikle duyarlı olmadığını ortaya koymuşlardır.

Panel veri analizi kapsamındaki çalışmalarında Crain ve Crain (2006) tarafından 147 ülkede terörizmin ekonomik büyümenin bileşenleri üzerindeki etkileri, 1968-2002 dönemi için doğrusal OLS modeliyle araştırılmıştır. Crain ve Crain (2006) çalışmalarının sonucunda terörizmin inceleme döneminde ilgili ülkelerde tüketim ve yatırım harcamaları ile ekonomik büyümeyi azalttığını belirlemişlerdir. Benzer bir şekilde, panel veri analiz kapsamındaki çalışmalarında Mehmood ve Mehmood (2016; OLS) 7 Güney Asya ülkesinde terörizmin yatırım harcamalarını ve Gaibulloev ve Sandler (2008; OLS) 42 Asya ülkesinde terörizmin yatırım harcamaları ile ekonomik büyümeyi azalttığını tespit etmişlerdir. Cevik ve Ricco (2015; GMM) çalışmalarında 153 ülkede terörizmin kamu harcamalarını artırdığını belirlerken, Llussá ve Tavares (2011; OLS) 187 ülkede terörizmin tüketim ile yatırım harcamalarını azalttığını ve kamu harcamaları ile ekonomik büyümeyi etkilemediğini tespit etmişledir. Gaibulloev ve Sandler (2009; OLS) çalışmalarında 42 Asya ülkesinde terörizmin yatırım harcamalarını etkilemediği, kamu harcamalarını artırdığı ve ekonomik büyümeyi azalttığı sonucuna ulaşmışlardır. Nitsch ve Schumacher (2004; OLS) 200 ülke ve Meierrieks ve Schneider (2021; OLS) 170 ülke üzerindeki çalışmalarında ise ilgili ülkelerde terörizmin ticari harcamaları azalttığını belirlemişlerdir.

Literatür değerlendirildiğinde, zaman serisi ve panel veri analizi kapsamındaki çalışmaların büyük bir bölümünde terör olaylarının sayısal verileriyle temsil edilen terörizmin ekonomik sonuçlarının, ekonomik büyümenin bileşenlerini dikkate almadan sadece büyüme üzerindeki etkileri itibariyle inceleme konusu yapıldığı görülmektedir. Terörizmin ekonomik sonuçlarının çoğunlukla zaman serisi analiziyle İsrail, Nijerya, Türkiye ve Pakistan ve panel veri analiziyle Asya ile Afrika ülkeleri üzerinde doğrusal modellerle incelendiği çalışmalarda, terörizmin ekonomik büyüme veya bileşenleri üzerinde teorik açıdan öngörüldüğü gibi genellikle olumsuz etkilere sahip olduğu sonucuna ulaşılmaktadır. Bu çalışmada ise 1960'lı yılların sonlarından buyana dini, etnik ve bölücü gerekçeler başta olmak üzere küresel ve ulusal düzeyde terörizmin bilinen bütün türlerine maruz kalan Türkiye'de, terörizmin ekonomik sonuçlarının, zaman serisi analiziyle ampirik açıdan incelenmesi amaçlanmaktadır. Bu amaçla çalışmada, 1970:q1-2020:q4 döneminde Türkiye'de gerçekleştirilen terörizm eylemlerinin ölçülebilen bütün boyutlarını kapsayan sayısal verilerin eşit ve etki ağırlıklı değerleri üzerinden endeks biçiminde hesaplanan terörizmin, ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkileri doğrusal olmayan TVP-SVAR modeliyle ekonometrik olarak incelenmektedir. Model değişkenlerinin inceleme dönemindeki doğrusal dışı eğilimlerini gözeten TVP-SVAR modeli, Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerindeki ekonomik sonuçlarını ortaya çıkarmasında zamanlamanın, belirli dönemlerin ve kısa-orta-uzun

vadelerin etkilerinin incelenebilmesine olanak sağlamaktadır. Türkiye üzerindeki çalışma bulgularının, terörizmin ekonomik sonuçlarını ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkileri gözeterek incelemesi, terörizmin bütün boyutlarını ve etki derecelerini gözeten endeks biçimindeki değişkenleri, değişkenlerdeki doğrusal dışı eğilimleri dikkate alan ekonometrik yöntemleri kullanması açısından literatüre katkı sağlayacağı değerlendirilmektedir.

3. Çalışmanın Veri Seti ve Ekonometrik Metodolojisi

3.1. Veri Seti

Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerindeki etkilerini TVP-SVAR modeliyle incelemeyi amaçlayan çalışmanın verileri, Ekonomik İşbirliği ve Kalkınma Örgütü (Organization for Economic Cooperation and Development-OECD) İstatistikleri ve Küresel Terörizm Veri tabanından (The Global Terrorism Database-GTD) 1970:q1-2020:q4 dönemi için çeyreklik bazda alınmakta ve veri dönüşüm sürecinden geçirilmektedir. Çalışmanın belirtilen dönemi kapsamında, Türkiye'de gerçekleştirilen terörizm eylemlerinin (terör olaylarının sayısı, terör olaylarında hayatını kaybedenlerin sayısı ve terör olaylarında yaralananların sayısı) sayısal verilerine GTD veri tabanından bu dönem aralığında erişilebilmesi etkili olmaktadır.

Türkiye'de terörizmin ekonomik sonuçlarını konu edinen çalışmanın; tüketim harcamaları (TH), yatırım harcamaları (YH), kamu harcamaları (KH), ticari harcamalar (RH), ekonomik büyüme (GH) ile terörizm endeksleri (ETI ve GTI) şeklinde yedi temel değişkeni bulunmaktadır. TH, YH, KH, RH ve GH ekonomik değişkenlerine ait veriler, 1970-2020 dönemi için çeyreklik bazda OECD veri tabanından doğrudan hazır veriler olarak temin edilmektedir. ETI ve GTI terörizm endeksi değişkenlerine ait veriler ise GTD veri tabanından 1970-2020 dönemi için aylık bazda alınan terörizm eylemlerinin sayısal verileri kullanılarak yazarlar tarafından hesaplanmaktadır. Çalışmada TH, YH, KH, RH ve GH ekonomik değişkenlerine ait veriler, OECD veri tabanından bu değişkenlerin reel (2015 baz yıllı milyon Türk Lirası) ve mevsimsel düzeltilmiş değerleri olarak alınmıştır. OECD veri tabanından TH, YH, KH ve GH değişkenlerinin verileri sırasıyla Özel Nihai Tüketim Harcamaları, Gayrisafi Sabit Sermaye Yatırımları, Genel Hükümet Nihai Tüketim Harcamaları, Gayrisafi Yurtiçi Hasıla değerleri olarak alınırken, RH değişkeninin verileri Mal-Hizmet İhracatı ile Mal-Hizmet İthalatı verilerinin toplanmasıyla elde edilmiştir. Çalışmada ekonomik büyüme ve bileşenlerindeki değişimleri yansıtması açısından TH, YH, KH, RH ve GH değişkenlerinin ekonometrik analizlerde inceleme dönemindeki yıllık büyüme hızı (önceki yılın aynı çeyreğine göre hesaplanan) değerleri kullanılmıştır. Çalışmada ETI ve GTI terörizm endeksi değişkenlerine ait veriler ise GTD veri tabanından 1970-2020 döneminde farklı kimlikteki terör örgütleri tarafından Türkiye'de gerçekleştirilen terörizm eylemlerinin aylık bazdaki sayısal değerleri olarak alınmıştır. Maryland Üniversitesi Terörizm ve Terörizmle Mücadele Araştırmaları Ulusal Konsorsiyumu (The National Consortium for the Study of Terrorism and Responses to Terrorism-START) projesine dayanan GTD veri tabanı, dünyada terörist olarak kabul edilen terör örgütlerince

gerçekleştirilen terörizm eylemlerinin sayısal verilerini kapsamaktadır. 2021 yılı itibariyle 163 ülkenin 1970-2020 dönemine ait aylık bazdaki verilerinin bulunduğu GTD veri tabanı, terör örgütlerince gerçekleştirilen terörizm eylemlerinin sayısal verilerini, terör olaylarının örgütü, zamanı, mekânı, hedefi, niteliği, türü, silahları vb., açılardan kategorize etmektedir[2].

ETI ve GTI terörizm endeksi değişkenlerinin hesaplanmasındaki verilerin GTD veri tabanından alınmasında, bu veri tabanının terörizm eylemlerinin sayısal verilerini, kapsamlı bir şekilde sınıflandırması ve düzenli aralıklarla yayımlanması etkili olmuştur[3]. ETI ve GTI terörizm endeksi değişkenleri, 1970-2020 döneminde terör örgütleri tarafından Türkiye'de gerçekleştirilen terörizm eylemlerinin sayısal verilerinin GTD veri tabanından alınan topluştırılmış üçer aylık değerleri kullanılarak aşağıdaki gibi hesaplanmaktadır. Eckstein ve Tsiddon (2004) tarafından geliştirilen ETI, terörizmin sadece terör olaylarının sayısal verileriyle temsil edilmesini boyut ve kapsam açısından eleştirerek, ölçülebilen bütün boyutlarını (terör olaylarının sayısı, terör olaylarında hayatını kaybedeblerin sayısı ve terör olaylarında yaralananların sayısı) kapsayan sayısal verileri kullanan bileşik göstergeyle temsil edilmesine dayanmaktadır. Literatürde terörizmin ölçülebilen bütün boyutlarını kapsayan sayısal verilerin eşit ağırlıklı değerlerini kullanarak endeks biçiminde hesaplanmasında öncü yaklaşım olan ETI, aşağıdaki denklem üzerinden hesaplanmaktadır: (Araz-Takay et al., 2009: 3).

$$ETI = ln[1 + (A + K + I)] \tag{1}$$

Denklemdeki terimlerden, (A), (K) ve (I) sırasıyla farklı kimlikteki terör örgütleri tarafından Türkiye'de 1970-2020 döneminde gerçekleştirilen terörizm eylemlerinden; terör olaylarının, terör olaylarında hayatını kaybedenlerin ve terör olaylarında yaralananların sayısal verilerinin belirli bir çeyrekteki toplam değerlerini belirtmektedir. Denklemdeki (ETI) terimi ise Türkiye'de 1970-2020 döneminde gerçekleştirilen terör eylemlerinden (A), (K) ve (I)'nın belirli bir çeyrekteki toplam değerlerinin basit ortalaması üzerinden doğal logaritmik formda (ln) hesaplanan terörizm endeksini göstermektedir (Eckstein ve Tsiddon, 2004: 988). Ekonomi ve Barış Enstitüsü (The Institute for Economics and Peace-IEP) tarafından geliştirilen GTI ise terör eylemlerinin ölçülebilen bütün boyutlarını kapsayan sayısal verilerin eşit ağırlıklı kullanılmasını etki derecesi (tahribat boyutu) açısından eleştirerek, etki derecelerine göre ağırlıklı bileşik gösterge olarak hesaplanmasına dayanmaktadır. Literatürde terörizmin ölçülebilen bütün boyutlarını kapsayan sayısal verilere toplumda yarattığı ekonomik ve sosyal etki dereceleriyle orantılı (0.5-3.0 aralığında) ağırlıklandırma uygulanarak endeks biçiminde hesaplanmasında son yıllarda yaygın bir

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[2] *GTD veri tabanının kapsamı ile terörizm eylemlerinin sayısal verilerinin sınıflandırılması hakkında ayrıntılı bilgi için bakınız: GTD.*

[3] *Terörizm eylemlerinin sayısal verilerinin daha sınırlı bir dönem aralığında temin edilebildiği diğer veri tabanları hakkında bakınız: Uluslararası Terörizm: Terörist Olayların Nitelikleri (The International Terrorism: Attributes of Terrorist Events-ITERATE); Küresel Terörizm Olayları Veritabanı (The RAND Database of Worldwide Terrorism Incidents-RDWTI).*

şekilde kullanılan GTI, aşağıdaki denklem üzerinden hesaplanmaktadır: (IEP-GTI, 2020: 1-109).

$$GTI = \ln[(A * 1) + (K * 3) + (I * 0.5)] \tag{2}$$

Denklemdeki (GTI) terimi Türkiye'de 1970-2020 döneminde gerçekleştirilen terörizm eylemlerinden (A), (K) ve (I)'nın belirli bir çeyrekteki toplam değerlerinin etki derecelerine göre ağırlıklandırılmış doğal logaritmik formda (ln) hesaplanan terörizm endeksini göstermektedir[4].

Veri dönüştürme sürecinin ardından değişkenlerin analizlerde kullanılan formlarının 1970:q1-2020:q4 dönemindeki zaman serisi özelliklerine ait istatistikler Tablo 1'de sunulmaktadır.

Tablo: 1
Değişkenlerin Tanımlayıcı İstatistikler

İstatistikler	Ortalama	Medyan	Maksimum	Minimum	Std. Sapma	Çarpıklık	Basıklık
TH	4.11	4.56	23.51	-11.88	6.11	-0.16	3.57
YH	7.46	7.33	66.04	-36.82	17.89	0.23	3.52
KH	5.87	5.53	70.36	-29.6	10.09	2.15	18.15
RH	8.65	9.616	44.30	-25.44	12.73	-0.17	2.74
GH	4.54	5.38	12.93	-12.94	4.74	-1.08	4.35
ETI	2.48	2.59	6.13	0.00	1.58	0.08	2.20
GTI	3.45	3.78	7.43	0.00	2.09	-0.25	2.10
Gözlem	204	204	204	204	204	204	204

Kaynak: Yazarların hesaplamaları.

3.2. TVP-SVAR Modeli

Primiceri (2005) tarafından geliştirilen TVP-SVAR modeli, Sims (1986) ve Shapiro ve Watson (1988) çalışmalarındaki doğrusal VAR ve SVAR modellerinin geliştirilmesine dayanmaktadır. TVP-SVAR modelinde, standart VAR modellerinin içsel değişkenlerin sıralamasına göre parametrelerde ve yapısal şoklarda meydana gelebilen değişimlerin giderilebilmesi amaçlanmakta ve parametreler ile yapısal şokların doğrusal eğilimler gösterdiği varsayımları değiştirilmektedir. Bu yönüyle TVP-SVAR modelinde, içsel değişkenlerin parametrelerinin ve varyans-kovaryans matrisinin zamanla değişebilmesine izin verilmekte ve parametrelerin ve yapısal şokların gecikme yapısındaki zamana göre değişimler ve doğrusal dışı eğilimler yakalanabilmektedir (Primiceri, 2005: 823; Dahem et al., 2017: 1-2). Birinci dereceden rassal bir yürüyüş sürecini takip ettikleri kabul edilen içsel değişkenler arasındaki zamanla değişen ilişkiler, TVP-SVAR modelinde Eşitlik 3'teki temel regresyon denklemine dayalı olarak araştırılmaktadır:

$$Y_t = c_t + \beta_{1t}y_{t-1} + \cdots + \beta_{st}y_{t-s} + e_t, e_t \sim N(0, \Omega_t) \tag{3}$$

Denklemde $(k \times 1)$ boyutundaki (Y_t) ve (c_t) terimleri sırasıyla içsel değişkenler ve sabit terim vektörünü belirtirken, $(k \times k)$ boyutundaki (β_{it}) ve (Ω_t) terimleri ise sırasıyla

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[4] *GTI metodolojisi hakkında daha kapsamlı bilgi için bakınız (IEP-GTI, 2020: 1-109).*

zamanla değişen katsayıların ve kalıntıların varyans-kovaryans matrisini göstermektedir. Denklemdeki (Ω_t) terimi, özyinelemeli (recursive identification) yapısal şokları göstermekte Eşitlik 4'teki gibi ayrıştırılabilmektedir:

$$\Omega_t = A_t^{-1}\textstyle\sum_t\sum_t'(A_t^{-1})' \tag{4}$$

Denklemdeki terimlerden $(\sum_t)$ içsel değişkenlerin yapısal şoklarının zamanla değişen varyans bileşenlerinin köşegen matrisini ve (A_t) içsel değişkenlerin zamanla değişen ilişkilerinin belirlenmesini sağlayan kovaryans bileşenlerinin alt üçgen matrisini belirtmektedir. Denklemdeki $(\sum_t)$ köşegen ve (A_t) alt üçgen matrisleri ise Eşitlik 5'teki gibi yazılabilmektedir:

$$\textstyle\sum_t = \begin{pmatrix} \sigma_1 & 0 & \dots & 0 \\ 0 & \ddots & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ 0 & \dots & 0 & \sigma_k \end{pmatrix}, A_t = \begin{pmatrix} 1 & 0 & \dots & 0 \\ \alpha_{21,t} & \ddots & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ \alpha_{k1,t} & \dots & \alpha_{k,k-1,t} & 1 \end{pmatrix} \tag{5}$$

Denklemlerdeki bu dönüştürme süreciyle birlikte Eşitlik 3'teki TVP-SVAR modeli temel resgresyon denklemi aşağıdaki gibi yeniden yazılabilmektedir:

$$y_t = X_1\beta_t + A_t^{-1}\textstyle\sum_t \varepsilon_t, \varepsilon_t = \sim N(0,I) \tag{6}$$

Burada Primiceri (2005) tarafından içsel değişkenlerin zamanla değişen parametrelerin modellenmesinde $(t = s + 1, \dots, n,)$ süreci ve (A_t) alt üçgen matrisinin belirlenmesinde $\alpha_t = (\alpha_{21}, \alpha_{31}, \alpha_{32}, \dots, \alpha_{k,k-1})'$ biçimindeki elemanların kümelenmiş vektörel gösterimi kullanılmaktadır. Bu gösterimle birlikte zamanla değişen kalıntıların varyans-kovaryans matrisi $h_t = (h_{1t}, \dots, h_{kt})'$ ve $h_{jt} = log\sigma_{jt}^2$, $(j = 1, \dots, k)$ olmakta ve parametrelerin rassal bir yürüyüş sürecini takip ettikleri varsayılmaktadır. Tüm bu varsayımlar altında (β_t), (α_t) ve (h_t) parametrelerinin yapısal görünümü Eşitlik 7'deki gibi tanımlanabilmektedir:

$$\begin{aligned} \beta_{t+1} &= \beta_t + \mu_{\beta t}, \\ \alpha_{t+1} &= \alpha_t + \mu_{\alpha t}, \\ h_{t+1} &= h_t + \mu_{ht}, \end{aligned} \begin{pmatrix} \varepsilon_t \\ \mu_{\beta t} \\ \mu_{\alpha t} \\ \mu_{ht} \end{pmatrix} \sim N\left(0, \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & \sum_\beta & 0 & 0 \\ 0 & 0 & \sum_\alpha & 0 \\ 0 & 0 & 0 & \sum_h \end{pmatrix}\right) \tag{7}$$

Denklemde $t = s + 1, \dots, n,$ olmak üzere parametrelerin sırasıyla $\beta_{s+1} \sim N(\mu_{\beta 0}, \sum_{\beta 0})$, $\alpha_{s+1} \sim N(\mu_{\alpha 0}, \sum_{\alpha 0})$ ve $h_{s+1} \sim N(\mu_{h0}, \sum_{h0})$ şeklinde normal bir dağılım gösterdiği kabul edilmektedir. Denklemdeki terimlerden; (ε_t) yapısal şokların kovaryans matrisinin köşegen matris üzerindeki elementleri, $(\mu_{\beta t})$, $(\mu_{\alpha t})$ ve (μ_{ht}) ise sırasıyla gecikmeli katsayılardaki, eş zamanlı katsayılardaki ve (μ_{ht}) standart hatalardaki zamanla değişen yapısal şokları belirtmektedir. Eşitlik 7'deki bu gösterimle alt üçgen bir matrise dönüşen (A_t), VAR modelini özyinelemeli bir yapıya dönüştürmekte ve SVAR modelinin indirgenmiş yapısının tahmini kolaylaşmaktadır. Bu kapsamda, Eşitlik 6'da tanımlanan

TVP-SVAR modelinin tahmininde indirgenmiş formdaki kalıntıların varyans-kovaryans matrisindeki yapısal şokların, Eşitlik 7'de tanımlanan (A_t) matrisinde yapısal şokların kovaryans matrisine (ε_t) getirilecek kısıtlamalarla belirlenmesi gerekmektedir. Eşitlik 6'da tanımlanan TVP-SVAR modelinin tahmini kalıntılardaki otokorelasyonu giderebilen optimal gecikme uzunluğunun Marjinal Likelihood (ML) eşliğinde belirlenmesini ve (A_t) matrisindeki içsel değişkenlerin sıralanmasını gerektirmektedir. Optimal gecikme uzunluğunun belirlenmesi ve (A_t) matrisindeki içsel değişkenlerin sıralanmasıyla birlikte TVP-SVAR modeli, rassal bir yürüyüş sürecine ve Bayesian algoritmasına dayanan Markov Zinciri Monte Carlo (Markov Chain Monte Carlo-MCMC) metoduyla yinelemeli olarak tahmin edilmektedir (Nakajima, 2011: 123-124).

4. Ampirik Bulgular

Çalışmanın bu bölümde, Türkiye'de ETI ve GTI değişkenleri üzerinden ölçülen terörizmin ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkileri, Eşitlik 6'da tanımlanan denklemle ve TVP-SVAR-1 ile TVP-SVAR-2 şeklindeki iki farklı modelle incelenmektedir. Eşitlik 6'da tanımlanan denklemde terörizm, ekonomik büyüme ve bileşenlerini içeren (y_t) içsel değişkenler vektörü (A_t) matrisine değişkenler; TVP-SVAR-1 modelinde ETI, TH, YH, KH, RH, GH ve TVP-SVAR-2 modelinde ise GTI, TH, YH, KH, RH, GH sıralamasıyla dahil edilmektedir. TVP-SVAR-1 ve TVP-SVAR-2 modellerindeki (y_t) içsel değişkenler vektöründeki değişkenlerin belirlenip (A_t) matrisinde sıralanmasıyla birlikte Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkilerini belirlemek üzere tanımlı model denklemleri 1970:q1-2020:q4 dönemi için ayrı ayrı tahmin edilmektedir. TVP-SVAR-1 ve TVP-SVAR-2 modellerindeki (y_t) içsel değişkenler vektörü değişkenlerinin belirlenmesinde ve (A_t) matrisindeki sıralanmalarında, literatürdeki Eckstein ve Tsiddon (2004), Mehmood (2014) ve Chuku vd. (2019) ampirik çalışmaları referans alınmaktadır. Çalışmada, terörizmin ETI ve GTI şeklindeki değişkenler üzerinden ölçülmesinde ve Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkilerinin TVP-SVAR-1 ve TVP-SVAR-2 modelleriyle incelenmesinde, ekonometrik analizlerde çoklu doğrusal bağlantı sorunlarının önlenebilmesi ve ampirik bulguların sağlamlığının kontrol edilmesi amaçlanmaktadır. Bununla birlikte, ekonometrik analizleri aynı metodolojiyle gerçekleştirilen TVP-SVAR-1 ve TVP-SVAR-2 modelleri, Türkiye'de terörizmin ekonomik sonuçları açısından uyumlu bulgular ortaya koyduklarından TVP-SVAR-2 modelinin ampirik bulguları Eklerdeki tablo ve şekillerde sunulmaktadır[5].

Zaman serisi analiz metodolojisine dayanan TVP-SVAR modellerinin tahmininden önce modellerdeki içsel değişkenlerin inceleme dönemindeki doğrusal dışı eğilimlerinin doğrusallık testleriyle tespit edilmesi gerekmektedir (Çatık, 2020: 65). TVP-SVAR modellerindeki içsel değişkenlerin inceleme dönemindeki doğrusal dışı eğilimlerinin tespit edilmesi, ekonometrik analiz metodolojisini yönlendirmekte ve sapmasız test

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[5] *Tanımlı modellerin ekonometrik analizleri, Winrats 10.0, Gauss 16.0, OxMetrics 7.0 ve Matlab-2019
ekonometri paket programlarıyla gerçekleştirilmiştir.*

istatistiklerinin üretilebilmesine olanak sağlamaktadır (Hoque & Zaidi, 2019: 996). Bu nedenle, çalışmada değişkenlerin doğrusallık yapıları, Harvey ve Leybourne (2007-HL) ve Harvey vd. (2008-HLB) doğrusallık testleriyle araştırılmaktadır. HL ve HLB doğrusallık testleri, zaman serisi analizlerinde seviye değerinde durağan olan değişkenlerin doğrusallığını sınamak üzere geliştirilen Tsay (1986), Terasvirta (1994) ve Brock vd. (1996) doğrusallık testlerinden farklı olarak değişkenlerin seviye değerinde durağan olması veya olmaması durumlarında kullanılabilmektedir. Değişkenlerin doğrusallığını durağanlık varsayımından bağımsız olarak tespit etmek üzere geliştirilen HL testinde değişkenlerin doğrusallığı Wald tipi (W_T^*) ve HLB testinde ise Wald tipi (W_λ) test istatistiğiyle araştırılmaktadır. HL ve HLB testlerinde değişkenler için hesaplanan (W_T^*) ve (W_λ) test istatistiklerinin kritik tablo değerlerinden büyük olması durumunda "değişkenler doğrusaldır" temel hipotezi reddedilmekte ve değişkenlerin inceleme döneminde doğrusal dışı eğilimler gösterdiği sonucuna ulaşılmaktadır (HL ve HLB doğrusallık testlerinin metodolojisi hakkında kapsamlı bilgi için bakınız: Harvey & Leybourne, 2007: 149-151; Harvey et al., 2008: 1-5). Çalışmada tahmin edilecek TVP-SVAR modellerindeki içsel değişkenlerin doğrusallığını araştıran HL ve HLB test sonuçları, çalışmanın Ekler kısmındaki Tablo 3'te sunulmaktadır. İlgili tablo incelendiğinde, HL ve HLB doğrusallık testlerine göre bütün değişkenlerin %1 veya %5 önem düzeyinde doğrusal olmadığı görülmektedir.

TVP-SVAR modellerindeki içsel değişkenlerin inceleme döneminde doğrusal dışı eğilim sergilediğini belirten bu bulgular, durağanlık analizlerinin bu doğrusal dışılığı dikkate alan birim kök testleriyle gerçekleştirilmesini gerektirmektedir (Cuestas & Garrant, 2011: 557). Çalışmada analizlere konu olan değişkenlerin durağanlık özellikleri ise değişkenlerdeki simetrik ve asimetrik özellikleri, deterministik ve stokastik yapıyı gözeterek test istatistikleri hesaplayabilen doğrusal olmayan Kapetanios vd. (2003-KSS) ve Kruse (2011-KRS) birim kök testleriyle araştırılmaktadır. Zaman serilerinin doğrusal dışı eğilimler göstermesi durumunda kullanılabilen KSS ve KRS birim kök testlerinde durağanlık analizi, değişkenlerin simetrik veya asimetrik özelliklerini gözeten çeşitli varsayımlar altında gerçekleştirilmektedir. Doğrusal olmayan zaman serilerinin durağanlık analizleri söz konusu birim kök testlerinde birinci dereceden Taylor açılımıyla genişletilen yardımcı regresyon denklemi ile üssel ve yumuşak geçişli bir otoregresif süreç üzerinden araştırılmaktadır. KSS ve KRS birim kök testlerinde değişkenlerin durağanlığı, (t) test istatistikleriyle ve ortalamadan ve eğilimden arındırılmış (Demeaned ve Detrend-DD) formda "değişkende birim kök bulunmaktadır" temel hipoteziyle sınanmaktadır. Hesaplanan KSS ve KRS (t) test istatistiklerinin kritik tablo değerlerinden mutlak değerce büyük olması durumunda temel hipotezler reddedilmekte ve değişkenlerin inceleme döneminde durağan olduğu sonucuna ulaşılmaktadır (Kapetanios et al., 2003: 359-379; Kruse, 2011: 71-85)[6]. Çalışmada değişkenlerin durağanlık durumunu DD formunda araştıran birim kök testi sonuçları çalışmanın Ekler kısmındaki Tablo 4'te sunulmaktadır. İlgili tablo incelendiğinde, KSS ve

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[6] *KSS ve KRS birim kök testlerinin metodolojisi hakkında kapsamlı bilgi için bakınız: (Kapetanios et al., 2003: 359-379; Kruse, 2011: 71-85).*

KRS birim kök testlerine göre bütün değişkenlerin %1 veya %5 önem düzeyinde seviye değerinde [I(0)] durağan oldukları görülmektedir.

Modellerdeki içsel değişkenlerin durağanlık özelliklerinin belirlenmesinin ardından, söz konusu değişkenlerin seviye değerleri kullanılarak Eşitlik 6'da tanımlanan denklemdeki TVP-SVAR modelleri tahmin edilmekte ve Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkileri araştırılmaktadır. Eşitlik 6'da tanımlanan denklemdeki (y_t) içsel değişkenler vektörünün (A_t) matrisinde sıralanan terörizm, ekonomik büyüme ve bileşenleri arasındaki zamanla değişen ilişkileri araştırmak üzere tahmin edilen TVP-SVAR modellerinin optimal gecikme uzunluğu, ML eşliğinde ve en yüksek ML değerine göre 2 olarak hesaplanmaktadır. Bu gecikme uzunluğunda tahmin edilen TVP-SVAR (2) modellerine ait parametrelerin bileşik ardıl dağılımlarının etkinlik sonuçları, 2.000'i zamanla değişen parametrelere ait olmak üzere 12.000 yineleme kullanılarak Bayesian MCMC algoritmasına dayalı olarak elde edilmektedir. Çalışmada tahmin edilen TVP-SVAR-1 modelinin etkinlik sonuçları Tablo 2'de sunulmaktadır.

Tablo: 2
TVP-SVAR-1 Modeli Parametrelerinin Tahmin Sonuçları

Parametreler	Ortalama	Standart Sapma	Güven Aralıkları (%95)	CD	IF
$(\Sigma_\beta)_1$	0,0227	0,0026	[0,0183-0,0284]	0,935	11,10
$(\Sigma_\beta)_2$	0,0223	0,0025	[0,0181-0,0277]	0,227	13,88
$(\Sigma_\alpha)_1$	0,0894	0,0343	[0,0467-0,1781]	0,453	95,27
$(\Sigma_\alpha)_2$	0,0874	0,0300	[0,0456-0,1599]	0,524	68,86
$(\Sigma_h)_1$	0,4226	0,0865	[0,2847-0,6117]	0,297	65,32
$(\Sigma_h)_2$	0,3766	0,0849	[0,2261-0,5597]	0,234	57,98

Kaynak: Yazarların hesaplamaları.

Tablo 2 incelendiğinde, TVP-SVAR-1 modelindeki parametrelerin ardıl dağılımlarının yakınsadığı ve MCMC algoritmasının etkin olduğu görülmektedir. Bu durum, CD testinde (Geweke-1992) parametrelerinin ardıl dağılımlarının yakınsadığını belirten temel hipotezlerinin %5 önem düzeyinde reddedilememesinden ve IF (Inefficiency Factors) değerlerinin görece düşük değerler almasından (yinelemelerin parametrelerin ardıl dağılımlarının yakınsaması için yeterli olmasından) anlaşılmaktadır. TVP-SVAR-1 modeli ile $(\Sigma_\beta)_1$, $(\Sigma_\beta)_2$, $(\Sigma_\alpha)_1$, $(\Sigma_\alpha)_2$ $(\Sigma_h)_1$ ve $(\Sigma_h)_2$ parametrelerinin MCMC algoritmasının etkin olduğuna işaret eden bu sonuçlar, örneklem otokorelasyonlarının istikrarlı bir şekilde düştüğü ve eğilimlerinin stabil olduğunu gösteren Şekil 1'den de izlenilebilmektedir.

Şekil: 1
TVP-SVAR-1 Modeli Parametrelerinin Tahmin Sonuçları
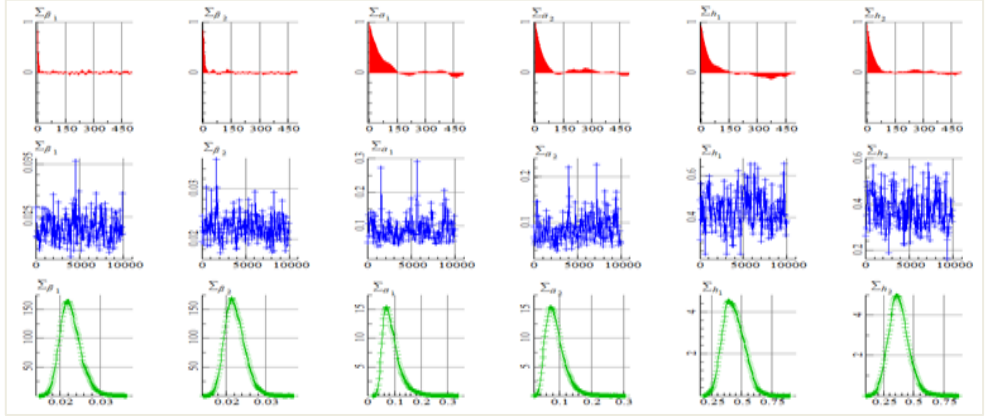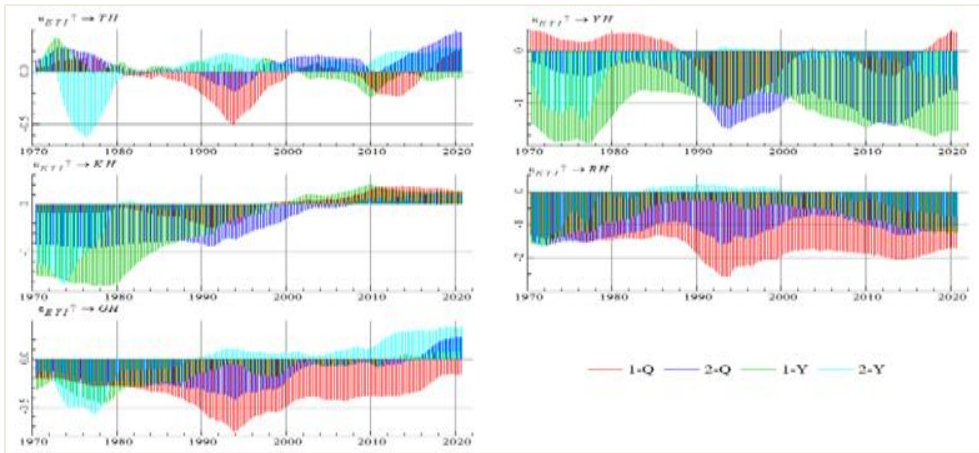

Kaynak: Yazarların hesaplamaları.
Not: Şeklin üstündeki (kırmızı), ortasındaki (mavi) ve altındaki (yeşil) grafikler sırasıyla TVP-SVAR-1 modelindeki zamanla değişen parametrelerin
otokorelasyonunu, eğilimlerini ve ardıl yoğunluklarını belirtmektedir.

TVP-SVAR-1 modelindeki ETI, TH, YH, KH, RH ve GH değişkenlerinin 1970:Q1-2020:Q4 dönemindeki gelişim seyrini, stokastik oynaklıklarını ve zamanla değişen eş zamanlı ilişkilerin ölçüsünü gösteren grafikler ise çalışmanın Ekler kısmında sırasıyla Şekil 3, 4 ve 5'te sunulmaktadır. Şekil 3 incelendiğinde, ETI değişkeninin inceleme döneminde dalgalı bir gelişim trendi izlediği, en yüksek değerlerini 1990, 1992, 1994, 2003 ile 2016 yıllarında ve en düşük değerlerini ise 1973, 1984, 2002 ile 2009 yıllarında aldığı görülmektedir. Bununla birlikte, TH, YH, KH, RH ve GH değişkenlerinin inceleme dönemi boyunca dalgalı bir gelişim trendi izlediği ve Türkiye ekonomisinde içsel ve dışsal gelişmelerden kaynaklı ekonomik krizler ile belirli yapısal dönüşümlerin gerçekleştirildiği tarihlerinde aldıkları değerlerin önemli ölçüde trendlerinden farklılaştığı izlenmektedir. Şekil 4 incelendiğinde, ETI, TH, YH, KH, RH ve GH değişkenlerinin stokastik oynaklıkların (yapısal şokların ortalama değerlerinin) inceleme dönemi boyunca oldukça değişken bir gelişim trend izlediği anlaşılmaktadır. Bununla birlikte, inceleme döneminde stokastik oynaklıklarındaki değişimlerin büyüklüğü açısından değişkenlerin ETI, YH, KH, GH, TH ve RH şeklinde sıralandıkları görülmektedir. Şekil 5 incelendiğinde, ETI ile TH, YH, KH, RH ve GH değişkenleri arasında özyinelemeli belirlenen yapısal şoklardan kaynaklı eş zamanlı ilişkilerin inceleme dönemi boyunca benzer bir trend içerisinde hareket ettiği görülmektedir. Bu kapsamda, ETI ile TH, YH, KH, RH ve GH değişkenleri arasındaki eş zamanlı ilişkilerin genellikle 1970-1990 döneminde genellikle negatif yönlü/zayıf ve 1990-2020 döneminde ise negatif yönlü/güçlü olduğu Şekil 5'ten izlenmektedir. ETI ile TH, YH, KH, RH ve GH değişkenleri arasında inceleme döneminde önsel olarak eş zamanlı ilişkilerin bulunduğunu belirten bu durum, bu ilişkilerin yönünün/büyüklüğünün ise zamana göre değiştiğini göstermektedir.

TVP-SVAR-1 modelinin tahmin edilmesiyle birlikte Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkilerini, parametrelerin varyans-kovaryans matrisini kullanarak araştıran etki-tepki analizlerine ilişkin sonuçlar Şekil 2'de sunulmaktadır. Şekil 2, terörizm-ETI değişkeninden kaynaklı yapısal şoklara, tüketim harcamaları-TH, yatırım harcamaları-YH, kamu harcamaları-KH, ticari harcamalar-RH ve ekonomik büyüme-GH değişkenlerin zamanla (1970-2020 dönemine ve kısa (1-Çeyreklik/1-Q), orta (2-Çeyreklik/2-Q), orta-uzun (1-Yıllık/1-Y) ve uzun (2 Yıllık/2-Y) vadelere göre) değişen tepkilerinin derecesini (yönünü/büyüklüğünü) göstermektedir.

Şekil: 2
TVP-SVAR-1 Modeli: Terörizm Şokları Karşısında Zamanla Değişen Tepkiler

Kaynak: Yazarların hesaplamaları.

Şekil 2 incelendiğinde ETI yapısal şoklarına TH değişkeninin 1-Q vadede 1970-1980, 2001-2007 ile 2016-2020, 2-Q vadede 1970-1990 ile 1997-2020, 1-Y vadede 1970-2001 ve 2-Y vadede 1985-2020 dönemleri aralığında pozitif yönlü/zayıf dereceden tepkiler verdiği görülmektedir. Buna karşılık, ETI yapısal şoklarına TH değişkeninin 1-Q vadede 1981-2000 ile 2008-2015, 2-Q vadede 1991-1996, 1-Y vadede 2002-2020 ve 2-Y vadede 1970-1984 dönemleri aralığında negatif yönlü/güçlü dereceden tepkiler verdiği izlenmektedir. ETI yapısal şoklarına TH değişkeninin 1970-2020 dönemi boyunca kısa vadeden uzun vadeye doğru derecesi nispeten azalan pozitif veya negatif yönlü en büyük tepkileri ise sırasıyla 2015-2020 ve 1973-1980, 1990-2000 ile 2010-2015 dönemleri aralığında verdiği anlaşılmaktadır. Bununla birlikte, ETI yapısal şoklarına TH değişkeninin 1970-2020 dönemi boyunca kısa vadeden uzun vadeye doğru önemli ölçüde farklılaşan, vade uzadıkça derecesi paralel bir şekilde azalan, tepkiler verdiği görülmektedir. Bu bulgular, terörizmin tüketim harcamaları üzerinde vade uzadıkça azalan ve dönemlere göre yönü/büyüklüğü önemli ölçüde farklılaşan etkiler meydana getirdiğini ve bu etkilerin büyük ölçüde azaltıcı olmakla birlikte bazen artırıcı olduğunu ortaya koymaktadır.

ETI yapısal şoklarına YH değişkeninin 1-Q vadede 1970-1988, 2003-2007 ve 2016-2020 dönemleri aralığında pozitif yönlü/zayıf dereceden ve diğer bütün dönemlerde negatif yönlü/güçlü dereceden tepkiler verdiği görülmektedir. ETI yapısal şoklarına YH değişkeninin 2-Q ve 1-Y vadelerde 1970-2020 dönemi boyunca ve 2-Y vadede 1992-2001 dışındaki diğer tüm dönemlerde sürekli negatif yönlü/güçlü dereceden tepkiler verdiği izlenmektedir. ETI yapısal şoklarına YH değişkeninin 1970-2020 dönemi boyunca kısa vadeden uzun vadeye doğru derecesi nispeten azalan pozitif veya negatif yönlü en büyük tepkileri ise sırasıyla 1981-1985 ve 1970-1980, 1990-2000 ile 2010-2020 dönemleri aralığında verdiği anlaşılmaktadır. Diğer yandan, ETI yapısal şoklarına YH değişkeninin 1970-2020 dönemi boyunca vade ile dönem açısından belirli ölçüde farklılaşmakla birlikte 1970-1980, 1990-2000 ve 2010-2020 dönemleri başta olmak üzere genellikle negatif yönlü ve yüksek dereceli tepkiler verdiği görülmektedir. Bu bulgular, terörizmin yatırım harcamaları üzerinde vade uzadıkça azalan ve dönemlere göre yönü/büyüklüğü belirli ölçüde farklılaşan etkiler meydana getirdiğini ve bu etkilerin 1970-1980, 1990-2000 ve 2010-2020 dönemleri başta olmak üzere genellikle azaltıcı olduğunu göstermektedir.

ETI yapısal şoklarına KH değişkeninin 1-Q, 2-Q ve 1-Y vadelerde 2000-2020 dönemi ve 2-Y vadede 1970-1982 ile 1996-2020 dönemi aralığında pozitif yönlü ve görece benzer büyüklükte tepkiler verdiği görülmektedir. Buna karşılık ETI yapısal şoklarına KH değişkeninin 1-Q, 2-Q, 1-Y ve 2-Y vadelerde 1970-1982 ile 1996-2020 dışındaki diğer bütün dönemlerde genellikle negatif yönlü ve derecesi vadelere göre değişen büyüklükte tepkiler verdiği izlenmektedir. ETI yapısal şoklarına KH değişkeninin 1970-2020 dönemi boyunca kısa vadeden uzun vadeye doğru derecesi nispeten azalan pozitif veya negatif yönlü en büyük tepkileri ise sırasıyla 2010-2020 ve 1970-1985 dönemleri aralığında verdiği anlaşılmaktadır. Bununla birlikte, ETI yapısal şoklarına KH değişkeninin 1970-2000 ile 2000-2020 dönemleri arasında önemli ölçüde farklılaşan, 1970-2000 döneminde negatif yönlü/yüksek dereceli ve 2001-2020 döneminde pozitif yönlü/düşük dereceli, tepkiler verdiği görülmektedir. Bu bulgular, terörizmin kamu harcamaları üzerinde vade uzadıkça azalan ve dönemlere göre yönü/büyüklüğü belirli ölçüde farklılaşan etkiler meydana getirdiğini ve bu etkilerin 1970-2000 döneminde azaltıcı ve 2001-2020 döneminde ise artırıcı olduğunu göstermektedir.

ETI yapısal şoklarına RH değişkeninin 1-Q, 2-Q ve 1-Y vadelerde 1970-2020 dönemi boyunca negatif yönlü/güçlü dereceden tepkiler verdiği ve 2-Y vadelerde 1984-2001 döneminde pozitif yönlü 1970-1983 ile 2002-2020 döneminde ise negatif yönlü/zayıf dereceden tepkiler verdiği görülmektedir. ETI yapısal şoklarına RH değişkeninin 1970-2020 dönemi boyunca kısa vadeden uzun vadeye doğru derecesi nispeten azalan pozitif veya negatif yönlü en büyük tepkileri ise sırasıyla 1990-1995 ile 1995-2004 dönemleri aralığında verdiği anlaşılmaktadır. Bununla birlikte, ETI yapısal şoklarına RH değişkeninin 1970-2020 dönemi boyunca kısa vadeden uzun vadeye doğru önemli ölçüde farklılaşan, vade uzadıkça derecesi paralel bir şekilde azalan tepkiler verdiği görülmektedir. Bu bulgular, terörizmin ticari harcamalar üzerinde vade uzadıkça azalan ve dönemlere göre yönü/büyüklüğü sınırlı ölçüde farklılaşan etkiler meydana getirdiğini ve bu etkilerin 1984-2001 dönemi dışındaki diğer tüm dönemlerde büyük ölçüde azaltıcı olduğunu ortaya koymaktadır.

ETI yapısal şoklarına GH değişkeninin 1-Q vadede 1970-2020 dönemi boyunca, 2-Q ve 1-Y vadelerde 1970-2011 dönemi aralığında ve 2-Y vadede 1970-1989 dönemi aralığında negatif yönlü/güçlü dereceden tepkiler verdiği görülmektedir. Buna karşılık, ETI yapısal şoklarına GH değişkeninin 2-Q ve 1-Y vadelerde 2012-2020 dönemi aralığında ve 2-Y vadede ise 1990-2020 dönemi aralığında pozitif yönlü/zayıf dereceden tepkiler verdiği izlenmektedir. ETI yapısal şoklarına GH değişkeninin 1970-2020 dönemi boyunca kısa vadeden uzun vadeye doğru derecesi nispeten azalan pozitif veya negatif yönlü en büyük tepkileri ise sırasıyla 2014-2020 ile 1990-2000 dönemleri aralığında verdiği anlaşılmaktadır. Bununla birlikte, ETI yapısal şoklarına GH değişkeninin 1970-2020 dönemi boyunca kısa vadeden uzun vadeye doğru önemli ölçüde farklılaşan, vade uzadıkça derecesi paralel bir şekilde azalan, tepkiler verdiği görülmektedir. Bu bulgular, terörizmin ekonomik büyüme üzerinde vade uzadıkça azalan ve dönemlere göre yönü/büyüklüğü sınırlı ölçüde farklılaşan etkiler meydana getirdiğini ve bu etkilerin 2012-2020 dönemi dışındaki diğer tüm dönemlerde büyük ölçüde azaltıcı olduğunu ortaya koymaktadır.

5. Sonuç ve Değerlendirme

Çalışmada 1960'lı yılların sonlarından itibaren dini, etnik, bölücü, ideolojik vb., gerekçelerle farklı kimlikteki terör örgütlerinin hedefinde bulunan Türkiye'de, terörizmin ekonomik sonuçlarının zamanlama etkisi gözetilerek ampirik açıdan incelenmesi amaçlanmıştır. Bu amaçla çalışmada, Türkiye'de terörizm eylemlerinin ölçülebilen bütün boyutlarına ait verilerin eşit/etki ağırlıklı değerleri kullanılarak endeks biçiminde hesaplanan terörizmin, ekonomik büyüme ve bileşenleri üzerindeki zamanla değişen etkileri, TVP-SVAR modelleriyle 1970:q1-2020:q4 dönemi için ekonometrik olarak incelenmiştir. Tahmin edilen TVP-SVAR modellerinin, Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerinde teorik açıdan öngörülen ekonomik sonuçlarını ortaya çıkarmasında zamanlamanın (1970-2020 dönemindeki belirli yılların ve vadelerin) etkili ve önemli olduğunu bulgulayan literatürle uyumlu sonuçları şu şekilde özetlenebilmektedir:

Modellerde, terörizmin tüketim harcamalarını 1970-2020 dönemi boyunca kısa vadeden uzun vadeye doğru önemli ölçüde farklılaşan, belirli dönem ve vadelerde sınırlı ölçüde artırdığı ve 1973-1980, 1990-2000 ile 2010-2015 dönemleri başta olmak üzere sürekli/önemli ölçüde azalttığı tespit edilmiştir. Modellerde terörizmin hane halklarının beklentilerini etkilemek suretiyle tüketim harcamaları üzerinde ortaya çıkardığı ve vade uzadıkça etkinliğini görece kaybeden bu azaltıcı ve artırıcı etkilerinin ise sırasıyla 1973-1980, 1990-2000, 2010-2015 ve 2015-2020 dönemlerinde belirginleştiği sonucuna ulaşılmıştır. Çalışmada terörizmin yatırım harcamaları üzerindeki sonuçlarının araştırıldığı modellerde, terörizmin yatırım harcamalarını 1970-1998 ve 2016-2020 dönemi aralığında ve sadece kısa vadede sınırlı ölçüde artırdığı belirlenirken, 1970-1980, 1990-2000 ve 2010-2020 dönemleri başta olmak üzere tüm vadelerde sürekli/önemli ölçüde azalttığı tespit edilmiştir. Modellerde terörizmin iş aleminin beklentilerini etkilemek suretiyle yatırım harcamaları üzerinde ortaya çıkardığı ve vade uzadıkça etkinliğini nispeten kaybeden bu artırıcı ve azaltıcı etkilerinin ise sırasıyla 1981-1985, 1970-1980 ve 1990-2000, 2010-2020 dönemlerinde belirginleştiği sonucuna varılmıştır.

Modellerde, terörizmin kamu harcamalarını 1970-2000 döneminde sürekli ve önemli ölçüde azalttığı belirlenirken, 2001-2020 döneminde genellikle ve sınırlı ölçüde artırdığı tespit edilmiştir. Modellerde terörizmin kamu kesiminin harcama bileşimini etkilemek suretiyle kamu harcamaları üzerinde ortaya çıkardığı ve vade uzadıkça etkinliğini kaybeden bu azaltıcı ve artırıcı etkilerinin ise sırasıyla 1970-1985 ve 2010-2020 dönemlerinde belirginleştiği sonucuna ulaşılmıştır. Çalışmada terörizmin ticari harcamalar üzerindeki sonuçlarının araştırıldığı modellerde, terörizmin ticari harcamaları 1984-2001 dönemi aralığında ve sadece uzun vadede sınırlı ölçüde artırdığı belirlenirken, 1970-1983 ile 2002-2020 dönemlerinde ve tüm vadelerde sürekli/önemli ölçüde azalttığı tespit edilmiştir. Modellerde terörizmin dış ticaretteki üretim-işlem maliyetlerini etkilemek suretiyle ticari harcamalar üzerinde ortaya çıkardığı ve vade uzadıkça etkinliğini kaybeden bu azaltıcı ve artırıcı etkilerinin ise sırasıyla 1995-2004 ve 1990-1995 dönemlerinde belirginleştiği sonucuna varılmıştır. Modellerde, terörizmin ekonomik büyümeyi 2012-2020 dönemi aralığında ve sadece orta-uzun vadede sınırlı ölçüde artırdığı belirlenirken, 1970-2011 dönemlerinde ve tüm vadelerde sürekli/önemli ölçüde azalttığı tespit edilmiştir. Modellerde terörizmin iktisadi aktörlerin tüketim, yatırım, kamu ve ticari harcamalarını etkilemek suretiyle ekonomik büyüme üzerinde ortaya çıkardığı ve vade uzadıkça etkinliğini kaybeden bu azaltıcı ve artırıcı etkilerinin ise sırasıyla 1990-2000 ve 2014-2020 dönemlerinde belirginleştiği sonucuna ulaşılmıştır.

Türkiye'de terörizmin ekonomik büyüme ve bileşenleri üzerindeki etkilerinin 1970-2020 dönemi boyunca ve kısa, orta ile uzun vadede önemli ölçüde değiştiğini gösteren bu sonuçlar, terörizmin ekonomik sonuçlarını ortaya çıkarmasında zaman unsurunun önemli olduğunu belirtmektedir. Terörizmin ekonomik sonuçlarının ekonomik çevrede oluşturduğu güvensizlik ortamına ve belirsizlik düzeyine göre zamanla simetrik/asimetrik olarak değişebileceğini belirten bu sonuçlar, terörizmin tüketim, yatırım, kamu ve ticari harcamalar ile ekonomik büyüme üzerindeki etkilerinin zamanla farklılaşabileceğini/her zaman aynı olmayabileceğini göstermektedir. Bu sonuçlar aynı zamanda terörizmin Türkiye ekonomisi üzerindeki olumsuz etkilerinin giderilebilmesine yönelik politikalar dizayn edilirlerken söz konusu etkilerin zamanla değişen doğasının göz önünde tutulması gerektiğini de ortaya koymaktadır.

Tüm bunların yanı sıra, yakın gelecekte Türkiye üzerine yapılacak çalışmalarda, endeks biçiminde hesaplanan terörizm değişkenleri ve doğrusal dışılığı gözeten modeller kullanılarak terörizmin ekonomik büyümenin bileşenlerinin yanı sıra dayanıklı tüketim harcamaları, savunma harcamaları, AR-GE yatırımları gibi söz konusu bileşenlerin alt birimlerini teşkil eden değişkenler üzerindeki etkilerinin ampirik olarak incelenmesinin, Türkiye'de terörizmin ortaya çıkardığı ekonomik sonuçların değerlendirilebilmesine katkı sağlayacağı düşünülmektedir. Zira terör eylemleriyle birlikte artan riskler karşısında; hane halkının dayanıklı tüketim malı harcamalarına göre diğer tüketim harcamalarına, firmaların yüksek batık maliyet içeren yatırımlarına göre AR-GE ve diğer yatırımlarına ve kamu sektörünün ise savunma harcamalarına göre diğer (cari veya sermaye) harcamalarına ilişkin tutumları farklılık gösterebilmektedir.

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Ekler:

Tablo: 3
Doğrusallık Testi Sonuçları

Değişkenler		HLB	HL	
		W_λ	W_T^*	
			%1	%5
TH		9,48[a]	12,81	12,76[b]
YH		6,91[b]	18,27[a]	18,16[b]
KH		6,93[b]	40,46[a]	40,26[b]
RH		7,22[b]	9,98	9,89[b]
GH		16,26[a]	22,03[a]	21,89[b]
ETI		9,22[a]	16,37[a]	16,32[b]
GTI		10,82[a]	15,34[a]	15,29[b]
Kritik Değerler	%1	9,21	13,27	
	%5	5,99	9,48	

Kaynak: Yazarların hesaplamaları.

Not: ($\chi^2 = 2$) serbestlik derecesinde hesaplanan test istatistiklerinin önündeki "a" ve "b" işaretleri sırasıyla %1 ve %5 önem düzeyinde temel hipotezlerinin reddedildiğini göstermektedir.

Tablo: 4
Doğrusal Olmayan Birim Kök Testi Sonuçları

DD		KSS		KRS	
Değişkenler		**t-İstatistiği**	**L**	**t-İstatistiği**	**L**
TH		-5,47[a]	3	35,73[a]	3
YH		-5,24[a]	3	27,57[a]	3
KH		-5,69[b]	2	39,21[b]	2
RH		-5,07[a]	3	26,50[a]	3
GH		-6,22[a]	2	47,28[a]	2
ETI		-4,93[a]	1	24,55[a]	1
GTI		-4,97[a]	1	25,17[a]	1
Kritik Değerler	%1	-3,93		17,10	
	%5	-3,40		12,82	

Kaynak: Yazarların hesaplamaları.

Not: Tablodaki "a" ve "b" işaretleri sırasıyla %1 ve %5 önem düzeyinde değişkenlerin durağanlığını ve "L" sütunu Akaike Bilgi Kriteri (AIC) eşliğinde belirlenen değişkenlerin optimal gecikme uzunluklarını göstermektedir. Tablodaki kritik değerler Kapetanios vd. (2003) ve Kruse (2011) çalışmalarından alınmaktadır.

Şekil: 3
TVP-SVAR-1 Modeli Değişkenlerinin Zaman Serisi Grafikleri
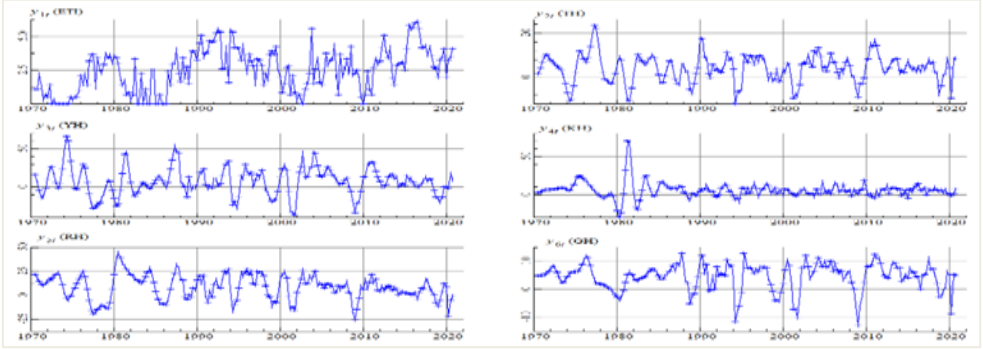
Kaynak: Yazarların hesaplamaları.

Şekil: 4
TVP-SVAR-1 Modeli Değişkenlerinin Stokastik Oynaklıkları
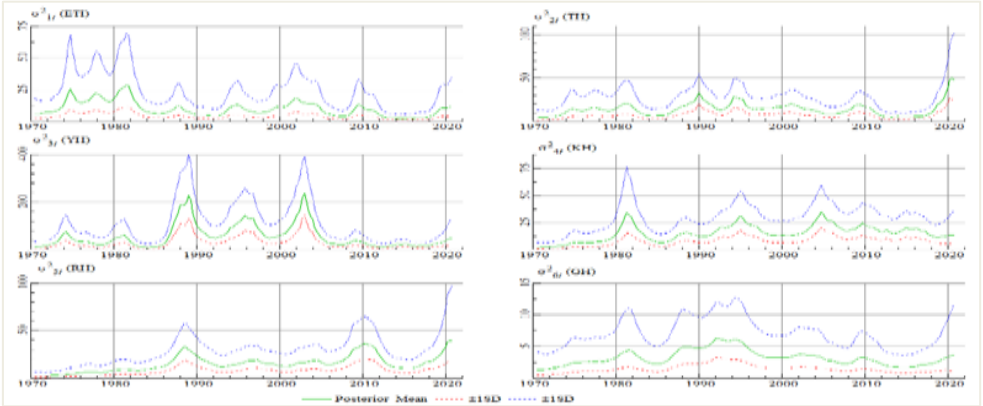
Kaynak: Yazarların hesaplamaları.
Not: Şekildeki yeşil ve sürekli çizgiler TVP-SVAR-1 modelindeki zamanla değişen parametrelerin ardıl ortalamalarını belirtirken, mavi/kırmızı ve kesikli çizgiler %99 güven aralığındaki artı/eksi standart sapmaları göstermektedir.

Şekil: 5
TVP-SVAR-1 Modeli Değişkenlerinin Eş Zamanlı İlişkileri

Kaynak: Yazarların hesaplamaları.
Not: Şekildeki yeşil ve sürekli çizgiler TVP-SVAR-1 modelindeki zamanla değişen parametrelerin ardıl ortalamalarını belirtirken, mavi/kırmızı ve kesikli çizgiler %99 güven aralığındaki artı/eksi standart sapmaları göstermektedir.

Tablo: 5
TVP-SVAR-2 Modeli Parametrelerinin Tahmin Sonuçları

Parametreler	Ortalama	Standart Sapma	Güven Aralıkları (%95)	CD	IF
$(\sum_{\beta})_1$	0,0225	0,0026	[0,0181-0,0284]	0,692	11,11
$(\sum_{\beta})_2$	0,0223	0,0024	[0,0180-0,0274]	0,288	10,43
$(\sum_{\alpha})_1$	0,0842	0,0362	[0,0442-0,1618]	0,906	94,46
$(\sum_{\alpha})_2$	0,0917	0,0401	[0,0454-0,2065]	0,164	131,01
$(\sum_h)_1$	0,4004	0,0839	[0,2568-0,5779]	0,507	70,47
$(\sum_h)_2$	0,3737	0,0864	[0,2205-0,5659]	0,126	39,01

Kaynak: Yazarların hesaplamaları.

Şekil: 6
TVP-SVAR-2 Modeli Parametrelerinin Tahmin Sonuçları

Kaynak: Yazarların hesaplamaları.

Şekil: 7
TVP-SVAR-2 Modeli Değişkenlerinin Zaman Serisi Grafikleri

Kaynak: Yazarların hesaplamaları.

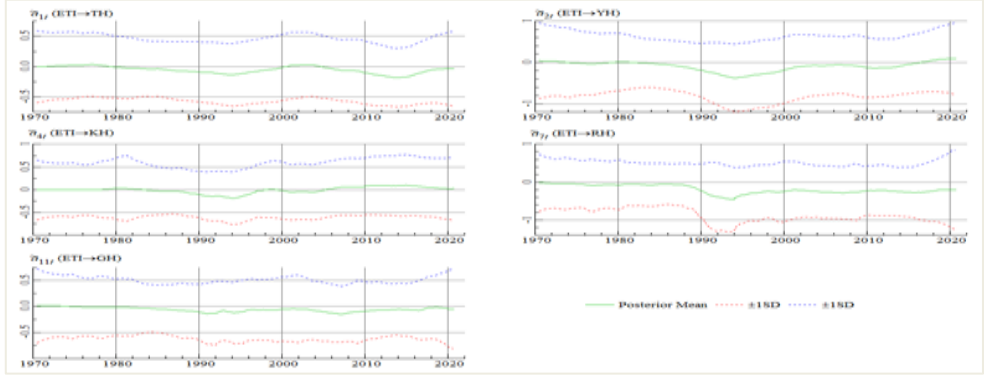**Şekil: 8**
TVP-SVAR-2 Modeli Değişkenlerinin Stokastik Oynaklıkları

Kaynak: Yazarların hesaplamaları.

Şekil: 9
TVP-SVAR-2 Modeli Değişkenlerinin Eş Zamanlı İlişkileri
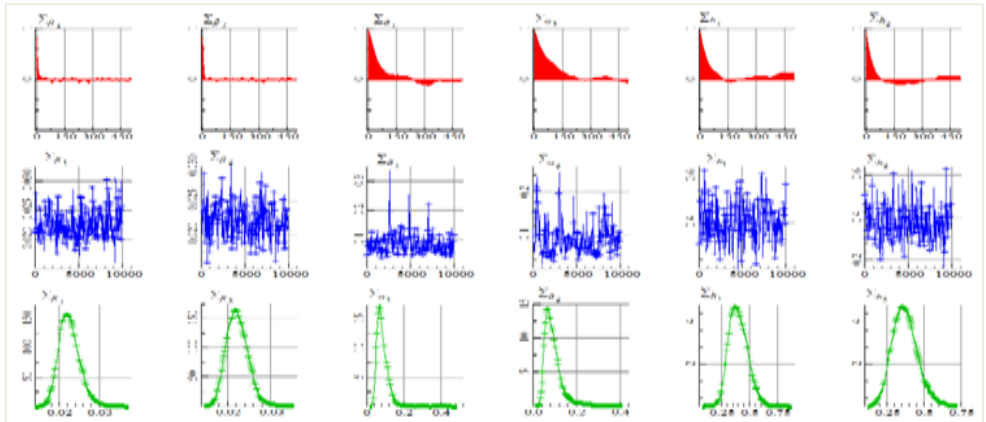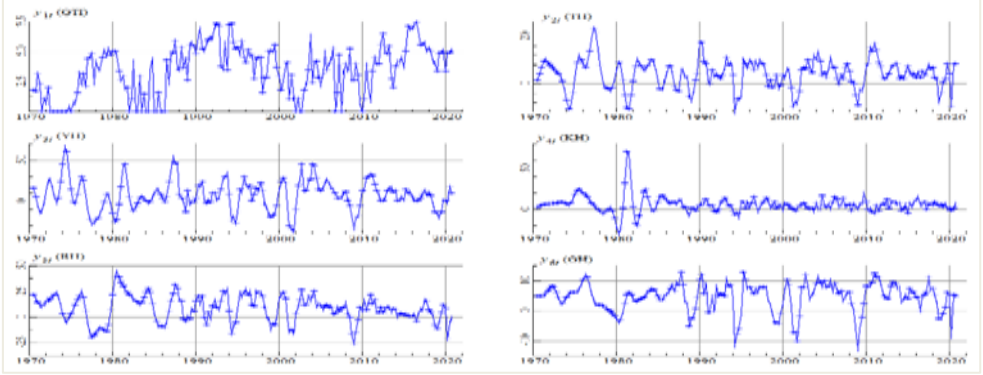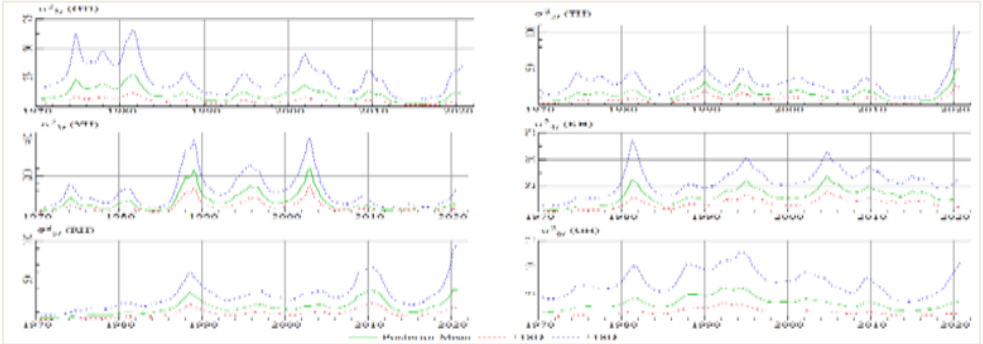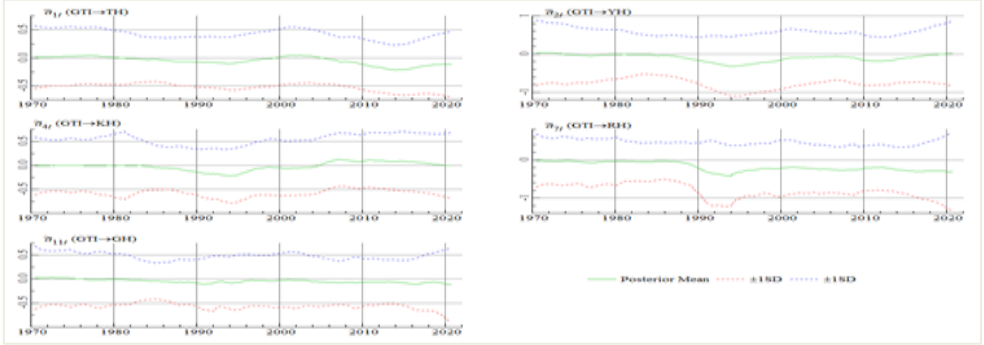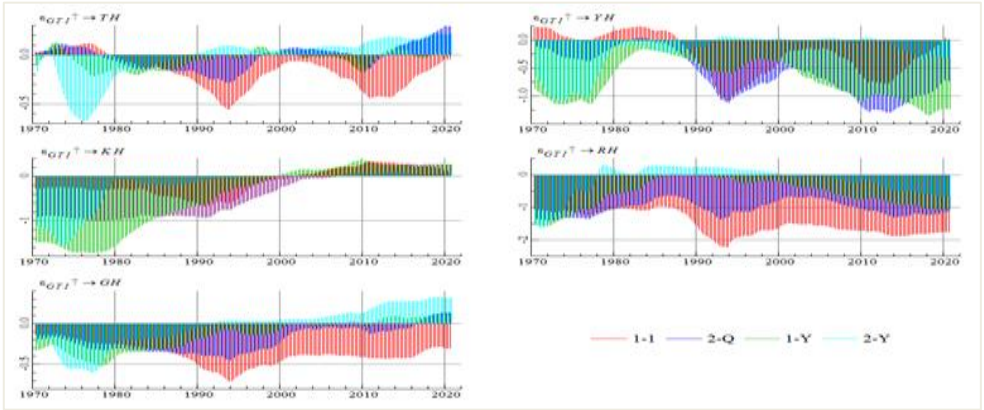

Kaynak: Yazarların hesaplamaları.

Şekil: 10
TVP-SVAR-2 Modeli: Terörizm Şokları Karşısında Zamanla Değişen Tepkiler

Kaynak: Yazarların hesaplamaları.

Vergi Cezaları Açısından Çerçeveleme Kuramı: Türkiye-Rusya Örneği

Burçin TUTCU *(https://orcid.org/0000-0003-1427-0741), Akdeniz University, Türkiye;*
burcintutcu@akdeniz.edu.tr

Günay Deniz DURSUN *(https://orcid.org/0000-0002-1079-2879), Beykent University, Türkiye;*
gunaydursun@beykent.edu.tr

Hasan TALAŞ *(https://orcid.org/0000-0001-8590-273X), Akdeniz University, Türkiye; htalas@akdeniz.edu.tr*

Tax Penalties in the light of Framing Theory: The Case of Turkey and Russia

Abstract

The framing theory, which suggests the effect that the frame presented to the individual will have on his / her behaviour, has been the subject of research conducted in different disciplines. Framing theory used in the fields of psychology, sociology, communication, economy, and marketing is discussed in terms of tax penalties in this study. Although the penalty itself is considered a negative framework, a positive framework is offered to taxpayers or responsible persons in cases such as reduction, restructuring, amnesty, and payment in instalments. In some countries, taxpayers or responsible persons are exposed to a negative framework due to practices such as no tax penalty amnesty, a decrease in credibility in case of non-payment, or suspension of commercial activities. This study aims to evaluate the countries with two different practices within the scope of tax penalties within the scope of framing theory. The tax penalty of positive policies implemented in Turkey, while the policies implemented in Russia as negative as determined under the influence of different frames of this study, is to evaluate the tax penalty. As a result of the research, it was revealed that the positive framework is more reasonable in countries with a high share of tax revenues in the public budget.

Keywords : Framing Theory, Tax, Tax Penalty.

JEL Classification Codes : M40, M48, H20.

Öz

Bireye sunulan çerçevenin onun davranışlarında yaratacağı etkiyi ileri süren çerçeveleme kuramı farklı disiplinlerde gerçekleştirilen araştırmalara konu olmuştur. Psikoloji, sosyoloji, iletişim, ekonomi, pazarlama alanlarında kullanılan çerçeveleme kuramı bu araştırmada vergi cezaları açısından ele alınmıştır. Cezanın kendisi negatif bir çerçeve olarak düşünülse de indirim, yapılandırma, af, taksitlendirilerek ödeme yapılması gibi durumlarda vergi mükelleflerine veya sorumlularına pozitif çerçeve sunulmaktadır. Kimi ülkelerde ise vergi ceza affı olmaması, ödenmeme durumunda kredibilitenin düşmesi veya ticari faaliyetlerin askıya alınması şeklinde yapılan uygulamalar ile mükellefler veya sorumlular negatif çerçeveye maruz kalmaktadırlar. Bu çalışmanın amacı vergi cezaları kapsamında farklı iki uygulamaya sahip ülkenin çerçeveleme kuramı kapsamında değerlendirilmesidir. Türkiye'de uygulanan vergi cezaları politikasının pozitif, Rusya'da uygulanan politikaların ise negatif çerçeve olarak belirlendiği bu araştırmada farklı çerçevelerin vergi cezalarına etkisi incelenmiştir. Araştırma sonucunda kamu bütçesi içinde vergi gelirlerinin payı yüksek olan ülkelerde pozitif çerçevenin daha makul olduğu ortaya konulmuştur.

Anahtar Sözcükler : Çerçeveleme Kuramı, Vergi, Vergi Cezası.

1. Giriş

Psikoloji ve sosyoloji bilimlerine özgü olarak ortaya çıkan çerçeveleme kuramı, daha sonra iletişim, halkla ilişkiler, ekonomi, pazarlama alanlarında da kullanılmaya başlanması ile disiplinler arası bir kuram halini almıştır.

Çerçeveleme kuramı, kişiye sunulan çerçevenin onun davranışlarına etkisini incelemektedir. Literatürde farklı bilim dallarında insan davranışlarının sunulan çerçeve ile nasıl değiştiği ortaya konulmuştur. Kimi durumlarda pozitif çerçevenin kimi durumlarda da negatif çerçevenin bireyi istenen davranışa yönlendirdiği belirlenmiştir.

Birey ve devlet arasındaki iletişimin önemli bir unsuru olan devlet eliyle sunulan mal ve hizmetlerin karşılığında toplanan vergi (Arıman & Tunçer, 2021: 295), bu araştırmada çerçeveleme konusu olarak belirlenmiştir. Gerçek veya tüzel kişilerin vergi borçlarını zamanında veya tam ödememesi, hatalı veya yanlış beyan etmesi gibi durumlarda uygulanan vergi cezalarının çerçevesi yasalar ile belirlenmektedir. Ekonomik, siyasi ve psikolojik olarak farklı nedenlerle uygulamaya konan vergi ceza afları ile otoritenin zayıflayacağı düşüncesi ile hiç uygulanmayan vergi aflarının bulunduğu ülkelerde vergi mükellefi veya sorumlularının davranışları etkilenmektedir. Bu açıdan vergi cezalarının pozitif ve negatif çerçevesinin vergi cezalarının ödenmesi davranışına etkisinin incelenmesi bu araştırmanın temel konusunu oluşturmaktadır.

Türkiye Cumhuriyeti'nin kuruluşundan bu yana çok sayıda af kanunu uygulanmış olup araştırmada Türk Vergi Sistemi'ndeki vergi cezaları pozitif çerçeveyi, Rusya'da ise Sovyetler Birliği'nden bu yana yalnızca üç vergi ceza affı kanunu yürürlüğe girmiş olup bu uygulamalar Türk Vergi Sistemi vergi ceza çerçevesine kıyasla negatif çerçeveyi temsil etmektedir. Rusya ve Türkiye vergi cezaları ve aflar konusunda farklı prensiplere sahip ülkeler olduğu için çalışmanın araştırma konusuna dahil edilmiştir.

2. Çerçeveleme Kuramı

Çerçeve kavramı literatürde ilk kez, Psikiyatrist Gregory Bateson (1904-1980) tarafından, kişinin belirli mesajları alarak diğerlerini dışarda bırakması, bu yolla gerçeklik algısını yönlendirmesi olarak tanımlanmaktadır. Sosyolog Erving Goffman (1922-1982) ise 1974 yılında yayınladığı Çerçeveleme Kuramı (*Framing Theory*) kitabında öznel gerçeklik üzerinde durarak, çerçevelerin kuralları ve normları belirlediği, bu durumun da kişinin davranışını yönlendirdiğini ifade etmektedir. Goffman'a göre çerçeveler, bireyin algısını doğrudan etkilemektedir. Ayrıca Goffman, çeşitli biçimlerde kurumsallaşan çerçevelerin dışsal olarak bireyi konumlandırdığını da ileri sürmektedir.

Çerçeveleme kuramının halka ilişkiler alanında öncü uygulayıcısı olarak kabul edilen Robert M. Entman, çerçevelerin seçmek ve öne çıkarmak temel özelliklerine vurgu yaparak, çerçevelerin dört unsurdan oluştuğunu ifade etmektedir. Entman'a göre bu unsurlar; iletişimci, metin, izleyici ve kültürdür. Kasıtlı ya da kasıtsız biçimde çerçeveleri oluşturan unsur iletişimciler olarak adlandırılmıştır. İletişimcilerin kurduğu bu çerçeveler izleyicilere

belirli metinler üzerinden aktarılmaktadır. Bu noktada metinler, çeşitli sembol, kelime ve imgeler ile güçlendirilmektedir. İzleyiciler, bu metinler ile iletişimcilerin kurduğu çerçeveleri kendi gerçekliklerine ve yargılarına göre yorumlamaktadırlar. Son unsur olan kültür ise çoğunluğun çerçevesi olarak açıklanmaktadır (Entman, 1993: 52-53). Çerçevelerin kültür unsuru, sosyal inşa sürecinde zamanla doğallaşıp normalleştiğini, bu durumun bir sonucu olarak da çerçevelerin etkilerinin görünür olmadığını ileri sürmektedir (Durur, 2011: 25).

2002 yılında Nobel Ekonomik Ödülü alan Daniel Kahneman ekonomi ve psikoloji bilimini ilişkilendirerek, insanların belirsizlik karşısında nasıl karar verdiğini incelemiştir. Amos Tversky ile birlikte yürüttükleri çalışmada, ekonomik bir problemin sunum şeklinin insanların davranışlarını değiştirdiğini ortaya koymuşlardır. Bu davranış değişikliğinin nedenini de çerçeveleme etkisi olarak açıklamışlardır (Kahneman & Tversky, 1981).

Bilgi üzerinden yapılan çerçeveler mesaj çerçevesi olarak pozitif ve negatif olarak iki durumda gerçekleştirilmektedir. Pozitif veya negatif ifadelerle yapılan çerçevelendirilmenin, insanların eylemi gerçekleştirme olasılığına etkisini belirlenmesi mesaj çerçevelerinin temeldir. Mesaj çerçevelemesi, iletilen bilginin pozitif ya da negatif olarak ifade edildiğinde bireylerin kararlarını etkileme durumunu ortaya koymaktadır (Levin et al., 1998).

Mesaj çerçevelemesine ait Levin, Schneider ve Gaeth tarafından geliştirilen üç ayrı alt boyut bulunmaktadır. Bunlar; risk çerçevesi, özellik çerçevesi ve amaç çerçevesi olarak adlandırılmıştır. Kişilerin, aynı bilgi içeriğine sahip pozitif ya da negatif sunulan iki riskli durum arasından tercih yapmaları üzerine kurulu çerçeveler risk çerçevesi olarak ifade edilmektedir. Özellik çerçevelemesinde ürün özellikleri ile ilgili çerçeveleme yapılarak kişilerin davranışları açıklanmaktadır. Amaç çerçevelemesinde ise bir amaç içeren davranışın sonuçları pozitif veya negatif olarak kişilere sunulmaktadır.

Literatürde risk çerçevesine ait en bilinen çalışmanın Tversky ve Kahneman'ın (1981) geliştirdiği Asya afeti problemi olduğu saptanmıştır. Birinci çerçeve kesin kazanç veya kayıp, ikinci çerçeve ise kazanç ve kayıp olasılıkları ve kesin kayıp seçenekleridir. Araştırma sonucunda ise kişilerin negatif çerçeveden daha fazla etkilendikleri saptanmıştır (Tversky & Kahneman, 1981). Özellik çerçevelemesi ile ilgili en bilinen çalışmanın Levin ve Gaeth (1988) tarafından geliştirildiği literatürde yer almaktadır. Bu araştırmada, tüketicilere %80 yağsız et ifadesi ile pozitif çerçeve ve %20 yağlı et ifadesi ile negatif çerçeve sunulmuş, hangi eti satın almak istedikleri incelenmiştir. Araştırma sonucunda pozitif çerçevenin bireyin kararını etkilediği ifade edilmiştir. Bir hedefe yönelik davranışın ortaya çıkmasını sağlayan amaç çerçevelemesi konusunda literatürde en temel alınan çalışma Meyerowitz ve Chaiken'in (1987) yaptıkları göğüs taraması ile ilgilidir. Bu araştırmada, negatif çerçevelemenin hastaların göğüs taraması yaptırmalarını artırdığı sonucuna ulaşmışlardır.

Temel çalışmalar ile risk ve amaç çerçevesinde negatif, özellik çerçevesinde ise pozitif çerçevenin bireyin kararlarını etkilediği sonucuna ulaşılmıştır. Literatürde yapılan üç tür mesaj çerçevesine ait çalışmaların bir bölümü ve hangi çerçevenin etkili olduğu Tablo 1'de aktarılmıştır.

Tablo: 1
Çerçeveleme Kuramı Hakkında Literatürde Yapılan Çalışmalar

Yıl	Yazar	Konu	Mesaj Çerçeve Türü	Çerçeve Türü	Sonuç
1981	Tversky & Kahneman	Kayıp Kazanç	Risk Çerçevesi	Negatif Çerçeve	Negatif çerçeveleme riskten kaçınma davranışına sebep olmuştur.
1987	Meyerowitz & Chaiken	Göğüs Taraması	Amaç Çerçevesi	Negatif Çerçeve	Hastaların göğüs taraması yaptırmalarında artış sağlanmıştır.
1988	Levin & Gaeth	Et Satın Alma	Özellik Çerçevesi	Pozitif Çerçeve	Pozitif özellikler satın alma davranışını artırmıştır.
1990	Maheswaran & Meyers-Levy	Kolesterol Testi	Amaç Çerçevesi	Negatif Çerçeve	İlgi düzeyi yüksek olanlarda negatif, düşük olanlarda pozitif çerçeve etkili olmuştur.
1992	Homer & Yoon	Ağız Sağlığı	Amaç Çerçevesi	Negatif Çerçeve	Negatif çerçeveleme ağız sağlığı konusunda daha ikna edici olmuştur.
1996	Dunegan	Reklam	Özellik Çerçevesi	Pozitif Çerçeve	Yanıltıcı reklam yapmayı engellemede pozitif çerçeve etkili olmuştur.
2014	Hussein, Manna & Cohen	Emzirme	Amaç Çerçevesi	Pozitif Çerçeve	Pozitif çerçevede güvenilir kaynaktan gelen bilgi, annelerin bebeklerini emzirme tutumlarını etkilemiştir.
2015	Orazi vd.	Bağımlılık	Amaç Çerçevesi	Negatif Çerçeve	Negatif çerçeveleme kumar bağımlılığını azaltmıştır.
2015	Yu vd.	Acil Kararlar	Risk Çerçevesi	Pozitif Çerçeve	Acil durumlarda karar verirken pozitif çerçeve etkin olmuştur.

3. Türk Vergi Sistemi ve Vergi Cezalarının Çerçevesi

Vergi hukuku, gerçek ve tüzel kişilerin temel hak ve hürriyetleriyle ilişkili olarak düzenlenmiştir. Kamu hizmetlerinin finansmanı toplanan vergilerle sağlanmakta, bu işleyiş içerisinde devletin yetkileri ise anayasalar ile sınırlandırılmaktadır. Vergi hukuku açısından devlet alacaklı olup, mükellefler açısından da vergi bir ödevi temsil etmektedir (Turan & Güler, 2020: 29). Söz konusu hukuki ilişki, Türk Vergi Sistemi'nde; mal ve hizmet üzerinden alınan vergiler, servet üzerinden alınan vergiler, gelir üzerinden alınan vergiler olarak çok vergili bir sistem olarak tanımlanmaktadır.

Türk vergi sistemi, gerçek veya tüzel kişi vergi mükellefinin beyan esası temel alınarak düzenlenmiştir. Beyan esası; vergilendirmede esas alınan tutarın (matrah) en doğru şekilde mükellef tarafından belirlenebileceği varsayımına dayanmaktadır. Beyanname, vergi borcunu ödemekle yükümlü gerçek veya tüzel kişi (mükellef) ya da verginin ödenmesi bakımından, alacaklı vergi dairesine karşı muhatap olan kişi (vergi sorumlusu) tarafından düzenlenmekte ve vergi dairesine teslim edilmektedir. Beyanname üzerinde yer alan matrah üzerinden, vergi alacağı kanunlarda gösterilen matrah ve oranlar üzerinden hesaplanarak ödenecek vergi miktarının belirlenmesi (tarh) işlemi gerçekleştirilmektedir. Bu şekilde, vergi alacağı miktar itibariyle bir tahakkuk fişi düzenlenerek tespit edilmiş olmaktadır. Bu fişin bir örneği mükellefe veya mükellef adına hareket eden kişiye verilmektedir. Sürecin sonunda vergi alacağı tarh ve tahakkuk etmiş, yani ödenmesi gerekli aşamaya gelinmiş olmaktadır (VUK Md. 22).

Vergi cezalarına ilişkin düzenlemelere Vergi Usul Kanunu'nda (VUK) yer verilmiştir. İlgili kanunun 4. kitabı, vergi suçları ile bunlara uygulanacak ceza hükümlerini kapsamaktadır. Buna göre vergi cezaları; vergi ziyaı cezası ve usulsüzlük cezaları olarak iki başlıkta yer almaktadır. Ayrıca diğer cezalar olarak hürriyeti bağlayıcı cezalar bulunmaktadır.

VUK 341. madde kapsamında vergi ziyaı (kaybı), "*mükellefin veya vergi sorumlusunun vergilendirme ile ilgili ödevlerini zamanında yerine getirmemesi veya eksik yerine getirmesi nedeni ile verginin zamanında tahakkuk ettirilmemesi veya eksik tahakkuk ettirilmesi*" olarak açıklanmıştır. Aynı maddede ayrıca, "*şahsi, medeni haller veya aile durumu hakkında gerçeğe aykırı beyanlar ile diğer şekillerde verginin eksik tahakkuk ettirilmesine veya haksız yere geri verilmesine neden olunması*" da vergi kaybı olarak ifade edilmektedir.

Vergi ziyaı cezası ise mükellef veya sorumlu tarafından VUK 341. maddede yazılı durumlarda vergi kaybına yol açılması olarak yer almaktadır. Bu durumda, mükellefin veya sorumlunun vergilendirme ile ilgili ödevlerini zamanında yerine getirmemesi veya eksik yerine getirmesi nedeni ile verginin zamanında tahakkuk ettirilmemesi veya eksik tahakkuk ettirilmesi ya da haksız yere geri verilmesine neden olunması sonucunda vergi kaybına sebebiyet verilmesi, vergi ziyaı kabahatini oluşturmaktadır. Bu kabahati işleyenlere, vergi kaybına bağlı olarak 'Vergi Ziyaı Cezası' kesilmesi yoluna başvurulmaktadır.

VUK kapsamında, vergilendirmeyle ilgili ödevlerin yerine getirilmesi sırasında dikkate alınması gereken şekle ve usule ilişkin düzenlemeler yer almaktadır. Bu kurullara uyulmaması sonucunda, usulsüzlük ortaya çıkmakta ve bu usulsüzlükler cezalandırılmaktadır. Usulsüzlük cezasının kesilmesi için, vergi ziyaı bulunması koşulu yoktur. Ancak, usulsüzlük cezasını gerektiren bir fiille, aynı zamanda vergi kaybına da neden olunması durumunda, cezalardan sadece miktar itibariyle daha yüksek olanı verilmektedir. Usulsüzlük cezasının kesilmesini gerektiren fiiller, işlenen fiilin ağırlık durumuna göre; daha ağır nitelikte görülen fiiller 'Birinci Derece' usulsüzlük cezasını, daha hafif nitelikte görülen fiiller ise 'İkinci Derece' usulsüzlük cezasını gerektirir.

Vergi ziyaı ya da usulsüzlük durumunda hesaplanan ceza tutarlarının tahsilatına ilişkin ekonomik veya idari nedenlerle af düzenlemeleri yapılmaktadır (Edizdoğan & Gümüş, 2013: 102-110). Vergi cezalarına ilişkin af, vergi cezalarını kısmen ya da tümüyle sona erdiren nedenlerden biridir. Vergilere ilişkin af kanunlarına Anayasamızda yer verilmediği gibi VUK'da da af ile ilgili bir düzenleme bulunmamaktadır (Edizdoğan vd., 2007: 217). Ülkemizde, kanunlarla vergi cezaları affedilebilmektedir (Kırbaş, 2012: 186). Ancak bazen cezaların yanında düşük tutardaki vergi aslı veya verginin bir miktarı da af kapsamına girebilmektedir (Savaşan, 2006: 151). Vergi aflarına ilişkin af yanlıları; kriz dönemleri sonrası af gerekliliği (Palamut, 1992: 8), vergi mevzuatının sık sık değişmesi nedeni ile yaşanan olumsuzlukların ortadan kaldırılması (Korkusuz, 2003: 78), vergi kaçırmanın azaltılması (Aygün, 2012: 89), vergi idaresinin iş yükünün hafifletilmesi (Narinoğlu, 1991: 40), kamu gelirlerini kısa vadede artırması (Dönmez, 1992: 36) vergi

kanunlarına uyumun artırılması (Leonard & Richard, 1987: 62), vergi idaresi ve mükellef arasında işbirliğinin sağlanması (Edizdoğan & Gümüş, 2013: 107) gibi nedenlerle af düzenlemelerinin gerekliliğini savunmaktadırlar. Vergi aflarına karşı olanlar ise adalet ve eşitlik ilkesini ortadan kaldırdığı (Şahin & Özenç, 2008), vergi kaçakçılığının önünü açması (Andreoni, 1991: 144), mali suçların affa layık olmadığı (Edizdoğan & Gümüş, 2013: 109), afların vergi idaresinin iş yükünü hafifletmeyeceği (Seviğ, 1992) ve denetim otoritesini zayıflatacağı (Edizdoğan & Gümüş, 2013: 109) nedenleri ile karşı çıkmaktadırlar.

Literatürde Hermand Leonard ve Richard Zeckhauser (1987), vergi affının faydalarını şöyle sıralamışlardır; toplanamayacak durumda olan geçmiş vergi borçlarının tahsil edilmesine yardımcı olmak, istemeden bir kabahate karışan ve pişmanlık duyanları affetme olanağı sağlaması, otoritelerin belirlediği kurallara yeniden uyum sağlanmasına destek olmak, bireysel suçlardan kaynaklanan etkinlik kaybının hafifletilmesine yardımcı olması ve daha adil bir rejime geçişi sağlamasıdır. Hari Sharan Luitel (2014) ise bu görüşlere, otoritenin vergi kaçakçılığı sorunuyla mücadele ettiğinin bir göstergesi olması, mükelleflerin üzerindeki suçluluk psikolojisini kaldırması, mükelleflerin vergi sistemi içerisine yeniden dahil edilmesiyle vergi matrahının genişlemesi ve vergi toplama maliyetlerini azaltılması şeklinde ilaveler yapmıştır.

Bu faydaları yanında af uygulamalarının sakıncaları konusunda ise Hermand Leonard ve Richard Zeckhauser (1987); sorumluluklarını hakkıyla yerine getirenleri cezalandırdığı, sorumluluklarını yerine getirmeme konusunda istenmeyecek bir motivasyon ortaya çıkardığı, bu durumun da toplumsal ve hukuki yaptırımların gücünü azaltmasına neden olabileceğini ileri sürmüşlerdir. Hari Sharan Luitel (2014) ise vergi affının karşısında olan görüşleri; devletin kanunlara uymayanlar karşısında güçlü bir konum alamaması, vergi ahlakını çökertmesi, mükellefin vergi kaçakçılığına özendirilmesi, devletin kendi belirlediği vergi yasalarını uygulayamadığı yönünde düşüncelerin ortaya çıkması, mükellefte vergi affı beklentisi oluşturarak vergi uyumunu ve vergi matrahını zedelemesi, beklenildiği kadar gelir getirmemesi, biraz sabredilirse vergi gelirlerinin istenildiği gibi toplanmaya başlanacak olması ve vergi aflarınına ait uygulamaların kolay ve maliyetsiz olmadığı olarak sıralamıştır.

Türkiye Cumhuriyeti'nin kuruluşundan günümüze kadar vergi cezalarına ilişkin çıkarılan aflar aşağıda Tablo 2'de verilmiştir.

Tablo: 2
Türkiye'de Uygulanan Vergi Afları

İlgili Kanun veya Kararname	Kapsamı
17.05.1924 tarihinde yürürlüğe giren Umumi Af Kanunu	Umumi Af Kanunu 1914 tarihi ile 1922 tarihi arasında devlete veya ahalisine karşı işlenen her türlü suç ve cezanın affi için çıkartılmıştır.
05.08.1928 tarihinde yürürlüğe giren Elviyei Selased Vergilerinin Sureti Cibayetine Dair Yasa	İlgili yasa, Kars, Ardahan, Artvin, Iğdır ve Sürmeli'nin Rus yönetimi altında olduğu dönemde uygulanan maktu vergilerin tahsil edilmesi amacıyla çıkartılmıştır. Yasanın yayınlanmasından önceki arazi, aşar, emlak vergileri hükümsüz kılınmış ve affolunmuştur.
15.03.1934 tarihinde yürürlüğe giren 4530 Sayılı Varlık Vergisinin Bakayasının Terkinine Dair Yasa	İlgili yasa ile, ikinci dünya savaşı sırasında ekonomiye destek vermek için konulan varlık vergisi kaldırılmıştır.
04.07.1934 2566 sayılı Vergi Bakayasının Tasfiyesine Dair Yasa	İlgili yasa ile belirlenen dönemler sonuna kadar Devlete, hususî idarelerle belediyelere ait tahakkuk etmiş bilumum vergiler kayıtları terkin olmuştur.

29.06.1938 tarihinde yürürlüğe giren 3586 sayılı Arazi Vergisinin Mali Yıl Sonuna Kadar Olan Bakiyesinin Terkinine Dair Kanun	İlgili yasa ile, arazi vergisinin tahakkuk etmiş ama tahsil edilmemiş kısmı ve cezaları (1935 yılı sonuna kadar) terk edilmiştir.
13.06.1946 Orman İşletmelerinin Bazı Vergilerden Muaf Tutulması Hakkındaki Yasa	Yasa ile belirtilen bütün devlet ormanları gayrimenkuller, arazi, bina, iktisadi buhran ve müdafaa vergilerinden muaf tutulmuştur.
21.01.1947 tarihinde yürürlüğe giren 5050 sayılı Toprak Mahsulleri Vergisi Artıklarının Silinmesi Hakkında Kanun	İlgili yasa ile, toprak mahsulleri vergisinden henüz tahsil edilmemiş olan tutarları, her türlü cezası ile birlikte silinmiştir.
26.10.1960 tarihinde yürürlüğe giren 113 sayılı Af Kanunu	İlgili yasa, Mayıs 1960 sonrası çıkartılan genel af kanunudur.
28.12.1961 tarihinde yürürlüğe giren 281 sayılı Vergi Cezaları Gecikme Zamlarının Tecil ve Tasfiyesine Dair Kanun	İlgili yasa ile, belediye bütçelerine, özel idare bütçelerine gelir yazılabilen her türlü vergi, resim ve harçlara ait olan, vergi cezaları, gecikme zamları ve zam cezaları 5 taksitte tahsil edilmiştir.
23.02.1963 tarihinde yürürlüğe giren 218 sayılı Bazı Suç ve Cezaların Affı Hakkında Kanun	İlgili yasa ile, 1960 yılına kadar olan vergi cezaları affedilmiş, usulsüzlük cezalarının yarısı affedilmiştir.
13.06.1963 tarihinde yürürlüğe giren 252 sayılı Spor Kulüplerinin Vergi Borçlarının Bir Defaya Mahsus Olmak Üzere Affı Hakkında Kanun	İlgili yasa ile, spor kulüplerinin 1962 yılı sonuna kadar ödedikleri transfer ücretleri, teşvik primleri ve diğer ödemeleri için tahakkuk eden fakat edilmemiş olan gelir vergisi ve cezaları sadece bir defa için affedilmiştir.
05.09.1963 tarihinde yürürlüğe giren 325 sayılı Yasa Kamu İktisadi Teşebbüslerinin 1960 veya Daha Önceki Yıllara Ait Bir Kısım Vergi Borçlarının Tasfiyesi Hakkında Kanun	İlgili yasa ile, kamu iktisadi teşebbüslerinin 1960 yılı ve daha önceki yıllara ait olan borçları ve bunlara bağlı cezaları tasfiye edilmiştir.
16.07.1965 tarihinde yürürlüğe giren 691 sayılı Belediyelerin ve Belediyelere Bağlı Müessese ve İşletmelerin Bir Kısım Borçlarının Hazinece Terkin ve Tahkimi Hakkında Kanun	İlgili yasa ile, belediyeler ve belediyelere bağlı işletmelerin mükellef sıfatı ile borçlu bulundukları vergiler, resimler, harçlar ve cezalar ile kanuni paylar, faizler ve gecikme faizleri, komisyonlar ve banka ve sigorta işlemlerinden alınan vergiler terkin edilmiştir.
03.08.1966 tarihinde yürürlüğe giren 780 sayılı Bazı Suç ve Cezaların Affı Hakkında Kanun	İlgili yasa, her türlü cezalarla ilgili af niteliği taşımaktadır. Siyasi nedenler sebebi ile en fazla eleştirilen kanun niteliği taşımaktadır.
28.02.1970 tarihinde yürürlüğe giren 1319 sayılı Emlak Vergisi Kanunu'yla Getirilen Af	İlgili yasa ile yürürlükten kaldırılmış olan emlak vergilerine ilişkin cezalar ve gecikme zamları ile ilgili alacakları affolunmuştur.
15.05.1974 tarihinde yürürlüğe giren 1803 sayılı Cumhuriyet'in 50. Yılı Nedeniyle Bazı Suç ve Cezaların Affı Hakkında Kanun	İlgili yasa, genel aflara yönelik olarak çıkartılmıştır. 1973 yılı sonuna kadar olan dönemlere ilişkin vergi, resim, harç ve sigorta primleri sekiz ay içinde ödenmesi koşulu ile cezaları ve gecikme zamları affedilmiştir.
20.03.1981 tarihinde yürürlüğe giren 2431 sayılı Tahsilâtın Hızlandırılması ve Beyan Dışı Kalmış Servet Unsurlarıyla Vesikasız Emtianın Beyanına İlişkin Kanun	İlgili yasa ile 31 Ağustos 1981 sonuna kadar borçlu olunan vergi, resim ve harçların ödenmesi durumunda bunlara isabet eden vergi cezalarının %90'ı affedilmiştir.
02.03.1982 2431 sayılı Yasaya Ek	2431 Sayılı Kanun'un 7 nci maddesine atıf yapılarak söz konusu maddenin kapsamı genişletilerek ek süreler verilmiştir.
22.02.1983 tarihinde yürürlüğe giren 2801 sayılı Bazı Kamu Alacaklarının Özel Uzlaşma Yolu ile Tahsil Hakkında Kanun	İlgili yasa ile ödenmemiş vergilerin, 1984 yılı sonuna kadar tümünün ödenmesi koşulu ile bu vergilere bağlı vergi cezalarının tamamı ile gecikme zamlarının yarısının tahsilinden vazgeçilmiştir.
04.02.1985 tarihinde yürürlüğe giren Bazı Vergi Kanunlarında Değişiklik Yapılması Hakkında 3239 Sayılı Kanun'un Geçici 4. Maddesi	İlgili yasa ile mükelleflerin 300.000 TL'yi geçmeyen vergi borcu aslını, ödemeleri koşulu ile, bunlara bağlı gecikme zam ve faizleri affedilmiştir.
03.12.1988 tarihinde yürürlüğe giren 3505 sayılı Kanun (Geçici Birinci Madde)	İlgili yasa ile mükelleflerin 500.000 TL'yi geçmeyen vergi borcu aslını, ödemeleri koşulu ile, bunlara bağlı gecikme zam ve faizleri affedilmiştir.
28.12.1988 tarihinde yürürlüğe giren 3512 sayılı Kanun	İlgili yasa ile belediyelere ve bağlı işletmelerine af getirmiştir. 1983 yılından önceki dönemlere ait vergi asılların, ödenmesi koşulu ile vergi ceza, gecikme zam ve faizleri affedilmiştir.
15.12.1990 tarihinde yürürlüğe giren 3689 sayılı Kanun (Geçici Birinci Madde)	İlgili yasa ile vade günü gelmesine rağmen ödenmemiş olan ya da ödeme süresi henüz gelmemiş olan vergilerin tümü ve bu vergilere isabet eden gecikme zammı, gecikme faizi ve vergi cezalarının %30'unun ödenmesi koşulu ile gecikme zammı, gecikme faizi ve vergi cezalarından kalan turadan vazgeçilmiştir.
21.02.1992 tarihinde yürürlüğe giren 3787 sayılı Kanun	İlgili yasa ile vade günü gelmesine rağmen ödenmemiş olan ya da ödeme süresi henüz gelmemiş olan vergilerin tümü ve bu vergilere isabet eden gecikme zammı, gecikme faizi ve vergi cezalarının %30'unun ödenmesi koşulu ile gecikme zammı, gecikme faizi ve vergi cezalarından kalan turadan vazgeçilmiştir.
05.09.1997 tarihinde yürürlüğe giren 400 sayılı Tahsilât Genel Tebliği	Vergi mükelleflerinin bir kısmı ekonomik sıkıntılar nedeni ile borçlarını süresinde ödeyememişlerdir. İlgili tebliğ ile vergi aslı, vergi cezası ve gecikme faizi talep edilmesi halinde, tecil edilmiş ve taksitlendirme yapılmıştır.
22.07.1998 tarihinde yürürlüğe giren 4369 sayılı Kanun	İlgili yasa kayıt dışı ekonomiyi kayıt altına almak için çıkartılmıştır.
06.02.2001 tarihinde yürürlüğe giren 414 sayılı Tahsilat Genel Tebliği	İlgili tebliğ vergi borcunu ödeyemeyen vergi mükelleflerine ödeme kolaylığı sağlayabilmek için çıkartılmıştır. Bir diğer amaç ise devlet alacaklarının hazineye dahi edilmesidir.
07.03.2002 4746 sayılı Yasa ile Emlak Vergisi ile ilgili Af Düzenlemesi (Emlak Vergisi Yasasının Geçici Madde 21)	Yasa ile emlak vergisinde beyan sistemi kaldırılmış, Sadece mükellefiyetlerde değişiklikler olması halinde bildirimler verilmesi, yasanın yürürlüğe girmesi ile belediyeler emlak vergilerini, vergi değerlerini esas alarak yıllık olarak hesaplamaları gerekmiştir.
27.02.2003 4811 sayılı Vergi Barışı Kanunu	İlgili kanun ile vergi konusunda Devlet ile vatandaş arasında ortaya çıkmış anlaşmazlıkların sona erdirilmesi, kamu alacağının mükellefin ödeyebileceği bir düzeye getirilmesi amaçlanmıştır.
22.11.2008 tarihinde yürürlüğe giren 5811 sayılı Bazı Varlıkların Milli Ekonomiye Kazandırılması Hakkında Kanun	İlgili yasa ile yurt dışında sahip olunan para, döviz, altın, menkul kıymet ve diğer sermaye piyasası araçları ekonomiye kazandırılmıştır.

25.02.2011 tarihinde yürürlüğe giren 6111 sayılı Bazı Alacakların Yapılandırılması ile Sosyal Sigortalar ve Genel Sağlık Sigortası Kanunu ve Diğer Bazı Kanun ve Kanun Hükmünde Kararnamelerde Değişiklik Yapılmasına Dair Kanun	İlgili yasa en geniş kapsamlı af olarak adlandırılmaktadır. Her türlü vergi, resim, harçlar ve bunlarla ilgili gecikme zam, faiz ve cezaları, taksitlendirilmiştir.
29.05.2013 tarihinde yürürlüğe giren 6486 sayılı Sosyal Sigortalar ve Genel Sağlık Sigortası Kanunu ile Bazı Kanunlarda Değişiklik Yapılmasına Dair Kanun (2. Varlık Barışı)	İlgili yasa ile, yurt dışında bulunan para, döviz, altın, menkul kıymet ve diğer sermaye piyasası araçları ülke içinde var olan işletmelerin sermayesine eklenmiştir.
10.09.2014 tarihinde yürürlüğe giren 6552 Sayılı İş Kanunu ile Bazı Kanun ve Kanun Hükmünde Kararnamelerde Değişiklik Yapılması ile Bazı Alacakların Yeniden Yapılandırılmasına Dair Kanun	Toplam 145 madde 3 geçici maddeden oluşan kanun çok çeşitli düzenlemeler içermesi nedeniyle torba kanun olarak adlandırılmaktadır.
19.08.2016 tarihinde yürürlüğe giren 6736 Sayılı Bazı Alacakların Yapılandırılmasına İlişkin Kanun	İlgili yasa ile alacakların yapılandırılması, matrah ve vergi artırımı, işletme kayıtlarının düzeltilmesi işlemleri yapılmıştır.
27.05.2017 tarihinde yürürlüğe giren 7020 sayılı Kanun Vergi Borçlarının Yapılandırılması	İlgili yasa, 6770 ve 6736 sayılı yasa şartlarını ihlal edenler için uygulanmıştır.
17.11.2020 tarihinde yürürlüğe giren 7256 sayılı Bazı Alacakların yapılandırılması ile Bazı Kanunlarda Değişiklik Yapılması Hakkında Kanun	Korona virüs (Covid-19) salgınının işçi ve işveren üzerindeki olumsuz etkilerinin azaltılması için gerekli düzenlemeleri içerir.
03.06.2021 tarihinde yürürlüğe giren 7326 Sayılı Bazı Alacakların Yeniden yapılandırılması ile Bazı Kanunlarda Değişiklik Yapılması Hakkında Kanun	İlgili yasa, matrah ve vergi artırımı sonucunda tahakkuk eden vergilerin tamamının ilk taksit ödeme süresi içerisinde peşin olarak ödenmesi halinde bu vergilerden ayrıca %10 indirim yapılacağını vurgulamıştır.

Kaynak: Resmî Gazetelerden ilgili yasal düzenlemeler derlenerek oluşturulmuştur.

Tablo 2'de yer alan vergi afları düzenlemeleri incelendiğinde; bazılarının yapılandırma şeklinde, bazılarının torba kanun bazı düzenlemelerin ise dönemsel olduğu görülmektedir. Türkiye'de yapılan tüm bu düzenlemeler ile kamu otoriteleri vergi gelirlerinin tahsil edilmesine katkı sağlama amacı gütmektedir.

Türkiye devlet bütçesi içinde vergi gelirleri son altı yılda %95 oranının üzerinde gerçekleşmiştir. Bu durum kamu gelirlerinin büyük kısmının vergilerden oluştuğunu göstermektedir. Son altı yıla ait bütçe gelirleri, bütçe gelirleri içinde yer alan vergi gelirleri tutarı ve oranları ile vergi gelirlerinin içinde yer alan vergi cezaları ve oranları Tablo 3'te verilmiştir. Buna göre bütçe içinde büyük paya sahip olan vergi gelirlerinin alt kaleminde yer alan vergi cezalarının oransal olarak son altı yılda %1 civarında olduğu görülmektedir.

Tablo: 3
Türkiye'de Bütçe ve Vergi Gelirleri ile Vergi Cezalarının Tutarları ve Oranları

Yıl	Bütçe Gelirleri (TL)	Vergi Gelirleri (TL)	Vergi Gelirlerinin Bütçe İçindeki Oranı %	Vergi Cezaları (TL)	Vergi Cezalarının Bütçe İçindeki Oranı %
2014	394.634.401.000	378.016.251.000	95,78%	3.933.219.000	1,00%
2015	427.251.002.000	410.599.540.000	96,10%	4.330.024.000	1,01%
2016	464.152.140.000	447.261.327.000	96,36%	4.791.542.000	1,03%
2017	586.696.152.000	564.746.658.000	96,25%	5.140.501.000	0,88%
2018	638.112.407.000	626.960.897.000	98,25%	5.820.111.000	0,91%
2019	697.854.376.000	690.865.633.000	98,99%	6.515.019.000	0,93%

Kaynak: T.C. Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı Merkezi Yönetim Kanunlarından derlenmiştir.

Türk vergi sisteminde vergi gelirlerinin bütçe içindeki payı, vergi cezalarına ilişkin aflar, vergi cezalarının tahsil edilebilirliği değerlendirildiğinde vergi düzenlemelerine ilişkin pozitif bir çerçeve olduğu ve vergi affı yanlılarının savunduğu gerekçelere dayanarak düzenlemeler yapıldığı görülmektedir. Ortaya konulan pozitif çerçeve ile vergi ziyaı ve usulsüzlük cezalarının tahsil edilebilirliğinin artırılması hedeflenmekte olup, ticari hayatın devamı, kamu gelirlerinin kısa vadede artırılması, ekonomik kriz sonrası dönemlerde ceza ödemelerinin kolaylaştırılması, siyasi değişimler nedeni ile mükelleflerle uyum geliştirilmesi gibi amaçlar güdülmektedir.

4. Rus Vergi Sistemi ve Vergi Cezalarının Çerçevesi

Rusya Federasyonu'nda vergilerle ilgili tüm işlemler, Maliye Bakanlığı'na bağlı Rusya Federasyonu Vergi Servisi (*Федеральная Налоговая Служба - ФНС России*) tarafından yürütülmektedir. Rusya Federasyonu'ndaki modern formdaki vergi sistemi, 1990'lı yıllarda, Sovyet Sosyalist Cumhuriyetler Birliği'nin (SSCB) çöküşünden sonra, piyasa ekonomisine geçişte ortaya çıkmıştır (Купина, 2016). SSCB döneminden sonrasından günümüze kadar geçerli olan, N146-F3 numaralı Rusya Federasyonu Vergi Kanunu 31 Temmuz 1998 tarihinde yürürlüğe girmiştir. Kanun üzerinde zaman içerisinde değişiklikler yapılmıştır. İlgili kanunda Rusya Federasyonu'ndaki vergi ve harçlar, sigorta primleri ve bu kavramlar ile ilgili ilkeler ortaya konulmuştur.

Rus vergi sistemi üç temel unsurdan oluşmaktadır. Bu unsurlar; Federal, bölgesel ve yerel vergiler olarak N146-F3 numaralı Rusya Federasyonu Vergi Kanunu'nda belirlenmiştir. Federal vergiler ülke genelinde ödenmesi gereken vergilerden (Katma Değer Vergisi, Özel Tüketim Vergisi, Gelir Vergisi, Maden Vergisi, Su Vergisi, Çevre Vergisi ve harçlar); bölgesel vergiler, Rusya Federasyonu Kanunu'na uygun olarak ilgili bölgelerin topraklarında ödenmesi gereken vergilerden (Kurumların Varlık / Mülk Vergisi, Piyango Vergisi, Ulaşım Vergisi) oluşmaktadır. Yerel vergiler ise, ilgili yerel yönetimin (belediye) topraklarında Rusya Federasyonu Kanunu'na uygun olarak ödenmesi gereken (Arsa / Arazi Vergisi, Gerçek Kişilerin Varlık / Mülk Vergisi) vergilerdir. Rusya Federasyonu'nda vergi mükellefleri tüzel kişiler, gerçek kişiler ve esnaflar olmak üzere üç gruba ayrılmıştır.

Vergi kontrolü (denetimi), Rusya'nın her seviyesindeki gelir bütçelerinin oluşumunda çok önemli bir unsurdur. Ayrıca, kontrol fonksiyonunun psikolojik etkisi unutulmamalıdır. Vergi kontrolü (denetimi) vergi kültürünün ekonomik faaliyetlere aşılanmasını, vergi mevzuatı ihlallerini kaçınılmaz olarak tanımlanmasını, önlenmesini ve bu tür ihlaller için cezalandırılmasını içermektedir (Мосейкин, 2014). Rusya Federasyonu Vergi Kanununun 11. Maddesinde; vergi ve harçlarla ilgili mevzuatta ödenmeyen vergi miktarı, zamanında ödenmeyen vergi, harç ve sigorta primlerine ilişkin düzenlemeler yer almaktadır.

Rusya'da vergi yaptırımları (cezaları) N146-F3 numaralı Rusya Federasyonu Vergi Kanunu'nun on beşinci bölümünün 114. maddesinde düzenlenmiştir. Vergi yaptırımlarının temel ilkeleri; yasallık, tek seferlik, her bir cezanın ayrılma ilkesi, sorumluluk, masumiyet karinesi ve adalet ilkesi (Ваймер, 2018) olarak açıklanmıştır.

Rusya'da vergi cezaları iki başlık altında incelenmektedir. Bu başlıklar gecikme zammı (*peny*) ve vergi ziyaı (*ştraf*)'dır. Gecikme zammı (*peny*), vergi mükellefinin borçlu olduğu vergi tutarlarını ödememesi durumunda ödemesi gereken tutar olarak tanımlanmıştır. Buna karşılık vergi ziyaı (*ştraf*), mükellefin vergi yasasını ihlali durumunda, vergi mükellefinden tahsil edilen tutarı ifade etmektedir (Бадалова, 2017).

Rusya'da oluşan vergi borçlarının bir kuruşunun bile ödenmediği durumda vergi mükelleflerinin banka hesaplarına vergi tutarının ödenemeyen kısmı kadar bloke konulmaktadır. Bu durum, vergi alacağının tahsili konusunda ciddi bir yaptırım gücüdür. Vergi kanunun 69. bölümünde, harç ve sigorta primlerin ödenmesi şartı incelenmiştir. Kanunun devamında 76. bölümde tüzel ve gerçek kişilerin banka hesaplarının askıya alınması başlığı altındadır. Vergi kanunun 76. bölümün ikinci maddesinde vergi, harç ve sigorta primleri ile vergi cezaların ödenmediği durumda banka hesaplarının askıya alınacağı (bloke edileceği) belirtilmiştir.

Rusya Federasyonu'nda vergi borçlarına ilişkin diğer bir dikkat çekici durum ise, vergi borçlarına karşı sorumlu olan kişilerdir. Vergi borçlarına karşı şirketlerin yöneticileri (Genel Müdür), Baş Muhasebeci(iç/dış), Finansman Müdürü ve diğer imza yetkilileri sorumludurlar. Yüzdelik sorumluluk oranları direkt olarak belirtilmeyen bu kişiler, vergi borçlarına karşı sorumlu tutulmuştur. Bu da vergi borçlarına karşı yaptırım gücünü oluşturmaktadır. Bu konu, Vergi Kanunu'nun 122. bölümünde, İdari Suçlar ve Ceza Kanunlarında destekleyici nitelikte değerlendirilmiştir.

SSCB'nin dağılmasından günümüze kadar Rusya'da üç farklı tarihte genel vergi affı düzenlenmiştir (Mayburov & Kireenko, 2018). Bunlardan birinci vergi affı 27.10.1993 tarihinde yürürlüğe giren 1773 numaralı Başkanlık Emri ile düzenlenmiştir. İkincisi vergi affı 30.12.2006 tarihinde yürürlüğe giren N269-F3 numaralı Federal Kanun ile düzenlenmiştir (*Федеральный закон от 30.12.2006 N 269-Ф3*). Üçüncüsü vergi affı ise literatürde 2018 vergi affı olarak bilinmektedir, 28.12.2017 tarihinde yürürlüğe girmiş N436-F3 nolu Fedaral Kanun ile düzenlenmiştir (*Федеральный закон от 28.12.2017 N 436-Ф3*). Uygulanan vergi afları gerçek kişi ve esnaf olan vergi mükellefleri için uygulanmıştır. Vergi aflarının genel niteliği ise beyan edilip ödenmemiş veya beyan edilmemiş tüm vergileri kapsamaktadır. Rusya Federasyonu'nda uygulanan genel vergi afları Tablo 4'te gösterilmiştir.

Tablo: 4
Rusya Federasyonu'nda Uygulanan Vergi Afları

İlgili Kanun veya Emir	Kapsamı
Başkanlık Emri No: 1773, 27.10.1993	Tüzel kişilik dışındaki diğer kişi ve kuruluşlar kapsam dahilinde olup 1993 yılı itibari ile ödenememiş ve beyan edilmemiş tüm vergileri kapsamaktadır. SSCB'nin dağılmasından sonra yapılan ilk genel vergi affıdır.
Federal Kanun No: 269-F3, 30.12.2006	Bireysel girişimciler ve bireylerin 2006 yılı öncesi beyan edip ödemediği veya beyan etmeği vergileri kapsamaktadır. Bu düzenlemede tüzel kişiler kapsam dışı tutulmuştur.
Federal Kanun No: 436-F3, 28.12.2017	Bireysel girişimciler ve daha önce girişimci faaliyette bulunan bireylerin vergi borçlarını kapsamaktadır. Tüzel kişiler kapsam dışı tutulmuştur.

Tüzel kişiler için vergi affı 2014 yılında uygulanmıştır. Uygulamanın kapsamında yurtdışındaki Rus sermayesinin ülkeye geri gelmesi teşvik edilmiştir. Bu kapsamda tüzel kişiler de istisnai bir şekilde vergi affı kapsamında alınmıştır. Bu af, Rusya Federasyonu Başkanı'nın 4 Aralık 2014 tarihli Federal Meclis hitabında, "Rusya'ya dönen sermaye için tam bir af" düzenlemesi olarak değerlendirilmiştir (Рустамов, 2019). Bu kapsamdaki tüzel kişiler, sadece yurtdışındaki tüzel kişiler olarak düzenlenmiştir.

Bu genel afların dışında ara dönemlerde de yerel düzeyde vergi afları düzenlenmiştir. Gerçekleşen bu aflar yerel düzeyde, bölgenin siyasi, coğrafi ve ekonomik durumu gözetilerek ekonomik kalkınmayı desteklemek için yapılmıştır. Bunlara örnek olarak 1996 yılındaki Kemerovsky, 1997 yılında Dağıstan ve 1998 yılındaki Çeçenistan bölgeleri için uygulanan vergi aflarını verilebilir.

Rusya Federasyonu kanunları gereği, vergi borcu bulanan tüm işletmeler vergi borçlarını ödemek zorundadırlar. İlgili kanun gereği vergi borcunun ödenmemesi durumunda işletmelerin banka hesapları ilgili vergi borcu tutarı kadar bloke edilmektedir. Blokenin kalkması ise borcun ödenmesine bağlıdır. Bu kapsamda Rusya Federasyonu için vergi cezalarının ödenmemesi durumundan söz etmemiz mümkün değildir. Rusya Federasyonu konsolide bütçesindeki son altı yıla ait vergi cezası ve vergi ziyaı tutarları toplamı Tablo 5'te verilmiştir. Buna göre, tutarların dönemler arasında artış ve azalışlar gösterdiği görülmektedir (Federal Vergi Servisi).

Tablo: 5
Rusya'da Vergi Cezaları ve Bütçe İçindeki Payı (Milyon Ruble)

Yıl	Bütçe Gelirleri (Ruble)	Vergi Gelirleri (Ruble)	Vergi Gelirlerinin Bütçe İçindeki Oranı %	Vergi Cezaları (Ruble)	Vergi Cezalarının Bütçe İçindeki Oranı %
2014	12.670.189	9.794.916	77,3%	336.121	2,70%
2015	13.788.300	10.606.860	76,9%	296.790	2,20%
2016	14.482.884	11.599.496	80,1%	348.016	2,40%
2017	17.343.436	13.267.996	76,5%	406.559	2,30%
2018	21.328.495	15.261.586	71,6%	401.716	1,90%
2019	22.737.273	16.699.618	73,5%	375.837	1,70%

Kaynak: Rusya Federasyonu Federal Vergi Servisi'nden elde edilmiştir.

Rusya Federasyonu bütçe gelirlerin ortalama olarak %76'sı vergi gelirlerinden oluşmaktadır. Rusya federasyonun bütçe gelirlerinin %24'lük kısmı ise petrol ve doğalgaz, yer altı kaynakları ile fosil yakıt gelirlerinden oluşmaktadır.

Banka hesaplarına bloke konulmasını işletmeler nezdinde düşündüğümüzde işletmelerin ticari işlemlerine devam edebilmeleri için vergi borçlarını ödemeleri gerektiği ortaya çıkarmaktadır. Devlet tarafından vergilerin adaletli bir şekilde toplaması için ilgili denetim ve kontrollerin yapılması gerekmektedir. Yapılan denetimler sonucunda vergi cezası ve ziyaı durumları ortaya çıkmaktadır. Bu durumlara ilişkin Rusya Federasyonu bünyesinde ülkemizde olduğu gibi vergi cezalarının ve ziyaılarının tahsil edilememe durumu söz konusu değildir. Bu açıdan değerlendirildiğinde Rusya vergi kanunlarının ceza ve ziyaı konusunda negatif bir çerçeve sunduğu ortaya çıkmaktadır.

5. Sonuç ve Öneriler

Bireye sunulan çerçevenin onun davranışlarını etkilediğini açıklayan çerçeveleme kuramı; risk, amaç ve özellik çerçevesi alt başlıklarında literatürde sosyoloji, iletişim, ekonomi, pazarlama, sosyal psikoloji gibi farklı disiplinlerde çalışılmıştır. Bu araştırmada çerçeveleme kuramı; vergi mükelleflerinin ve sorumlularının vergisel ödevlerini tam, zamanında ve yasalara uygun olarak yerine getirmemeleri durumunda ortaya çıkan vergi

cezaları açısından ele alınmış ve davranış sonuçları merkezi bütçe içerisindeki rakamlar ele alınarak değerlendirilmiştir. Çerçeveleme kuramının bu araştırma kapsamında incelenen türü amaç çerçevesi olarak belirlenmiştir. Bunun nedeni ise çerçeveyi ortaya koyan otoritenin gelirlerini tam ve zamanında tahsil etme amacı ile vergi mükelleflerinin bu amaç doğrultusunda davranmalarını sağlamaktır.

Bu çalışmada vergi aflarının, yapılandırmalarının, erken ödeme indirimlerinin ve taksitlendirmelerinin daha fazla sayıda olduğu Türkiye ile söz konusu alanlarda kısıtlı yasal düzenlemelerin olduğu Rusya ele alınmıştır. Türkiye Cumhuriyeti'nde kuruluşundan bu yana vergi gelirlerinin cezalandırılması konusunda çok sayıda yasal düzenleme olmasına karşın Rusya Federasyonu'nda bu sayı yalnızca üç olarak gerçekleşmiştir. Türkiye'de kamu bütçesi içerisinde vergi gelirleri %95 oranının üzerinde bir paya sahip iken daha fazla yer altı zenginliklere sahip olan Rusya'da bu oran %80 düzeyindedir. Bu farklılık vergi gelirlerini tahsil etme konusunda devletlerin yasal düzenleme konusundaki politikalarına da yansımaktadır. Vergilerin tam, zamanında ödenmemesi durumunda ortaya çıkan vergi ziyaı ile usule ilişkin ortaya çıkan cezalar her iki ülkede de kanunlarla düzenlenmiştir. Ancak farklılık söz konusu cezalarla ilgili olarak yasal çerçevelerdedir. Türkiye'de cezalar para cezaları ve hürriyet kısıtlaması şeklinde olmakta iken Rusya'da ticari hayatın kısmen durdurulması ile sonuçlanmaktadır. Rusya Federasyonu'nda bir tüzel kişinin vergi ziyaı ya da cezası söz konusu olduğunda bu borcun ödenmemesi durumunda şirketin banka hesaplarına bloke konulmakta ve işletmenin sürekliliği geçici olarak askıya alınmaktadır. Bu durum sadece işletmeyi değil, işletme ile ilişkili kişi ve kurumların faaliyetlerinin de etkilenmesi ile sonuçlanmaktadır. Bu açıdan Rusya Federasyonu'nun merkezi bütçe içerisindeki vergi cezalarının %100'e yakın oranda tahsil edildiğini söylemek mümkündür. İki ülkenin vergi cezalarının bütçe içindeki payı değerlendirildiğinde bu oran Türkiye için %1, Rusya için %2 düzeyindedir.

Vergi cezaları konusundaki her iki ülkedeki yasal düzenlemeler ve yukarıdaki ifade edilen farklılıklar kıyaslandığında Türkiye'de vergi sistemi ve cezalar konusunda pozitif çerçeve, Rusya'da ise negatif çerçeve olduğunu ifade etmek mümkündür. Türkiye'de devletin vergi gelirlerini tahsil etme amacı ile mükelleflerinin bu amaç doğrultusunda davranmalarını sağlamayı hedeflemesi amaç çerçevesini, yasal düzenlemelerin çokluğu, cezaların erken ödenmesinde sunulan indirimler ve affedici olması nedeni ile pozitif çerçeveyi sunduğu buna karşın Rusya'da tam tersi uygulamalar nedeni ile negatif çerçevenin geçerli olduğu tespit edilmiştir.

Pozitif çerçeve, literatürde vergi ceza affı yanlıların da ileri sürdüğü devletin gelirini artırıcı, vergi kaçırmayı azaltıcı, vergi idaresi ve mükellef arasında iş birliğinin sağlayıcı amaçları nedeni ile de tercih edilmektedir. Özellikle Türkiye gibi kamu bütçesinin çok büyük kısmı vergi gelirlerinden oluşan devletlerde cezalara ilişkin pozitif çerçevenin kamu bütçesi ve kamu hizmetinin devamlılığı açısından daha uygun olduğu düşünülmektedir. Vergi aflarına karşı olanların adalet ve eşitlik ilkesini ortadan kaldırdığı, bu tür suçların affa layık olmadığı ve kamu denetiminin otoritesini zayıflatacağı negatif çerçeveler ise özellikle Rusya'daki gibi işletmelerin varlıklarını tehdit eden ve

süreklilikilerini riske sokan durumlar yaratması ile uygun bulunmamaktadır. Çerçeveleme kuramında amaç çerçevesi ile ilgili literatürde yapılan çalışmalar, negatif çerçevenin bireyin davranışlarını olumlu etkilediğini ortaya konsa da araştırma konusu olan vergi cezalarında pozitif çerçevenin amaçlanan davranışı sağladığı görülmektedir.

Vergi cezaları konusunda pozitif çerçeve sunan Türkiye'de çerçevenin uzun yıllardır bu şekli ile uygulanmasının temel nedeni kamu gelirleri içinde vergi gelirlerinin büyüklüğüdür. Bu koşullar devam ettiği sürece pozitif çerçevenin mükelleflerin tam ve zamanında vergi ödeme davranışı gerçekleştirdiği durumlarda ise negatif çerçevenin kullanımın uygun olacağı düşünülmektedir. Ancak yine de hem kamu ororiteleri hemde vergi mükellefleri açısından yapılacak bir alan araştırmasının çerçevenin özelliklerini ve kısıtlarınınbelirlemesine katkı sağlayacağı düşünülmektedir.

Bir başka açıdan vergi cezalarının çerçevesini kayıp ve daha az kayıp olarak sınıflandırarak risk çerçevesi şeklinde değerlendirmek ve analiz etmek de mümkündür. Ancak bu çalışmada kamu gelirleri açısından kamu otoritelerinin sunduğu çerçeve değerlendirildiğinden risk değil amaç çerçevesi açısından değerlendirme yapılmıştır. Vergi mükellefi veya sorumlularına risk ve amaç çerçevesi açısından yapılacak diğer alan araştırmalarının kamu maliyesi, muhasebe ve sosyoloji alanlarına katkı sağlayacağı ve disiplinler arası çalışmalara fırsat yaratacağı düşünülmektedir.

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Yatırımcıların Karar Verme Sürecinde VIX Volatilite Endeksinin Belirleyiciliği: Çoklu Yapısal Kırılmalı Analizi

Tuncer YILMAZ (https://orcid.org/0000-0001-8956-5814), Kafkas University, Türkiye; yilmaz-tuncer@hotmail.com

Ömer Uğur BULUT (https://orcid.org/0000-0002-6511-8187), Kafkas University, Türkiye; bulut.o.u@gmail.com

The Determination of the VIX Volatility Index in the Decision-Making Process of Investors: A Multiple Structural Breakthrough Analysis

Abstract

In this study, the determinant of volatility expectations in the markets, which the VIX index can determine, in other words, the scale of investors' fear about the markets on hot money movements and foreign direct investments, is investigated. The long-term relationship between the variables included in the research has been determined by Maki cointegration analysis, considering multiple structural breaks. The structural break periods determined in the Maki test have been included in the model as dummy variables, and the Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) tests have been used. The coefficients calculated in the empirical analysis reveal the negative and reducing effect of the structural break periods and the VIX volatility index, more in hot money movements. Finally, it has been seen that the effects of structural break periods determined in multiple structural break tests on foreign direct investments and hot money inflows are decreasing.

Keywords : Foreign Capital, Volatility Index, Structural Break.

JEL Classification Codes : F21, G11, G15.

Öz

Bu çalışmada, VIX endeksi tarafından belirlenebilen piyasalardaki volatilite beklentilerinin, başka bir ifadeyle, yatırımcıların piyasalar hakkındaki korku ölçeğinin sıcak para hareketleri ve doğrudan yabancı yatırımlar üzerindeki belirleyiciliği araştırılmaktadır. Araştırma kapsamında yer alan değişkenler arasındaki uzun dönem ilişki çoklu yapısal kırılmalar dikkate alınarak Maki eşbütünleşme analiziyle tespit edilmiştir. Maki testinde belirlenen yapısal kırılma dönemleri kukla değişkenler olarak modele dâhil edilerek, Tamamen Modifiye Edilmiş Sıradan En Küçük Kareler (FMOLS) ve Dinamik Sıradan En Küçük Kareler (DOLS) testi kullanılmıştır. Yapılan analizlerde hesaplanan katsayılar yapısal kırılma dönemleri ve VIX volatilite endeksinin, sıcak para hareketlerinde daha fazla olmak üzere, negatif yönlü ve azaltıcı etkisini ortaya koymaktadır. Son olarak, çoklu yapısal kırılmalı testlerde belirlenen yapısal kırılma dönemlerinin doğrudan yabancı yatırımlar ve sıcak para girişleri üzerindeki etkisinin azaltıcı yönde olduğu görülmektedir.

Anahtar Sözcükler : Yabancı Sermaye, Volatilite Endeksi, Yapısal Kırılma.

1. Giriş

Piyasalarda belirsizliğin artması, sermaye tahsisi, hedge yapma ve yatırım portföylerini çeşitlendirerek olumsuzlukları ortadan kaldırmak veya kayıp riskini en aza indirmek için profesyonel yatırımcıların karar verme mekanizmalarında finansal varlıkların fiyat volatiliteleri, başka bir deyişle oynaklık en önemli bilgi kaynağı olarak öne çıkmaktadır. Zira volatilite, piyasada yatırımcılar arasında riske maruz varlıkların hesaplanmasında anahtar bir parametre olarak dikkate alınmaktadır.

Volatilite, finansal piyasaların temel bir özelliğidir. Fiyatların dalgalanma eğilimini tanımlayan türetilmiş nicel bir değer olmasına rağmen, opsiyon fiyatlandırmasında ve piyasa dinamiklerinin herhangi bir basit tanımlanmasında da önemli bir rol oynamaktadır. Demeterfi vd. (1999), ticari dalgalanmanın üç nedenini listelemektedir. Birincisi, sinyal gönderen belirli bir görüşe bağlı olarak fiyatlardaki görünüm sadece uzun veya kısa dalgalanmanın olmasını arzulayabilir. İkincisi, gerçekleşen ve zımni oynaklık arasındaki fark üzerine spekülasyon yapmak isteyebilirler. Bu ikisi, gelecekteki hisse senedi veya endeks oynaklığı seviyesi hakkında doğrudan spekülasyon içermektedir. Üçüncüsü, etkin olarak kısa volatilite olan diğer portföy bileşenlerine karşı bir koruma olarak uzun bir volatilite olmasını isteyebilir (Hsu & Murray, 2007: 366).

Volatiliteyi hesaplamak mümkündür; ancak yatırımcılar için varlıkların fiyatlarındaki değişimi iyi yansıtan bir volatilite ölçüsüne sahip olmak daha önemli görülmektedir. Aksi takdirde piyasadaki oynaklık seviyeleri kolayca gözlemlenmeyebilir. Bu bağlamda, piyasalarda zaman içindeki fiyat hareketlerinin sıklığını ve büyüklüğünü ölçmek için yatırımcılar tarafından dünyada en çok dikkate alınan birincil gösterge VIX[1] (Volatilitiy Index) olarak bilinen Chicago Opsiyon Borsası (Chicago Board Options Exchange-CBOE) volatilite endeksidir. VIX endeksi uluslararası piyasalarda hem volatilite göstergesi hem yatırım kararları hem de risk yönetimi açısından çok önemli bir gösterge niteliği taşımaktadır.

Volatilite, son yıllardaki ampirik uygulamalarda, finans ve zaman serisi ekonometrisinde en aktif araştırma alanlarından biri olmuştur. Bu çalışmada, ilgili literatürden farklı olacak şekilde, CBOE tarafından piyasalardaki korkunun derecesini ölçmek için S&P 500 endeksinin opsiyon fiyatlarını kullanarak hesaplanan ve dünya piyasalarında en popüler ve en çok takip edilen gösterge olan VIX volatilite endeksi ile Türkiye'deki doğrudan yabancı yatırım ve sıcak para girişleri arasındaki etkileşimi analiz etmeyi amaçlamaktayız. Yapısal kırılmaların da dikkate alındığı çalışma, kullanılan değişkenler ve yöntem itibariyle literatüre katkı sağlamayı, ulaşılan bulgular açısından politika yapıcılarına ipuçları vermeyi hedeflemektedir. Bu amaç doğrultusunda yaptığımız bu çalışmada üç soruya cevap aranmaktadır.

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[1] *VIX, Chicago Board Options Exchange Volatility Index'in menkul değer sembolüdür.*

- Yapısal kırılmalar altında VIX volatilite endeksi, doğrudan yabancı yatırım ve sıcak para girişleri etkileşim içinde midir?
- Yapısal kırılmalar altında yatırımcıların Türkiye'ye yönelik karar verme sürecinde VIX volatilite endeksi belirleyici faktör müdür?
- Yapısal kırılma dönemlerinin ve VIX volatilite endeksinin yatırımcıların sıcak para ve doğrudan yabancı yatırımlara yönelik karar verme sürecindeki etkisinin yönü ve şiddeti nasıldır?

2. VIX Volatilite Endeksi

CBOE, 1993 yılında başlangıçta piyasanın para karşılığı S&P 100[2] endeksi (Borsa Kodu: OEX) opsiyon fiyatlarının yer aldığı 30 günlük oynaklık beklentisini ölçmek için tasarlanmış olan CBOE Volatilite endeksi VIX'i tanıttı. OEX seçeneklerine dayalı orijinal CBOE volatilite endeksi (VXO) için fiyat geçmişi 1986'dan günümüze kadar mevcuttur. Bu kapsamlı veri seti, yatırımcılara, çeşitli piyasa koşullarına yanıt olarak opsiyon fiyatlarının nasıl davrandığına dair yararlı bir bakış açısı sağlamaktadır. VXO, varsayımsal olarak 30 takvim günü nakit karşılığı S&P 100 endeks opsiyonunun zımni oynaklığını temsil ederken, VIX ise, 30 takvimlik bir S&P 500[3] (Borsa Kodu: SPX) portföyünün fiyatlarına bağlıdır ve işlem fiyatının karesi ile ters orantılı ağırlıkları ortaya koymaktadır. Bu durum, VIX endeksinin kısa süre sonra ABD (Amerika Birleşik Devletleri) borsa oynaklığı için en önemli kriter haline gelmesini sağlamıştır. 2003'te ABD yatırım bankası Goldman Sachs ile birlikte CBOE, finans teorisyenleri, risk yöneticileri ve volatilite tacirleri tarafından yaygın olarak kullanılmaya devam eden ve beklenen oynaklığı ölçmenin yeni bir yolunu yansıtmak için VIX endeksinin hesaplamasını hem teorik hem de pratik hususlar nedeniyle revize etmiştir. Yeni VIX değeri, ABD hisse senetleri için çekirdek endeks olan S&P 500 endeksine dayanmakta ve SPX alım ve satım işlemlerinin ağırlıklı fiyatlarını bir araya getirerek geniş bir işlem fiyatı yelpazesi üzerinden beklenen oynaklığı tahmin etmektedir. Böylece S&P 500 endeksi, hisse senedi piyasasını daha iyi temsil etmek için temel varlık olarak S&P 100 endeksinin yerini almıştır. Bu yeni metodoloji, bir SPX opsiyon portföyü ile volatilite durumunu açığa çıkarmak için bir komut dosyası sağlayarak, VIX endeksini soyut bir kavramdan alım satım ve riskten korunma dalgalanması için pratik bir standarda dönüştürmüştür. 2014 yılında CBOE, VIX'i SPX WeeklysSM serisini içerecek şekilde geliştirdi ve ilk olarak 2005 yılında CBOE tarafından tanıtılan haftalık seçeneklerde artık yüzlerce endeks, hisse senedi, tahvil ve yatırım fonlarını içinde barındırmaya başlamıştır. Böylece SPX Weeklys çok popüler ve aktif olarak işlem gören bir risk yönetimi aracı haline gelmiştir. Bugün, SPX Weeklys işlem gören tüm SPX opsiyonlarının üçte birini ve günde ortalama 350.000'e yakın sözleşmeyi barındırmaktadır. SPX Weeklys'in dahil edilmesi, VIX endeksinin temsil etmesi amaçlanan beklenen dalgalanma için 30 günlük hedef zaman

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[2] *ABD'nin en büyük 100 şirketin hisse senetlerinin yer aldığı ve Standard & Poor's tarafından hesaplanan endekstir.*

[3] *ABD'nin en büyük 500 şirketin hisse senetlerinin yer aldığı ve Standard & Poor's tarafından hesaplanan endekstir.*

çerçevesine en kesin şekilde uyan S&P 500 endeksi opsiyon serisiyle hesaplanmasına olanak tanımaktadır (CBOE, 2019: 3).

Piyasalardaki korkunun derecesini ölçmek için CBOE tarafından oluşturulan ve yatırımcı korku göstergesi veya menkul kıymetler endüstrisinin deyimiyle zımni bir oynaklık olarak kabul edilen VIX endeksi, yatırımcılar tarafından belirlenir ve gelecekte beklenen borsa oynaklığı hakkında yatırımcıların ortak görüşlerini ifade etmektedir. VIX'in değeri ne kadar yüksekse piyasalardaki korku o kadar büyük, VIX'in değeri ne kadar düşükse korku o kadar azdır şeklinde yorumlanmaktadır. VIX, bir tahvilin vadeye kadar getirisine benzer bir özellik taşımaktadır. VIX'in hesaplanmasının altında yatan opsiyon değerleme modeli, Black, Scholes ve Merton'un (1973)[4] çalışmasına dayanmaktadır (Whaley, 2000: 12-13).

VIX endeksi, Dow Jones Borsası Endüstri Endeksi (Dow Jones Industrial Average-DJIA)[5] gibi her işlem günü boyunca gerçek zamanlı olarak hesaplanan bir endekstir. VIX ve DJIA arasındaki tek anlamlı fark, VIX'in volatiliteyi ölçmesi, DJIA'nın ise fiyatı ölçmesidir. VIX, 1993 yılında iki amaç göz önünde bulundurularak tanıtılmıştır. Birinci amaç, beklenen kısa vadeli piyasa oynaklığı için bir karşılaştırma ölçütü sağlamak niyetini içermekteydi. O dönemde mevcut olan VIX seviyesinin geçmiş seviyelerle karşılaştırılmasını kolaylaştırmak için, dakika dakika değerler Ocak 1986'nın başına kadar uzanan endeks opsiyon fiyatları kullanılarak hesaplanmıştır. Bu özellikle önemliydi, çünkü büyük buhrandan (1929 Ekonomik Krizi)[6] bu yana en kötü borsa çöküşü (Ekim 1987 borsa krizi) sırasında piyasa kaygı düzeyini belgelemek, daha sonra yaşanan piyasa türbülansının derecesini değerlendirmede yararlı bir kıyaslama bilgisi sağlamaktır. İkinci amaç, VIX'in volatilite üzerine vadeli işlem ve opsiyon sözleşmelerinin yazılabileceği bir endeks olması amaçlanmaktaydı. Ticari volatilitenin toplumsal faydaları uzun zamandır genel olarak kabul görmektedir. CBOE, Mayıs 2004'te VIX vadeli işlem sözleşmelerinin ve Şubat 2006'da VIX opsiyon sözleşmelerinin alım satımını başlatmıştır. VIX'in ileriye dönük olduğunu vurgulamak önemlidir; yani burada yatırımcıların görmeyi beklediği oynaklığı ölçmektedir. Bazı yorumcuların bazen önerdiği gibi, son zamanlarda fark edilen oynaklığı ölçmek için geriye dönük bir endeks değildir. Kavramsal olarak VIX endeksi bir tahvilin vadeye kadar getirisi gibidir. Vadeye kadar getiri, bir tahvilin fiyatını taahhüt edilen ödemelerin bugünkü değerine eşitleyen iskonto oranıdır. Bu nedenle, bir tahvilin getirisi cari fiyatı ile ifade edilir ve tahvilin kalan vade süresi boyunca beklenen gelecekteki getirisini temsil

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[4] *Black Scholes Eşitliği, 1973 yılında Fischer Black ve Myron Scholes tarafından yazılan "The Pricing of Options And Corporate Liabilities" adlı makalede ilk defa bahsedilen ve o zamana kadar yapılan en iyi opsiyon fiyatlama modeli olup günümüzde halen kullanılmaktadır. Robert C. Merton'un modelde çözülemeyen bir bölümü çözmesinden sonra, model, Black-Scholes-Merton Modeli olarak anılmaya başlamıştır. Bu çalışmaları sayesinde 1997'de ekonomi alanında Nobel ödülü almışlardır (<https://tr.wikipedia.org/wiki/Black-Scholes_e%C5%9Fitli%C4%9Fi>).*

[5] *ABD'nin en büyük 30 şirketin hisse senetlerinin yer aldığı endekstir.*

[6] *24 Ekim 1929'da Perşembe günü ABD'de başlayan ve daha sonra uluslararası piyasalara yayılan ekonomik krizdir. Bu kriz literatürde "1929 Ekonomik Krizi", "Büyük Buhran" veya "Kara Perşembe" olarak bilinmektedir.*

etmektedir. Aynı şekilde, VIX seviyesi S&P 500 endeksindeki mevcut opsiyon fiyatlarını işaret etmekte ve gelecekteki 30 takvim günü boyunca beklenen borsa oynaklığını temsil etmektedir (Whaley, 2009: 98).

VIX endeksi, opsiyon fiyatlarından gelen bilgileri VXO endeksinde olduğu gibi sadece parasal işlemlerde değil, tüm oynaklık çarpıklığı üzerinde bir araya getirerek beklenen piyasa oynaklığını ölçen bir endekstir. Ayrıca VIX, zımni oynaklığa ilişkin modelden bağımsız bir tahminci dikkate almak ve böylece herhangi bir özel opsiyon fiyatlandırma çerçevesine bağlı kalmamaktadır. S&P 100 yerine S&P 500 endeksindeki opsiyonları kullanmadaki amaç, S&P 500'ün ABD'de sadece türev piyasalar için değil, aynı zamanda yüksek riskli yatırım fonu endüstrisi için de temel hisse senedi piyasası ölçütü olduğu gerçeğinde yatmaktadır. Aslında opsiyon fiyatlarından bir oynaklık endeksi oluşturma fikri, 1973'te borsada işlem gören endeks opsiyonlarının kullanılmaya başlanmasının hemen ardından ortaya çıkmıştır. Gastineau (1977) 14 adet hisse senedinin karşılıksız alım opsiyonlarının sebep olduğu oynaklıkların ortalamasını alan bir oynaklık endeksi önerirken, Cox ve Rubinstein (1985) her hisse senedinde birden fazla çağrı seçeneği kullanarak ve oynaklıkları endeksin sabit vadeli bir kullanma süresi olacak şekilde ağırlıklandırarak Gastineau'nun fikrini geliştirmişlerdir. CBOE volatilite endeksleri, daha önce bu yönde yapılan çabaların mantığına uygun bir şekilde volatilite kavramını iki önemli yönde genişletmiştir. İlk olarak, VIX hisse senedi opsiyonlarından çok endeks seçeneklerine bağlıdır. İkincisi hem alım hem de satım seçeneklerinin zımni oynaklıklarına bağlıdır. Bu durum yalnızca endeksin topladığı bilgi miktarını artırmakla kalmaz, aynı zamanda gözlenen endeks seviyesindeki yıpranmışlık ve risksiz orandaki yanlış ölçüm nedeniyle ortaya çıkan olası önyargıları da azaltmaktadır (Fernandes et al., 2014: 1-2).

Hisse senedi endeksi opsiyonlarına dayalı zımni oynaklık endeksleri var oldukları 20 yıl boyunca son derece popüler hale gelmiştir. Yatırımcılar bunları gelecekteki oynaklığın bir beklentisi, bir piyasa duyarlılığı göstergesi ve oynaklığı alıp satmanın bir yolu olarak kullanmaktadırlar. Uluslararası alanda zımni oynaklık endekslerine olan ilgi, 1993'te CBOE'nin VIX'i tanıtmasından bu yana sürekli olarak artmaktadır. Whaley (1993) bu endekslerin yatırım topluluğuna en az iki farklı şekilde yardımcı olabileceğini öne sürmüştür. Birincisi, beklenen kısa vadeli hisse senedi piyasası oynaklığı hakkında güvenilir tahminler sağlamaktadır. İkincisi, türev sözleşmelerinin üzerine yazılabileceği bir piyasa oynaklığı standardı sunmaktadır. Volatilite riskine karşı korunma ve oynaklıkta kâr ticareti yapma potansiyeli, volatilite türevleri ve zımni volatilite endekslerini taklit eden borsada işlem gören ürünler için başarılı piyasalara yol açmıştır. CBOE (2015) bugün VIX opsiyonları ve vadeli işlemlerdeki birleşik alım satım faaliyeti günlük 800.000'den fazla sözleşmedir. Yalnızca CBOE, hisse senedi endeksleri, tahviller, faiz oranları, emtialar, para birimleri ve bireysel hisse senetleri için 28 oynaklık endeksi yayınlamaktadır (Bugge et al., 2016: 133).

Hisse senedi piyasası stratejistleri genellikle VIX'in aşırı seviyelerini ters ticaret sinyalleri olarak yorumlamaktadırlar. Yüksek VIX seviyeleri aşırı karamsarlığa işaret etmektedir. Bu da hisse senedi fiyatlarının aşağı yönde değişmesine neden olduğundan, bu

durum daha sonra takip eden rallilere yol açmaktadır. McMillan'a (1996) göre son derece düşük VIX seviyeleri, piyasa katılımcıları arasındaki kayıtsızlığı yansıtmaktadır, bu da piyasayı hayal kırıklığına uğratacağından aşağı yönlü bir piyasa düzeltmesi olasılığını yükseltmektedir (Simon, 2003: 9).

VIX endeksinin yükselmesi, profesyonel yatırımcıların özellikle S&P 500'de ve genel olarak piyasalarda daha fazla fiyat oynaklığına tepki verdiği gerçeğini yansıtmaktadır. VIX endeksi düştüğünde yatırımcılar S&P 500'de daha küçük fiyat hareketleri olacağına dair iddiaya girerler, bu da daha sakin pazarlar ve daha az belirsizlik anlamına gelmektedir. Burada, oynaklığın daha fazla risk, daha fazla stres, daha derin belirsizlik veya daha büyük piyasa düşüşleri gibi olumsuz çağrışımlara sahip olabilmesine rağmen, oynaklığın kendisinin nötr bir terim olduğunu da belirtmek önemlidir. Genel olarak VIX endeksinin değeri 12 veya 12'den daha düşük olduğu zaman piyasanın düşük oynaklık döneminde olduğu kabul edilmektedir. VIX endeksi 20'nin üzerinde herhangi bir değer aldığında piyasada genellikle anormal derecede yüksek volatilite, 30'un üzerinde olduğu zaman ise bu skor bazen piyasaların çok kararsız olduğunun bir göstergesi olarak görülmektedir (Marquit & Curry, 2021).

3. Literatür İncelemesi

Yurt içinde ve yurt dışında VIX endeksi kullanarak yapılan çalışmalardan bazıları aşağıdaki şekilde derlenmiştir.

Dowling & Muthuswamy (2005), çalışmalarında önce VIX endeksi metodolojisini kullanarak Avustralya hisse senedi endeksi olan S&P/ASX 200 endeks opsiyonlarının zımni oynaklığına dayalı olarak Avustralya borsa oynaklığının yeni bir ölçüsü olan Avustralya Piyasa Oynaklık Endeksini (AVIX) oluşturdular. Daha sonra AVIX endeksi ile S&P/ASX 200 endeksi ile getirileri arasındaki zamansal ilişkiyi analiz etmişler. Analiz sonucunda VIX ile tutarlı olarak, AVIX'in gecikmeli ve eşzamanlı değerleri ile S&P/ASX 200 endeksi getirileri arasında negatif bir ilişkinin olduğu tespit edilmiştir. Bu sonuca göre, AVIX Avustralya piyasaları için VIX gibi gelecekteki oynaklığın bir göstergesi olarak dikkate alınabileceğini göstermektedir.

Giot (2005), zımni oynaklık endeksleri ile hisse senedi endeksi getirileri arasındaki ampirik bağlantıyı ele alan yakından ilişkili iki konuya, zımni oynaklık ve borsa getirilerindeki göreceli değişiklikler arasındaki eşzamanlı ilişki ve zımni oynaklık ile vadeli işlem piyasası getirileri arasındaki olası ilişkiyi incelemiştir. Bu amaçla, zımni oynaklık endeksleri VIX ve VXN'nin hâlihazırda yer aldığı S&P 100 ve NASDAQ 100 endeksleri üzerinde yapılan araştırma ile hem S&P 100 hem de NASDAQ 100 için zımni oynaklık endekslerindeki eşzamanlı değişiklikler ile temel hisse senedi endeks getirileri arasında güçlü bir negatif ilişki olduğunu ortaya koymuştur.

Hsu & Murray (2007), S&P 500 endeksi, VIX endeksi ve SPX'in 30 günlük gerçekleşen volatiliteleri arasındaki ilişkiyi korelasyon analizi ile incelemişlerdir. Elde

edilen sonuçlara göre, VIX'teki değişikliklerin SPX'teki değişikliklerle negatif ilişkili olduğu, VIX'teki değişiklikler ile SPX'in 30 günlük gerçekleşen volatilitesindeki değişiklikler arasında ise önemli bir korelasyon görülmemiştir.

Becker vd. (2008), S&P 500 VIX zımni oynaklık endeksinin bilgi içeriğiyle ilgili olarak, geçmiş dönem sıçrama faaliyetinin, fiyat oynaklığına yaptığı katkıya ilişkin bilgileri içerip içermediği ve VIX'in model tabanlı tahminlere göre gelecekteki sıçrama etkinliğine yönelik herhangi bir düzenli artışa sahip bilgi içeriğini yansıtıp yansıtmadığını incelemişlerdir. Bunun sonucunda, VIX endeksinin hem geçmiş dönem sıçrama faaliyetinin sebep olduğu bilgileri toplam oynaklığa dâhil ettiği hem de gelecek dönemlerdeki etkinliğe ilişkin bilgileri yansıttığı ortaya konulmuştur.

Arbatli (2011) çalışmasında 46 tane gelişmekte olan ülkenin verilerini kullanarak bu ülkelere doğrudan yabancı sermaye yatırımları üzerindeki etkisini incelemiştir. Araştırmasında sermaye yatırımlarını etkileyen birçok küresel (küresel belirsizliğin ve risk ortamının etkilerini yakalamak için VIX endeksi alınmıştır) ve ülkeye özgü yapısal veya sabit faktörler kullanılmıştır. Araştırma sonucunda, küresel riskten kaçınma ve artan belirsizliğin de doğrudan yabancı yatırım girişlerini açıklamada önemli bir rol oynadığını ve VIX endeksi ile doğrudan yabancı sermaye girişleri arasındaki ilişkinin düşük, ancak 2006 sonrası gibi belirli dönemlerde önemli negatif bir ilişkinin olduğu gözlemlenmiştir.

Sarwar (2012) çalışmasında, VIX'in bir yatırımcı korku göstergesi olarak hizmet edip etmediğini ortaya koymak için VIX endeksi ile BRIC ülkeleri olarak bilinen Brezilya, Rusya, Hindistan ve Çin borsa getirileri ve VIX ile ABD borsa getirileri arasındaki dönemsel ilişkiyi incelemiştir. Çalışmada genel olarak ulaşılan sonuçlara göre; VIX'in yalnızca ABD hisse senedi piyasası için değil, aynı zamanda Çin, Brezilya ve Hindistan hisse senedi piyasaları için de bir yatırımcı korku göstergesi olduğunu tespit etmiştir.

Shaikh & Padhi (2015), yatırımcı korku göstergesi ve/veya gelişmekte olan piyasalar ortamında Hindistan VIX'inde gelecekteki hisse senedi piyasası oynaklığının ileriye dönük beklentisi olarak zımni oynaklığı incelemişlerdir. Hindistan VIX'i ve S&P, CNX ve NIFTY hisse endeksi üzerinde yaptıkları araştırma sonucunda, VIX'in yatırımcı korkusunun göstergesi olduğu ve burada beklenen hisse senedi piyasasında belirli bir piyasada düşüş yaşandığında oynaklığın da arttığı sonucu elde edilmiştir.

Huang & Wang (2017), makalelerinde piyasa katılımcılarının Tayvan borsasındaki VIX değişimlerine göre yatırım davranışları üzerindeki etkisini araştırmışlar. Ulaşılan sonuçlara göre; sürü davranışının VIX ile arttığını, başka bir deyişle sürü davranışı yatırımcıların korkusunun artmasıyla teşvik edildiği tespit edilmiştir.

Kula & Baykut (2017), çalışmalarında Borsa İstanbul Kurumsal Yönetim Endeksi (XKURY) ile VIX endeksinin günlük verilerini kullanılarak aralarındaki uzun dönemli ilişkiyi incelemişler. Çalışmada ARDL modeli kullanılmıştır. Araştırma sonucunda XKURY ile VIX endeksi arasında uzun dönemli bir ilişki olduğu tespit edilmiştir.

Caporale vd. (2018) çalışmalarında, VIX endeksindeki piyasa korkusunun süreklilik veya kalıcılık derecesini araştırmışlardır. Araştırmacılar çalışmalarında kriz öncesi (2004-2006), kriz dönemi (2007-2009), krizden sonra (2010-2016) ve tüm dönemi (2004-2016) kapsayacak şekilde 4 zaman örneklemini kullanmışlardır. VIX'in kalıcılığını analiz etmek için ise iki farklı yaklaşım (Hurst üs yöntemi ile R/S analizi ve kesirli entegrasyon) ile test edilmiştir. Yapılan analiz sonucunda, VIX'in etkisi farklı zaman dilimlerinde değişiklik gösterdiğini, normal dönemlerde süreklilik göstermiyorken, kriz döneminde süreklilik derecesinin arttığı tespit edilmiştir.

Sakarya & Akkuş (2018) çalışmalarında VIX endeksi ile BİST 100, BİST Banka, BİST Mali ve BİST Teknoloji endeksleri arasındaki ilişkisinin varlığını ve yönünü tespit incelemişler. Çalışmada kullanılan günlük veriler ARDL sınır testi ve Toda-Yamamoto nedensellik testi ile analiz edilmiştir. Analizlerden elde edilen sonuçlara göre, VIX endeksi ile BİST 100, BİST Banka, BİST Mali ve BİST Teknoloji endeksleri arasında uzun dönemli anlamlı bir ilişki olduğu ortaya çıkmıştır. Ayrıca, VIX endeksinden BİST 100, BİST Banka, BİST Mali ve BİST Teknoloji endekslerine doğru tek yönlü bir nedensellik olduğu gözlemlenmiştir.

Öner (2019) çalışmasında VIX endeksinin gelişmekte olan ülkeler arasında yer alan Brezilya, Çin, Endonezya, Hindistan, Meksika, Filipinler, Rusya, Güney Afrika ve Türkiye'nin 10 yıllık tahvil faiz oranları üzerindeki etkisini incelemiştir. Çalışmada, gün verileri kullanılarak Granger nedensellik analizi yapılmıştır. Elde edilen bulgulara göre, VIX endeksi ile Rusya ve Meksika tahvil fiyatları arasında tek yönlü, Güney Afrika ve Endonezya tahvil fiyatlarıyla ise çift yönü bir ilişki olduğu saptanmıştır.

Kamışlı & Temizel (2019), VIX, EURO STOXX 50, CBOE EuroCurrency, CBOE altın ve CBOE petrol oynaklık endeksleri arasındaki ilişkiyi Breitung & Candelon (2006) frekansta nedensellik testi ile analiz etmişlerdir. Analizlerden elde edilen istatistiksel sonuçlara göre, altın oynaklığından EUROSTOXX 50, döviz kuru ve petrol oynaklığına doğru, EUROSTOXX 50 oynaklığından VIX endeksine doğru nedensellik tespit edilememiştir. Çalışmada ulaşılan bir diğer sonuç ise, petrol oynaklığının tüm frekanslarda VIX endeksinin nedeni olduğu tespit edilmiştir.

Topaloğlu (2019) çalışmasında, VIX volatilite endeksi ile Ekonomik Kalkınma ve İşbirliği Örgütü (OECD) kurucu üye ülkelerin borsaları arasındaki volatilite yayılımını tespit etmek için günlük veriler kullanarak CCC-MGARCH modeli ile analiz etmiştir. Analiz sonuçlarından elde edilen bulgulara göre, VIX endeksinden İzlanda OMX endeksi haricindeki tüm ülke borsalarına doğru negatif yönlü şok ve volatilite yayılımının olduğu ortaya çıkmıştır.

Özdemir (2020) yaptığı çalışmada, VIX endeksinin BİST 30 pay senedi endeksi ve BİST 30 pay senedi endeksine dayalı vadeli işlem sözleşmesi getiri volatilitelerine etkisi günlük veriler kullanılarak EGARCH modelleri ile analiz edilmiştir. Yapılan EGARCH modellerinde her iki getiri serisinde de kaldıraç etkisinin varlığı tespit edilmiştir. Modele

VIX endeksi dâhil edildiğinde her iki getiri serisinde de kaldıraç etkisinin güçlendiği tespit
edilmiştir. Ayrıca, VIX endeksinin BİST 30 endeks getirisinin volatilite kalıcılığına etkisi
aynı düzeyde kalırken, BİST 30 vadeli işlem getirisinin volatilite kalıcılığında ise azalış
olduğu gözlemlenmiştir.

Ögel & Fındık (2020), VIX ile Nikkei 225, Shanghai, Dow Jones 30, Bovespa,
S&P/ASX 200), NSX 50, South Africa Top 40, NSE 30, BİST 100 ve DAX 30 endeksleri
arasında uzun dönemli bir ilişkinin varlığını incelemişler. Elde edilen sonuçlara göre; VIX
ile inceleme kapsamında yer alan tüm endeksler arasında uzun dönemli bir ilişkinin olduğu
tespit edilmiştir. Ayrıca, VIX'den Dow 30'a doğru kısa dönemli bir ilişki bulunmazken,
diğer endekslere doğru kısa dönemli bir ilişkinin olduğu gözlemlenmiştir.

Telek (2020), ARDL sınır testi metoduyla VIX'in Türkiye'de portföy yatırımları ve
döviz kurları üzerindeki etkisini incelemiştir. Ortaya çıkan sonuçlarda, VIX ile döviz kurları
arasında eşbütünleşme ilişkisine rastlanmazken, portföy yatırımları ile arasındaki
eşbütünleşme ilişkisi anlamlı görülmüştür. Ayrıca, kısa dönemde VIX ile döviz kuru ve
portföy yatırımları arasındaki ilişki pozitif ve anlamlı bulunurken, uzun dönemdeki ilişki
anlamlı bulunmamıştır.

Bams & Honarvar (2021), VIX arttıkça getiri ve likidite karşılığındaki Sharpe
oranının birbiri ile ilişkili olduğunu ve bunların aynı temellere bağlı olduklarını savundukları
çalışmalarında, belirledikleri üç faktör ile bu faktörlerde meydana gelen herhangi bir artışın,
VIX endeksinde daha yüksek bir artışa yol açtığını ileri sürmüşlerdir. Bunun için likidite
tedarikçilerinin getirisini temsil eden bir portföy oluşturarak bu teorik bulguların
geçerliliğini araştırmışlardır. Böylelikle NYSE, AMEX ve NASDAQ'da işlem gören
hisseleri kapsayan bir çalışma yürütmüşlerdir. Çalışma sonucunda oluşturdukları portföye
bağlı olarak getirilerin, Sharpe oranı ile büyük ölçüde pozitif bir şekilde ilişkili olduğunu
tespit etmişlerdir.

Güngör (2021) çalışmasında, VIX ile döviz kurunun Türkiye'deki portföy yatırımları
üzerinde etkili olup olmadığını tespit etmek için değişkenler arasındaki eşbütünleşme ilişkiyi
görmek için ARDL sınır testi yöntemi kullanılmıştır. Elde edilen bulgularda, portföy
yatırımları, döviz kuru ve VIX volatilite endeksi arasında uzun dönemli bir ilişki
bulunmuştur. Kurulan modellerde ortaya çıkan uzun dönem katsayı tahmin sonuçlarında
sadece döviz kurunun portföy yatırımları üzerinde anlamlı bir etkisi bulunmuştur. Hata
düzeltme modeli yapıldığında kısa dönemde döviz kurunun portföy yatırımları üzerinde
negatif, VIX'in ise portföy yatırımları üzerindeki etkisi pozitif ve anlamlı olduğu
görülmüştür.

Yaptığımız bu çalışmada, uzun dönemde VIX volatilite endeksinin yatırımcı
kararlarını temsilen kullanılan doğrudan yabancı yatırımlar ve sıcak para hareketleri
üzerindeki etkisini test etmek için kullanılan FMOLS ve DOLS test tahminleyici
bulgularında, yatırımcıların doğrudan yabancı yatırımlar ve sıcak para hareketlerine yönelik
kararında rasyonel davrandığı görülmüştür. 2008-2012 döneminde küresel finansa krizi ve

durgunluk, 2009 sonunda başlayan Avrupa borç krizi, 2019 sonunda hissedilmeye başlayan küresel Covid-19 salgını ve 2018-2022 döneminde Türkiye ekonomisinde döviz kurunda yaşanan dalgalanmaların yabancı yatırımcıların kararlarında yapısal kırılmalara neden olduğunu dikkate alarak kurguladığımız bu çalışmanın bulguları alan literatürünü genişleterek önemli katkı sunmaktadır. Ayrıca, yurt içinde ve yurt dışında VIX volatilite endeksiyle ilgili yapılan çalışmaların kısa özetlerinde de görüldüğü üzere, bu çalışmada kullanılan değişkenlerin farklı olması, yapısal kırılmaların dikkate alınması, iki farklı dinamik zaman serisi metodunun birlikte kullanılması çalışmamızı diğer çalışmalardan ayırarak özgün kılmaktadır.

4. Ekonometrik Analiz

4.1. Kullanılan Değişkenler ve Temel Denklemler

2009M6 ve 2021M12 dönemi aylık (M) veriler aracılığıyla, Türkiye'de yatırımcıların karar verme sürecini analiz etmek amacıyla VIX volatilite endeksinin doğrudan yabancı yatırımlar ve sıcak para hareketleri üzerindeki etkisi değerlendirilmektedir. Kontrol değişkenleri olarak spekülatif baskı endeksi (kriz göstergesi) ve sanayi üretim endeksi (büyüme göstergesi) kullanılarak çalışmanın ampirik analizinin tahmin kuvveti güçlendirilmiştir. Sıcak para hareketleri ve spekülatif baskı endeksi, ilgili literatürden faydalanılarak tarafımızca hazırlanmış, VIX volatilite endeksi tr.investing.com internet sitesinden, sanayi üretim endeksi ve doğrudan yabancı yatırım verileri Türkiye Cumhuriyet Merkez Bankası (TCMB) Elektronik Veri Dağıtım Sisteminden (EVDS) alınmıştır.

Döviz krizleri özelindeki ekonomik ve finansal krizleri önceden belirlemek adına Kaminsky, Reinhart ve Lizondo (1998: 42) Spekülatif Baskı Endeksi'ni (SPE) kullanmışlardır. Araştırmacılar çalışmalarında SPE değerini hesaplamak için aşağıda yer alan üç ekonomik göstergeyi kullanmışlardır (Çepni, 2014: 172).

$$SPE = \beta_1.nex + \beta_2.int - \beta_3.rez \tag{1}$$

nex: Nominal döviz kurundaki yüzde değişim

int: Faiz oranlarındaki yüzde değişim

rez: Uluslararası rezervlerdeki yüzde değişim

1 no'lu denklemdeki SPE hesaplamasında kullanılan "β" katsayıları bazı çalışmalarda 1 olarak alınmış ve ampirik bulguları fazla etkilemediği anlaşılmıştır (Krkoska, 2000). Bu endeksin yükseliş eğiliminde olması finansal sistem üzerinde baskıya işaret ederek kriz göstergesi olarak kabul edilmektedir. Çalışmamızda, 1 no'lu denklemdeki $\beta_1 = \beta_2 = \beta_3 = 1$ varsayımından yola çıkarak, SPE endeksi Türkiye ekonomisi için hesaplanmış ve bağımsız değişken olarak modele dâhil edilmiştir. Denklemdeki ekonomik göstergeler EVDS'den alınmıştır.

Sıcak para kavramı, beklenen getiri oranı ve risklerdeki değişmelere hızlı bir şekilde tepki veren sermaye akımları olarak ifade edilmekte ve aşırı dalgalanma, spekülatif ve hızlı

hareket edebilme unsurlarını kapsamaktadır. Portföy yatırımlar, ödemeler dengesindeki net hata ve noksan hesabı, bankalara ve banka dışındaki özel kesimlere açılan kısa vadeli krediler, yabancıların ülke içindeki bankalarda tuttukları kısa vadeli mevduatlar sıcak paranın unsurları içinde yer almaktadır (Altun & Mutan, 2007: 10-11). Sıcak paranın miktarından ziyade ani artış ve azalışları önemlidir (Boratav, 2001: 216).

Sıcak para, kısa vadeli sermaye hareketleri olarak da tanımlanmaktadır. Ödemeler bilançosunda yer alan cari işlemler, net hata ve noksan kalemi ve sermaye giriş-çıkışlarını ifade etmektedir. Bu kalem Uluslararası Para Fonu (International Monetary Fund-IMF) tarafından sıcak para olarak tanımlanmaktadır (İnandım, 2005: 7). Bu doğrultudan hareketle bazı kaynaklarda sıcak parayı kısa vadeli spekülatif sermaye hareketi şeklinde tanımlamakla birlikte, tahvilden oluşan portföy yatırımları ve hisse senedi hesaplamaları da çoğunlukla yer almaktadır. Çalışmamızda, sıcak para hareketleri Tablo 1'de yer alan EVDS'den elde edilen ekonomik göstergelerden yola çıkarak hesaplanmıştır.

Tablo: 1
Sıcak Para Hareketleri Bileşenleri

Portföy Yatırımları		
Bankalar ve Diğer Sektörlerin Hisse Senedi Yükümlülükleri (+)	Genel Hükümet Yurtiçi Borç Senedi ve Yükümlülükleri (+)	
Diğer Yatırımlar		
Banka Efektif ve Mevduat Yükümlülükleri (+)	Banka Kredi Varlıkları ve Kısa Vadeli Kredi Yükümlülükleri (+)	Diğer Sektör Kısa Vadeli Kredi Yükümlülükleri (+)
Net Hata ve Noksan		
Kaynağı Belirlenemeyen Döviz Giriş-Çıkışları ve İstatistiksel Farklar (+)		

Kaynak: İnandım, Ş., 2005: 110-112.

Çalışmamızın ampirik analizinde, açıklamaları yapılan değişkenler aracılığıyla, 2 ve 3 no'lu fonksiyonel işlemler ekonomik olarak temel alınmaktadır.

Model 1'e ait fonksiyonel ilişki;

$$fdi = f\,(vix,\ spe,\ ipe) \tag{2}$$

Model 2'ye ait fonksiyonel ilişki;

$$hmm = f\,(vix,\ spe,\ ipe) \tag{3}$$

Denklem 2 ve Denklem 3; bağımlı değişkenler doğrudan yabancı yatırımlar ve sıcak para hareketleri olacak şekilde 2 ayrı modele işaret etmektedir. Bu denklemlerde yer alan "fdi" kısaltması doğrudan yabancı yatırımları, "hmm" sıcak para hareketlerini, "vix" korku endeksini, "spe" spekülatif baskı endeksini, "ipe" sanayi üretim endeksini temsil etmektedir. Modeller 4 ve 5 no'lu denklemlerde olduğu gibi açıklanmakta ve ekonometrik olarak analiz edilmektedir.

Model 1'e ait temel denklem;

$$fdi_t = \beta_1 vix_t + \beta_2 spe_t + \beta_3 ipe_t + \varepsilon_t \tag{4}$$

Model 2'ye ait temel denklem;

$$hmm_t = \alpha_1 vix_t + \alpha_2 spe_t + \alpha_3 ipe_t + \varepsilon_t \tag{5}$$

Denklem 4 ve Denklem 5'te, fdi ve hmm bağımlı değişkenler, vix, spe ve ipe ise bağımsız değişkenlerdir. Ayrıca, t ampirik analizin zaman aralığını (2009M6-2021M12), β_1, β_2, β_3, α_1, α_2 ve α_3 sembolleri regresyon katsayılarını, ε sembolü ise modelin hata terimini temsil etmektedir.

4.2. Kapetanios Birim Kök Testi ve Bulgular

Model tahmini için durağan olmayan verilerin kullanılması, sahte regresyon sorunu üretecek ve dolayısıyla istatistiksel çıkarımları etkileyecektir (Granger & Newbold, 1974: 118). Örneklenen serilerin durağanlık özelliklerini araştırmak için bu çalışmada Kapetanios (2005) çoklu yapısal kırılmalı birim kök testi kullanılmıştır. Birim kökün varlığının tespiti için literatürde yaygın olarak kullanılan ADF (Augmented Dickey-Fuller) ve PP PP (Phillips-Perron) gibi geleneksel birim kök testleri ve tek yapısal kırılmayı içeren Zivot ve Andrews'in (2002) testleri tercih edilmemiştir. Kapetanios (2005) testinde, 5 yapısal kırılma dönemine kadar durağanlık analizi yapabilmekte ve analizdeki bu kırılma dönemleri içsel olarak belirlenebilmektedir. Durağanlık analizinin testi için kritik değerler "bootstrap" döngüsü aracılığıyla hesaplanabilmektedir (Uslu, 2019: 49). Bu yönleriyle oldukça güçlü bir test olan Kapetanios (2005) testi bu çalışmada tercih edilmiştir. Çoklu yapısal kırılmalı durağanlık testinde sabit ve trendde kırılmaya izin veren model 6 no'lu denkleme dayanmaktadır.

$$y_t = \alpha_0 + \alpha_1 t + \beta y_{t-1} + \sum_{i=1}^{m} \gamma_i \Delta y_{t-i} + \sum_{i=1}^{k} \varphi_i DU_{i,t} + \sum_{i=1}^{k} \vartheta_i DT_{i,t} + \varepsilon_t \tag{6}$$

Testin H_0 hipotezi serinin birim köklü ve durağan olmadığı şeklinde iken, alternatif hipotez maksimum "m" kırılma sayısı 5 olacak şekilde serinin durağan olduğunu vurgular. H_0 hipotezi, $\alpha = 1$ koşuluna göre, Kapetanios (2005: 129) tarafından hesaplanan kritik değerler t-istatistik değerleri ile kıyaslanarak sınanmaktadır. 6 no'lu denklemdeki sabit ve trendli model için kritik değerler Monte Carlo tekniği ile hesaplanmaktadır (Bayrak, 2019: 47-48). Maksimum "m" kadar kırılma sayısı için öncelikle tek kırılma örneklem boyunca aranmakta ve kalıntı kareler toplamının minimum olduğu modelde yapısal kırılma tarihi belirlenmektedir. İlgili kırılma tarihi tahmin edilip modele eklendikten sonra $\alpha = 1$ koşulu için t-istatistik değerleri hesaplanır ve maksimum "m" kırılma sayısı elde edildiğinde süreç tamamlanmaktadır. Kapetanios (2005) testinde minimum t-istatistik değeri uygun kırılma sayısına işaret etmektedir. Çoklu yapısal birim kök testi sonuçlarına göre hesaplanan t-istatistik değerleri Kapetanios (2005) tarafından belirlenen kritik değerlerden düşük çıkması durumunda yapısal kırılmalar altında ampirik analizde kullanılan değişkenlerde birim kök olduğu, başka bir ifade ile serinin durağan olmadığı sonucuna ulaşılmaktadır (Çalışkan vd., 2018: 85-86).

6 no'lu denklemde $DU_{i,t}$ ve $DT_{i,t}$ değerleri sırasıyla sabit ve trend eğilimi olması durumundaki kukla değişkenleri ifade ederken $T_{b,i}$ değeri ise kırılma tarihini (i = 1, 2, …..…,

m) göstermektedir. Denklemde yer alan kukla değişkenler ve yapısal kırılma tarihleri t > $T_{b,i}$
ise $DU_{i,t} = 1$; t ≤ $T_{b,i}$ ise $DU_{i,t} = 0$ ve t > $T_{b,i}$ ise $DT_{i,t} = t - T_{b,i}$; t ≤ $T_{b,i}$ ise $DT_{i,t} = 0$ şeklinde
tanımlanmaktadır (Hepaktan, 2016: 86).

Kapetanios (2005) çoklu yapısal kırılmalı birim kök testi sonuçlarına göre t-istatistik
değerinin minimum olduğu yapısal kırılma sayısı fdi, hmm ve vix için 5, spe ve ipe için ise
sırasıyla 4 ve 3'tür. Yapılan analizden elde bulgular Tablo 2'de sunulmuştur.

Tablo: 2
Kapetanios (2005) Sabit ve Trend İçeren Model Durağanlık Testi Sonuçları

Değişken*	m**	t-istatistik değeri***	Yapısal kırılma dönemleri
fdi	5	4,327	2010M4; 2013M6; 2018M7; 2020M12; 2021M11
dfdi	5	10,114	2010M2; 2012M5; 2018M3; 2019M12; 2021M06
hmm	5	5,742	2009M10; 2012M09; 2013M06; 2019M1; 2021M3
dhmm	5	11,112	2009M12; 2013M1; 2015M08; 2019M6; 2020M8
vix	5	3,184	2010M5; 2013M6; 2018M9; 2020M5; 2021M1
dvix	5	9,952	2010M9; 2014M8; 2017M10; 2020M1; 2021M10
spe	4	5,284	2009M12; 2018M6; 2019M12; 2021M6
dspe	4	9,062	2010M8; 2016M10; 2018M05; 2021M10
ipe	3	5,194	2009M8; 2018M8; 2020M11
dipe	3	7,843	2009M10; 2019M1; 2021M7

* Değişkenler arasında yer alan "d" sembolü fark işlemcisidir.
** Yapısal kırılma sayısı.
**** İstatistiksel değerlerin karşılaştırılması için Kapetanios (2005) kritik değerleri %1, %5 ve %10 anlam düzeyinde sırasıyla 5 yapısal kırılma için
9,039, 8,343, 8,016, 4 yapısal kırılma için 8,243, 7,736, 7,426, 3 yapısal kırılma için 7,401, 7,006 ve 6,686'dır.*

Kapetanios (2005) durağanlık analizi sonuçlarına göre, ampirik analizde kullanılan
tüm değişkenlerin belirlenen yapısal kırılma dönemlerinde birim köke sahip olduğu
görülmektedir. Hesaplanan test istatistik değerleri her üç anlam düzeyinde kritik değerlerden
düşük çıkmıştır. Diğer taraftan değişkenlerin birinci farkı alındığında serilerin durağanlaştığı
görülmüştür. Kapetanios (2005) çoklu yapısal kırılmalı birim kök testinden, Tablo 2'de yer
alan ekonometrik analizde kullanılan tüm değişkenlerin birinci farkı alındığında durağan
hale geldiği bulgusuna ulaşılmaktadır. Yapısal kırılma dönemlerine bakıldığında ise 2008-
2012 döneminde Türkiye ve Avrupa ekonomilerini etkileyen "Küresel Kriz", "Yunanistan
Borç Krizi" ve "Euro Krizi" etkilerinin hissedildiğini söyleyebiliriz. 2013 yılının ortasında
Amerikan Merkez Bankasının (Federal Reserve-FED) tahvil alım programında azalmaya
gitmesinin doğrudan yabancı yatırımlar, sıcak para hareketleri ve VIX volatilite
endeksindeki kırılmalarda etkisi olduğu görülmektedir. Son olarak, 2018-2022 döneminde
Türkiye, ABD ve dünya genelinde yaşanan politik, toplumsal ve ekonomik gelişmelerden
(seçimler, döviz kurundaki dalgalanmalar, Covid-19 küresel salgın) yola çıkıldığında,
belirlenen yapısal kırılmaların anlamlı olduğu sonucuna ulaşabiliriz.

4.3. Maki Eşbütünleşme Testi ve Bulgular

Serilerdeki yapısal kırılmaları dikkate alarak yaptığımız bu çalışmada, Türkiye'de fdi
ile vix, spe ve ipe, hmm ile vix, spe ve ipe arasındaki eşbütünleşme özelliklerini araştırmak
için Maki eşbütünleşme testi uygulanmıştır. Bu test, iki veya daha fazla potansiyel kırılma
tarihini yakalayabilen Hatemi-j (2008) ve Gregory ve Hansen (1996) eşbütünleşme testlerine
tercih edilmiştir. Maki eşbütünleşme testi, aynı anda neredeyse 5 kırılma ile seri halinde

eşbütünleşmeyi yakalayabilmektedir. Yapısal kırılmaların belirlenebildiği farklı çözümlemelerinin yer aldığı model 7, 8, 9 ve 10 no'lu denklemde gösterilmiştir (Maki, 2012: 2011-2012).

Düzeyde Kırılma;

$$y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta X_t + e_t \tag{7}$$

Düzeyde ve Bağımsız Değişkenlerde Kırılma;

$$y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta X_t + \sum_{i=1}^{k} \beta X_t D_{i,t} + e_t \tag{8}$$

Düzeyde ve Trendli Kırılma;

$$y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta X_t + \gamma_t + \sum_{i=1}^{k} \beta X_t D_{i,t} + e_t \tag{9}$$

Düzeyde, Bağımsız Değişkenlerde ve Trendli Kırılma;

$$y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta X_t + \gamma_t + \sum_{i=1}^{k} \gamma D_{i,t} + \sum_{i=1}^{k} \beta X_t D_{i,t} + e_t \tag{10}$$

7, 8, 9 ve 10 no'lu denklemlerde $D_{i,t}$ yapısal kırılmalara işaret eden kukla değişkeni temsil etmektedir. Eğer test istatistik değerleri kritik değerden büyükse $D_{i,t} = 1$ değeri alırken, başka bir ifadeyle yapısal kırılmanın varlığını belirlerken, yapısal kırılmaların olmadığı durumlarda $D_{i,t} = 0$ değeri almaktadır. Denklemde yer alan t zamanı, y_t bağımlı değişkeni, X_t bağımsız değişkeni, β ve γ sırasıyla bağımsız değişkenlerdeki ve zaman trendindeki eğilimi gösteren katsayıları, $ε_t$ modeldeki hata terimini temsil etmektedir (Hepaktan, 2016: 86; Adebayo et al., 2021: 1019).

Maki eşbütünleşme analizinde yapısal kırılmalar altında eşbütünleşik ilişkiye karar verilirken hesaplanan t-istatistik değerleriyle Monte Carlo simülasyonundan elde edilen kritik değerler karşılaştırılmaktadır. Hesaplanan istatistiksel değerlerin kritik değerlerden yüksek çıkması, analizde kullanılan değişkenler arasında çoklu yapısal kırılmalar altında uzun dönemli eşbütünleşik ilişkinin varlığına işaret etmektedir (Bayrak, 2019: 49). Monte Carlo simülasyonundan elde edilen kritik değerler yapısal kırılma (k) ve bağımsız değişken (X_t) sayısına göre değişmektedir. k ve X_t değeri arttıkça kritik değerler düşmektedir (Maki, 2012: 2012-2013).

Maksimum 5 yapısal kırılmayı içsel olarak belirleyen Maki eşbütünleşme testinde denklemleri verilen çözümlemeler arasından en uygun model istatistiksel değerlere bakılarak belirlenmektedir. Buna göre Kapetanios (2005) durağanlık analizine benzer şekilde en düşük t-istatistik değerini veren model seçilmektedir (Çalışkan vd., 2018: 88).

Bu çalışmada, Maki çoklu yapısal kırılmalı eşbütünleşme analizi bulgularına göre minimum t-istatistik değerini veren model düzeyde, bağımsız değişkenlerde ve trendli kırılmayı içeren ve denklem 10'da gösterilen çözümleme olduğu tespit edilmiştir. Analizden

elde edilen bulgular Tablo 3'te yer almaktadır. Doğrudan yabancı yatırımlar (fdi) ve sıcak para hareketlerinin (hmm) bağımlı değişkenler olduğu 2 ayrı modelin sonuçlarına bu tabloda yer verilmiştir. Bağımsız değişken sayısı her iki model için 3'tür (X_t = 3). Yapısal kırılma analiz sonuçlarına göre fdi modelinde yapısal kırılma sayısı 3 (k = 3), hmm modeli için ise yapısal kırılma sayısı 4 (k = 4) olarak belirlenmiştir. Kritik değerler her iki model için k ve X_t değerlerine göre Maki'nin (2012; 2013) çalışmasından alınmıştır.

Tablo: 3
Maki Çoklu Yapısal Kırılmalı Eşbütünleşme Testi Sonuçları

Çözümleme: Düzeyde, Bağımsız Değişkenlerde ve Trendli Kırılma					
Model	k	X_t	t-istatistik değeri	Kritik Değerler*	Yapısal Kırılma Dönemleri
fdi = f (vix, spe, ipe)	3	3	9,182	8,331; 7,743; 7,449	2013M8; 2019M12; 2021M10
hmm = f (vix, spe, ipe)	4	3	10,014	8,851; 8,269; 7,960	2011M3; 2013M6; 2019M4; 2021M5

*, %1 anlam düzeyindeki değerlerdir.

Tablo 2'de sunulan serilerin birim kök özellikleri, fdi, hmm, vix, spe ve ipe değişkenlerinin I(1) süreci entegrasyonunu, birinci farkında durağan olduklarını göstermektedir. Dolayısıyla, Tablo 3'te sunulan ve ilgili değişkenler arasındaki yapısal kırılmalar altında uzun dönem denge etkileşimini araştırmak için Maki (2012) eşbütünleşme testinin uygulanmasında bir engel bulunmamaktadır (Adebayo vd., 2021: 1020). Tablo 3'teki Maki (2012) eşbütünleşme testinin sonuçları, fdi modeli için doğrudan yabancı yatırımlar, spekülatif baskı endeksi, sanayi üretim endeksi arasında; hmm modeli için sıcak para hareketleri ve aynı bağımsız değişkenler arasındaki yapısal kırılmalar altında uzun dönemli ilişkiyi ortaya koymaktadır. İki model için de hesaplanan t-istatistik değerleri her üç anlam düzeyinde Maki'nin (2012) belirlediği kritik değerlerden yüksek çıkmıştır. Ayrıca, belirlenen yapısal kırılma dönemleri Kapetanios (2005) durağanlık analiziyle benzerlik taşımakla birlikte, ilgili dönemlerdeki ekonomik, politik ve toplumsal gelişmeler dikkate alındığında anlamlı bulunmuştur.

4.4. FMOLS - DOLS Testi ve Bulgular

Değişkenler arasındaki çoklu yapısal kırılmalar altında uzun dönemli ilişkinin varlığının tespit edilmesi, bu değişkenler için uzun dönem katsayılarını tahmin etme ihtiyacını doğurmaktadır. Bu doğrultuda yaptığımız bu çalışmada, Maki (2012) eşbütünleşme analizinde belirlenen yapısal kırılma dönemleri kukla değişkenler olarak modele dâhil edilerek, Phillips ve Hansen (1990) tarafından geliştirilmiş Tamamen Modifiye Edilmiş Sıradan En Küçük Kareler (FMOLS) ve Dinamik Sıradan En Küçük Kareler (DOLS) testi kullanılmıştır.

FMOLS (Fully Modified Least Squares) tahmincisi, otokorelasyon ve içsellik problemlerinin yanı sıra örnek yanlılığından kaynaklanan hataları düzeltme avantajına sahiptir (Narayan & Narayan, 2005: 164). Diğer taraftan, uzun dönemli dengenin büyüklüğünü tespit etmek için DOLS (Dynamic Ordinary Least Squares) tahmin testi de ekonometrik çalışmalarda kullanılmaktadır. Çalışmalarda DOLS tahmincisini kullanmanın çeşitli avantajları vardır. Bunlar;

- Seriler durağanlık mertebelerinden bağımsız olarak tahmin edilebilmekte, ancak bağımlı değişkenin birinci dereceden eşbütünleşik olması beklenmektedir.
- Model tahmininden kaynaklanan otokorelasyon ve diğer içsellik sorunlarını ortadan kaldırmaktadır (Esteve & Requena, 2006: 119).

Çalışmada, FMOLS ve DOLS tahmin edicileri aracılığıyla, bağımlı değişkenlerin sırasıyla doğrudan yabancı yatırımlar ve sıcak para hareketlerinin olduğu her iki modelin katsayıları, başka bir ifadeyle, uzun dönem esneklikleri hesaplanmıştır. FMOLS ve DOLS tahmincisi 11 ve 12 no'lu denklemde gösterilmektedir. Bu denklemlerde yer alan p ve k değerleri Schwarz bilgi kriteri tarafından önerilen optimum gecikme seviyesini temsil etmektedir (Adebayo et al., 2021: 1018).

Doğrudan yabancı yatırımların bağımlı değişken olduğu 2 no'lu fonksiyonel modele ait denklem;

$$fdi = \S_0 + \S_1 vix_t + \S_2 spe_t + \S_3 ipe_t + \sum_{i=p}^{p} \math"b_1 \Delta vix_{t-i} + \sum_{i=p}^{p} \math"b_2 \Delta spe_{t-i} + \sum_{i=p}^{p} \math"b_3 \Delta ipe_{t-i} + \varepsilon_t \qquad (11)$$

Sıcak para hareketlerinin bağımlı değişkenin olduğu 3 no'lu fonksiyonel modele ait denklem;

$$hmm = \alpha_0 + \alpha_1 vix_t + \alpha_2 spe_t + \alpha_3 ipe_t + \sum_{i=k}^{k} \beta_1 \Delta vix_{t-i} + \sum_{i=k}^{k} \beta_2 \Delta spe_{t-i} + \sum_{i=k}^{k} \beta_3 \Delta ipe_{t-i} + e_t \qquad (12)$$

Maki (2012) eşbütünleşme analizinde tespit edilen uzun vadeli etkileşimin sonucunda değişkenler arasındaki uzun dönemli katsayıları sunabilmek için fdi ve hmm ile bağımsız değişkenler (vix, spe, ipe) arasındaki FMOLS ve DOLS tahmincilerine ait analiz katsayıları Tablo 4'te yer almaktadır. Tablodaki "bd" sembolü Maki eşbütünleşme testinde belirlenen yapısal kırılma dönemlerini temsil etmektedir. 11 ve 12 no'lu denklemlerde yer alan "$\S_0$" ve "α_0" ilgili regresyon modellerinin sabit terimidir.

Tablo: 4
FMOLS ve DOLS Test Sonuçları

Değişken	Katsayı	t-istatistik değeri	Olasılık değeri (p)
Model 1 (fdi): Tamamen Modifiye Edilmiş En Küçük Kareler (FMOLS) Bulguları			
vix	-0,002	-1,804	0,071*
spe	-0,067	-7,378	0,000***
ipe	0,014	2,588	0,012**
bd_13m8	-0,006	-3,582	0,001***
bd_19m12	-0,016	-5,289	0,000***
bd_21m10	-0,018	-6,235	0,000***
$\S_0$	4,655	2,546	0,016**
Trend	-0,051	-1,969	0,052*
$R^2 = 0,97$ Düzeltilmiş $R^2 = 0,96$			
Model 1 (fdi): Dinamik En Küçük Kareler (DOLS) Bulguları			
vix	-0,002	-1,728	0,076***
spe	-0,071	-4,258	0,000***
ipe	0,017	3,005	0,006***
bd_13m8	-0,007	-4,128	0,000***
bd_19m12	-0,020	-6,108	0,000***
bd_21m10	-0,020	-6,670	0,000***
$\S_0$	4,959	3,572	0,002***
Trend	-0,070	-2,105	0,041**
$R^2 = 0,97$ Düzeltilmiş $R^2 = 0,96$			

Model 2 (hmm): Tamamen Modifiye Edilmiş En Küçük Kareler (FMOLS) Bulguları			
vix	-1,385	-4,410	0,000***
spe	-1,195	-3,474	0,002***
ipe	0,853	0,727	1,264
bd_11m3	-2,355	-2,191	0,031**
bd_13m6	-1,983	-5,031	0,000***
bd_19m4	-3,098	-4,243	0,000***
bd_21m5	-3,097	-2,243	0,021**
α_0	5,378	3,950	0,000***
Trend	-2,050	-3,174	0,004***
$R^2 = 0,94$ Düzeltilmiş $R^2 = 0,93$			
Model 2 (hmm): Dinamik En Küçük Kareler (DOLS) Bulguları			
vix	-1,456	-4,218	0,000***
spe	-1,282	-3,872	0,000***
ipe	0,943	0,780	1,153
bd_11m3	-2,488	-2,146	0,041**
bd_13m6	-2,025	-4,279	0,000***
bd_19m4	-3,172	-4,872	0,000***
bd_21m5	-3,218	-2,223	0,021**
α_0	5,679	-3,634	0,000***
Trend	-2,085	-3,002	0,011**
$R^2 = 0,94$ Düzeltilmiş $R^2 = 0,93$			

*Not: ***, ** ve * sırasıyla %1, %5 ve %10 anlamlılık düzeylerini temsil etmektedir.*

Tablo 4'teki Model 1 ve Model 2 bulgularına bakıldığında, Maki eşbütünleşme testinde belirlenen yapısal kırılma dönemleri sıcak para hareketleri ve doğrudan yabancı yatırım girişlerini azalttığı görülmüştür. Azaltıcı etkinin şiddeti sıcak para hareketlerinde doğrudan yabancı yatırımlara göre daha fazladır. DOLS testine göre, 2021 yılındaki yapısal kırılma dönemine ait kukla değişken doğrudan yabancı yatırımları ve sıcak para hareketlerini sırasıyla 0.020 ve 3.218 birim azalttığı görülmüştür.

Model 1'de FMOLS ve DOLS testlerinde elde edilen bulgularda, bütün bağımsız değişkenlerin doğrudan yabancı yatırımlar üzerindeki etki katsayıları anlamlı bulunmuştur. Burada spekülatif baskı endeksinin etki katsayı değerinin (FMOLS = 0,067; DOLS = 0,071) en büyük olduğu, bunu sırasıyla sanayi üretim endeksi (FMOLS = 0,014; DOLS = 0,071) ve VIX volatilite endeksi (FMOLS = -0,002; DOLS = -0,004) takip etmektedir. Bu bulgulara göre, spekülatif baskı endeksi ile VIX endeksinin doğrudan yabancı yatırımlar üzerindeki etkisi negatif, sanayi üretim endeksinin etkisi ise pozitif olduğu tespit edilmiştir.

Model 2'ye ait FMOLS ve DOLS test bulguları incelendiğinde, sanayi üretim endeksi hariç diğer bağımsız değişkenlerin sıcak para hareketleri üzerindeki etki katsayıları anlamlı bulunmuştur. Her iki testte de VIX endeksinin etki katsayısının (FMOLS = -1,385; DOLS = -1,456) spekülatif baskı endeksinin katsayısından (FMOLS = -1,195; DOLS = -1,282) büyük olduğu ortaya çıkmıştır. Bağımsız değişkenlere ait regresyon etki katsayılarından da görüldüğü üzere VIX volatilite endeksi ile spekülatif baskı endeksinin sıcak para hareketleri üzerindeki etkisi istatistiksel olarak negatif yönde olduğu görülmüştür. Her iki modelde de anlamlı bir etkiye sahip olan VIX endeksi ile spekülatif baskı endeksinin sıcak para hareketleri üzerindeki etkileri doğrudan yabancı yatırımlara göre daha fazla bulunmuştur.

5. Sonuç ve Değerlendirme

Yatırımcıların karar verme sürecinde VIX volatilite endeksinin uzun dönemli belirleyiciliğini ampirik olarak analiz etmeyi amaçlayan bu çalışmada iki ayrı model test

edilmiştir. Ülke ekonomilerinin ekonomik gelişme ve kalkınma hedefine yönelik önemli yatırım araçları olan doğrudan yabancı yatırımlar ve sıcak para hareketleri bu modellerde bağımlı değişken olarak alınmıştır. Finansal sistemdeki baskıya ve krizlere işaret eden spekülatif baskı endeksi ve ekonomide büyüme göstergesi olan sanayi üretim endeksi her iki modelde kontrol değişkeni olarak kullanılmıştır. Çalışmanın ampirik analizi araştırmanın konusuna uygun olacak şekilde yapısal kırılmaları dikkate alarak tasarlanmış ve bu doğrultuda Kapetanios (2005) çoklu yapısal kırılmalı birim kök testi ve Maki (2012) çoklu yapısal kırılmalı eşbütünleşme analizi tercih edilmiştir. Uzun dönem katsayıların yorumlanmasında FMOLS ve DOLS tahmincilerinden faydalanılmıştır.

Kapetanios (2005) durağanlık analizi ve Maki (2012) eşbütünleşme sonuçlarından yapısal kırılma dönemleri ön plana çıkmaktadır. Her iki testte de 2008-2012 küresel ekonomik kriz ve durgunluk döneminin, 2009 yılının sonunda başlayan Avrupa borç krizinin, 2019 yılının sonunda hissedilmeye başlayan küresel salgının ve 2018-2022 döneminde Türkiye ekonomisinde döviz kurunda yaşanan dalgalanmaların yabancı yatırımcıların kararlarında yapısal kırılmalara neden olduğu ve önemli etken faktörler olduğu tespit edilmiştir. Diğer taraftan, yapılan eşbütünleşme analizi sonuçları her iki model için de yapısal kırılmalar altında uzun dönemli ilişkiyi göstermektedir. Doğrudan yabancı yatırımlar VIX volatilite endeksi, spekülatif baskı endeksi ve sanayi üretim endeksiyle, sıcak para hareketleri ise VIX volatilite endeksi ile spekülatif baskı endeksiyle uzun dönemde etkileşim içerisinde olduğu tespit edilmiştir.

Uzun dönem katsayıların yorumlanmasına imkân veren FMOLS ve DOLS bulgularına göre, VIX volatilite endeksi ve spekülatif baskı endeksindeki değişimlerin doğrudan yabancı yatırımlar üzerindeki etkisi istatistiksel olarak anlamlı ve negatiftir. Sanayi üretim endeksinin bulgularına bakıldığında, istatistiksel olarak anlamlı ve pozitif bir etki söz konusudur. Doğrudan yabancı yatırımlara ilişkin teorik açıklamalara bakıldığında, istihdamı artırıcı etkisi ve teknoloji odaklı verimlilik artışıyla ekonomik büyümeyi teşvik ettiğinden, elde edilen bulgu teoriyle uyuşmaktadır (Ekinci, 2011: 72). Diğer taraftan, eşbütünleşme analizinde belirlenen yapısal kırılmaların etkisi anlamlı ve negatif yönlüdür.

Yatırımcıların döviz kuru belirsizlikleri ya da faiz getirisi gibi spekülatif amaç gütmeyen doğrudan yabancı yatırım kararlarında, VIX volatilite endeksinin istatistiksel olarak düşük düzeyde belirleyici faktör çıkması Model 1'den elde edilen bulguların tutarlılığına işaret etmektedir. Ayrıca, doğrudan yabancı yatırımlara verilen negatif tepkinin nedeni VIX volatilite endeksinin aynı zamanda bir belirsizlik endeksi olarak takip edilmesidir. Bu bulgu Arbatli'nin (2011) yaptığı çalışmayla da uyuşmaktadır. Ayrıca, spekülatif baskı endeksine verilen negatif tepkiden kriz dönemlerinde artan finansal baskının doğrudan yabancı yatırımları olumsuz yönde etkilediği anlaşılmaktadır. Ekonomideki belirsizlik, korku ya da risk ortamında yatırımcıların çekimser davranabileceğinden yola çıkılırsa, elde edilen bulguların pratikte kabul edilebilir olduğunu söyleyebiliriz.

Her iki modelde de yapısal kırılma dönemlerinin yabancı yatırımlar üzerindeki negatif etkisi dikkat çekmektedir. Model 1'den farklı olarak sıcak para hareketlerinin yer

aldığı modele eklenen 2011 yılına ait yapısal kırılma dönemini temsil eden kukla değişkenin anlamlı ve negatif yönlü etkisinin çıkması, 2008-2012 döneminde Avrupa'da deneyimlenen ve Türkiye ekonomisinde de hissedilen küresel krizin yabancı yatırımlar üzerindeki kötümser beklentisine işaret etmektedir. Ayrıca Model 2 bulguları VIX volatilite endeksi ve spekülatif baskı endeksinin yüksek düzeyde sıcak para hareketleri üzerindeki anlamı ve negatif yönlü etkisini göstermektedir. Sanayi üretim endeksi özelinde istatiksel olarak anlamlı bir etki bulunmamıştır. Bu sonuç, sıcak para hareketlerinin büyümedeki değişimlerden ziyade spekülatif eğilimlere açık olmasıyla açıklanabilir. Diğer taraftan, VIX volatilite endeksi ve spekülatif baskı endeksinin her iki modelde kullanılan yatırımlar üzerindeki etkisinin şiddeti karşılaştırıldığında, sıcak para hareketlerinin bu endekslere verdiği negatif tepkinin daha fazla olduğu görülmüştür. Elde edilen bu bulgu, kırılgan bir yapısı olan sıcak para hareketlerinin ekonomideki risk ve belirsizlik anında spekülatif ve hızlı hareket edebilme özelliğinden dolayı pratikte anlamlıdır.

Her iki modelin analizlerinden elde edilen bulgularda, yatırımcıların Türkiye ekonomisine yönelik karar verme sürecinde, VIX volatilite endeksi ve spekülatif baskı endeksinin yapısal kırılmalar altında ve uzun dönemde belirleyici olduğunu göstermektedir. Yapısal kırılma dönemleri her iki yabancı yatırımı da uzun dönemde olumsuz etkilerken, en fazla negatif etkinin sıcak para hareketlerinde göründüğü anlaşılmaktadır. Ayrıca bu sonuçlarda, bir kriz göstergesi olan spekülatif baskı endeksi ve piyasalardaki beklentilerin ve belirsizliğin önemli bir sinyali olan VIX volatilite endeksinin yabancı yatırımcıların kararlarında ön plana çıktığı görülmektedir.

VIX volatilite endeksinin belirleyiciliğinin ampirik olarak test edildiği bu çalışmada yatırımcıların doğrudan yabancı yatırımlar ve sıcak para hareketlerine yönelik kararında rasyonel davrandığı sonucuna ulaşılmaktadır. Yatırımcıların iyimser ya da kötümser beklentileri ile VIX volatilite endeksinin istatistiksel olarak anlamlı ve negatif yönlü bir şekilde etkileşim içinde olduğu anlaşılmaktadır. Yatırımcılar VIX volatilite endeksini gelecekteki ekonomik koşulların bir göstergesi olarak gördüğünden ilgili endekslerdeki değişimlere bu şekilde tepki vermeleri oldukça olası bir durumdur.

2008 küresel finans krizi sonrasını analiz eden bu çalışmada, belirlenen yapısal kırılmalar dikkate alındığında, Türkiye ekonomisi gibi gelişmekte olan piyasa ekonomilerinde kriz ya da yapısal kırılma dönemlerinde doğrudan yabancı yatırım girişleri ve sıcak para hareketlerinde önemli bir daralma gerçekleşmiştir. Doğrudan yabancı yatırımlardan spekülatif ve ani hareket etme özelliğiyle teorik olarak farklılaşan sıcak para hareketlerindeki çıkışların etkisi gelişmekte olan ülkeler için daha fazla olmaktadır. Bu bağlamda çalışmadan elde edilen ampirik bulgular bu durumu destekler niteliktedir. Ancak, doğrudan yabancı yatırım girişlerinin özellikle cari açık ve yatırımların finansmanındaki olumlu rolü göz önüne alındığında, bu girişlerin iç politika veya diğer ülkeye özgü faktörler tarafından ne ölçüde kullanıldığı ve yönlendirdiği önemli bir politika sorusudur.

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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*, New York: McGraw-Hill, Inc., 163-82.

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Chang, R. (1998), "The Asian Crisis", *NBER Discussion Paper*, 4470, National Bureau of Economic Research, Cambridge, Mass.

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Derlemeler: Krugman, P. (1995), "The Move Toward Free Trade Zones", P. King (ed.), *International Economics and International Economic Policy: A Reader* içinde, New York: McGraw-Hill, Inc., 163-82.

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