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Executive Summary

The objective of our journal is to publish up-to-date, high-quality and original research papers. In our 31st volume, 52nd issue, we present twenty-five studies, including socioeconomic-based findings and reviews, which broadly the issue contains research papers. Research papers provide a clear contribution to knowledge in the field with solid theoretical and/or methodological support and give a critical, concise yet comprehensive and contemporary examination of economics in real life and its applications.

The opening article of this issue investigates shadow economy and political involvement relations between 2001 and 2008. The obtained results of **Gokcekus, McFall and Bagirzadeh's** article point to a negative relationship through voter turnout rate. In **Gülcemal's** study, which is the second study on this issue, the relationship between foreign borrowing and economic growth in Argentina, Turkey, Russia, Turkey, the Philippines and South Africa is examined. The research findings show causality in all emerging countries from the period 1990-to 2019. **Budak and Yilmaz's** research, on the other hand, is on the taxation of digital assets, which are described as crypto money, and includes a discussion on this subject. The fourth study is on smoking and its tariff, which is one of the leading social problems of today. **Tosun and Tekdemir** compared smoking trends and tax burdens in their research on the European Union and Turkey. The fifth study, which belongs to **Öztürk and Danişman**, is about the technological innovations of and the internationality of the companies.

On the other hand, the sixth study deals with the relationship between agricultural commodity prices and the stock market index from an international perspective. In this study conducted between Poland and Turkey by **İlarslan and Yıldız**, empirical evidence has been obtained those agricultural commodities affect the stock market in both countries. While **Dur and Şahin's** paper, which is the seventh study on this issue, takes England as an example and proposes an independent social security advisory board for Turkey; the eighth study, the work of **Erü, Topuz and Cop**, is to make an application in the retail sector based on the augmented reality experience. In the ninth study on the issue, **Gezer** conducted research between military expenditures and GDP based on the per capita income of 12 NATO member countries and did not obtain any causality in only five countries, Croatia, Estonia, Latvia, Lithuania and Turkey. The subject of the tenth article is the socio-economic determinants of happiness in Afghanistan. In this paper by **Amirzai and Sönmez**, age, marital status, employment, education level, income, foreign language ability, perception of the country's future direction, and change in the household economic situation are the key variables affecting happiness. While the eleventh article written by **Atık** is titled "*The Dynamic Effect of Biomass Energy Consumption on Economic Growth and Environmental Quality in Turkey*", the twelfth article written by **Zengin and Naktiyok** carries the title of "*Effect of Internet Addiction on Female Employee Performance: The Regulatory Role of Social Support*".

Mutmainah, Nugroho and Sukmadilaga's study compares the number of companies, assets, contributions, and Islamic insurance claims in Malaysia, Brunei Darussalam, and Indonesia. By employing the descriptive quantitative method, they figure that while Indonesia has the highest growing Islamic insurance companies, Brunei Darussalam is the country with the lowest growth due to its complicated laws and bureaucratic structure. In the study of **Yavuz and Sultan**, which is included in this issue as the fourteenth article, a comparative evaluation has made between education expenditures and property crimes and the relationship between the annual spending per student at the secondary education level and the number of people convicted of theft crime is reached. **Babaoğlu and Karasoy's** study evaluating blockchain in public administration is another one of the evaluated studies on this issue. The study has pointed out that blockchain technology will have important functions in many areas, such as increasing the public sector's accountability, reducing bureaucracies, and reducing the public sector's costs. **Çelik and Uysal**, who analysed the Turkish banking sector between 2010 and 2019, made significant contributions to the literature in the field by estimating the Panzar and Rosse H Statistics for the period above.

The study of **Mike, Özyatürk and Kızılkaya**, which scrutinises the exchange rate and foreign trade balance in Turkey, reached important findings for the first quarter of 1998 and the third quarter of 2019. According to the article, the real effective exchange rate and the foreign income level have positive and statistically significant effects on the trade balance in Turkey. In contrast, the national income level negatively and statistically significant impact the trade balance. Included in our issue as the eighteenth article, **Yeşilkaya's** study, which deals with the relationship between women's employment and the birth rate in Sweden and the USA, has determined a positive relationship in the long run. Analysing the Ankara Çankaya region through hedonic pricing, **Altun** has obtained evidence that some purchasing conveniences regulated by law in favour of a particular segment may adversely affect the competitive conditions in tenders. Another provincial level work belongs to **Tekdere and Çadırcı**. With the convergence analysis of local government expenditures in Turkey, no evidence shows that cities converged to a single equilibrium state from 2006-to 2019.

While **Gülşen and Yıldırım** are trying to develop an index for the measurability of the rational tax system in transition economies, **Küçüköglu, Küçükçolak and Küçükçolak**'s rating on the relationship between corporate governance and share value in Borsa Istanbul is also luring. The twenty-third article of this issue, a research article in public finance studied by **Kurt and Akbulut**, evaluates the role of governance on budget balance and growth with panel data analysis. Based on a sample of 28 countries covering the period 2006-2018, the fixed effects model's findings show a positive and non-linear relationship between the budget balance and economic growth. The twenty-fourth article written by **Özer and Büyükkeklik** aims to calculate the amount of municipal waste in Turkey. The study is carried out using the linear fuzzy regression model, and Turkey's determinants estimation is laboured between 2005-and 2019. The study of **Batmaz and Yuruk**, who tried to determine the CO₂ emission identifiers in the Eurasian Economic Union countries and Turkey between 2000 and 2008, is the last study on this issue.

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. cildimizde 52. sayımızda sosyoekonomik temelli bulgu ve incelemeleri içeren yirmi beş çalışmayı sunuyoruz, ki sayı genel olarak araştırmaya 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.

Bu sayının açılış makalesi 2001 ve 2008 dönemi için kayıt dışı ekonomi ve siyasi katılım ilişkisini incelemektedir. **Gokcekus, McFall ve Bagirzadeh**'in makalesinden elde edilen sonuçlar, seçmen katılım oranı üzerinden negatif bir ilişkiye işaret etmektedir. Bu sayının ikinci çalışması olan **Gülcemal**'in çalışmasında Arjantin, Türkiye, Rusya, Türkiye, Filipinler ve Güney Afrika'da dış borçlanma ile ekonomik büyüme arasındaki ilişki incelenmiştir. Araştırma bulguları, 1990-2019 dönemi için tüm gelişmekte olan ülkelerde nedensellik olduğunu göstermektedir. **Budak ve Yılmaz**'ın çalışması ise kripto para olarak nitelendirilen dijital varlıkların vergilendirilmesi üzerinedir ve bu konuda bir tartışma içermektedir. Dördüncü çalışma, günümüzün temel toplumsal sorunlarından biri olan sigara ve sigaranın vergilendirilmesi hakkındadır. **Tosun ve Tekdemir**, Avrupa Birliği ve Türkiye üzerine yaptıkları araştırmada sigara içme eğilimlerini ve vergi yüklerini analiz ederek bir karşılaştırmada bulunmuşlardır. **Öztürk ve Danışman**'a ait beşinci çalışma, şirketlerin teknolojik yenilikleri ve uluslararası olmaları ile ilgilidir. Altıncı çalışma ise tarımsal emtia fiyatları ile borsa endeksi arasındaki ilişkiyi uluslararası bir perspektiften ele almaktadır. **İlarslan ve Yıldız** tarafından Polonya ve Türkiye arasında yapılan bu çalışmada, her iki ülkede de tarımsal emtiaların borsa üzerindeki etkisi olduğuna dair ampirik kanıtlar elde edilmiştir. **Dur ve Şahin**'in bu sayıda yer alan yedinci çalışma olan makalesi ise İngiltere'yi örnek alarak Türkiye için bağımsız bir sosyal güvenlik danışma kurulu önerirken; **Eru, Topuz ve Cop**'un çalışmaları olan sekizinci çalışma, artırılmış gerçeklik deneyiminden yola çıkarak perakende sektöründe bir uygulama yapma çabası içindedir. Sayının dokuzuncu çalışmasında **Gezer**, 12 NATO üyesi ülkenin kişi başına düşen gelirin dayalı olarak askeri harcamalar ile GSYİH arasında bir araştırma yapmış ve sadece beş ülkede, Hırvatistan, Estonya, Letonya, Litvanya ve Türkiye'de herhangi bir nedensellik elde edememiştir. Onuncu makalenin konusu ise Afganistan'da mutluluğun sosyoekonomik belirleyicileridir. **Amirzai ve Sönmez**'in bu çalışmasında, mutluluğu etkileyen temel değişkenler olarak yaş, medeni durum, istihdam, eğitim düzeyi, gelir, yabancı dil yeteneği, ülkenin gelecekteki yönüne ilişkin algı ve hane ekonomik durumundaki değişiklik bulunmuştur. **Atık** tarafından yazılan on birinci makale "*Türkiye'de Biyokütle Enerji Tüketiminin Ekonomik Büyüme ve Çevresel Kalite Üzerindeki Dinamik Etkisi*" başlığını taşıırken, **Zengin ve Naktiyok** tarafından kaleme alınan on ikinci makale ise "*İnternet Bağımlılığının Kadın Çalışan Performansına Etkisi: Sosyal Desteğin Düzenleyici Rolü*"dür.

Mutmainah, Nugroho ve Sukmadilaga'nın çalışması Malezya, Brunei Sultanlığı ve Endonezya'daki şirket, varlık, katkı ve İslami sigorta taleplerini karşılamaktadır. Tanımlayıcı nicel yöntemi kullanarak, Endonezya'nın en yüksek büyüyen İslami sigorta şirketlerine sahipken, karmaşık yasaları ve bürokratik yapısı nedeniyle Brunei Darussalam'ın en düşük büyüme gösteren ülke olduğu tespitinde bulunmuşlardır. Bu sayıda on dördüncü madde olarak yer alan **Yavuz ve Sultan**'ın çalışmasında ise eğitim harcamaları ile mal suçları arasında karşılaştırmalı bir değerlendirme yapılmış ve ortaöğretim düzeyinde öğrenci başına düşen yıllık harcama ile hırsızlık suçundan hükümlü sayısı arasındaki ilişki incelenmiştir. **Babaoğlu ve Karasoy**'un kamu yönetiminde blok zincirini değerlendiren çalışması, bu sayıdaki güncel olarak değerlendirilen çalışmalardan bir diğeridir. Çalışmada blokzincir teknolojisinin kamu sektörünün hesap verebilirliğinin artırılması, bürokrasilerin azaltılması ve kamu sektörünün maliyetlerini düşürülmesi gibi birçok alanda önemli işlevlere sahip olacağı işaret edilmektedir. 2010-2019 yılları arasında Türk bankacılık sektörünü analiz eden **Çelik ve Uysal** ise belirlenen dönem için Panzar ve Rosse H İstatistiklerini tahmin ederek alan literatürüne önemli katkılarda bulunmuşlardır.

Mike, Özyatırık ve Kızılkaya'nın Türkiye'de döviz kuru ve dış ticaret dengesini mercek altına alan çalışması, 1998 yılının ilk çeyreği ve 2019 yılının üçüncü çeyreği için önemli bulgulara ulaşmıştır. Makaleye göre reel efektif döviz kuru ve dış gelir düzeyinin Türkiye'deki ticaret dengesi üzerinde pozitif ve istatistiksel olarak anlamlı etkileri olurken, milli gelir düzeyinin ticaret dengesi üzerinde negatif ve istatistiksel olarak anlamlı bir etkisi bulunmaktadır. On sekizinci makale olarak sayımızda yer alan **Yeşilkaya**'nın İsviçre ve ABD'de kadın istihdamı ile doğum oranı arasındaki ilişkiyi ele aldığı çalışması uzun vadede pozitif bir ilişkinin varlığını tespit etmiştir. Ankara Çankaya bölgesini hedonik fiyatlandırma üzerinden inceleyen **Altun** ise kanunla belirli bir kesim lehine düzenlenen bazı satın alma kolaylıklarının ihalelerdeki rekabet koşullarını olumsuz etkileyebileceğine dair kanıtlar saptamıştır. Sayıda yer alan il düzeyindeki bir diğer çalışma ise **Tekdere ve Çadırcı**'ya aittir. Türkiye'de yerel yönetim harcamalarının yakınsama analizi ile şehirlerin 2006-2019 döneminde tek bir denge durumuna yakınsadığına dair herhangi bir kanıt bulunamamıştır.

Gülşen ve Yıldırım geçiş ekonomilerinde Rasyonel vergi sisteminin ölçülebilirliği için bir endeks geliştirmeye çalışırken, **Küçükkoğlu, Küçükçolak ve Küçükçolak**'ın kurumsal yönetim ile hisse değeri arasındaki ilişkiye ilişkin Borsa İstanbul'da derecelendirmesi ise oldukça ilgi çekicidir. Kamu maliyesi alanında araştırma makalesi olan ve **Kurt ile Akbulut** tarafından yayımlanan bu sayının yirmi üçüncü makalesi, yönetişimin bütçe dengesi ve büyüme üzerindeki rolünü panel veri analizi ile değerlendirmektedir. 2006-2018 dönemini kapsayan 28 ülke örneklemini baz alındığında, sabit etkiler modelinden elde edilen bulgular, bütçe dengesi ile ekonomik büyüme arasında pozitif ve doğrusal olmayan bir ilişki olduğunu göstermektedir. **Özer ve Büyükkelik** tarafından yazılan yirmi dördüncü makale ise Türkiye'deki belediye atık miktarını hesaplamayı hedeflemiştir. Çalışma, doğrusal bulanık regresyon modeli kullanılarak yürütülmüş ve Türkiye'de 2005-2019 yılları arasında determinant tahmini yapılmıştır. 2000-2008 yılları arasında Avrasya Ekonomik Birliği ülkeleri ve Türkiye'de CO₂ emisyon tanımlayıcılarını belirlemeye çalışan **Batmaz ve Yörük**'ün çalışması ise bu sayının son çalışmasıdır.

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

Sevilay Ece GÜMÜŞ-ÖZUYAR

Yayın Kurulu Üyesi

Shadow Economy and Political Participation in the United States

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Amerika Birleşik Devletleri'nde Kayıt Dışı Ekonomi ve Politik Katılım

Abstract

The empirical evidence presented in this study indicates a negative relationship between the size of the shadow economy and political participation. Based on panel data from 50 states for four election cycles between 2001 and 2008, regression results show that in the United States, both voter turnout rate and political contributions decline as the shadow economy grows. Specifically, when the size of the shadow economy increased across election cycles and between states by 1%, the voter turnout rate declined by 6.6% ($P<0.01$), and political contributions went down by 11.2% ($P<0.01$).

Keywords : Shadow Economy, Political Participation, Voter Turnout, Political Contributions, United States.

JEL Classification Codes : C23, K42, P16.

Öz

Bu çalışmada sunulan ampirik kanıtlar, kayıt dışı ekonominin büyüklüğü ile politik katılım arasında negatif bir ilişki olduğunu göstermektedir. 2001 ile 2008 arasındaki dört seçim dönemi için 50 eyaletten alınan panel verilerine dayanan regresyon sonuçları, ABD'de kayıt dışı ekonomi büyüdükçe hem seçmen katılım oranının hem de siyasi katkıların azaldığını gösteriyor: seçim dönemleri boyunca eyaletler arasında kayıt dışı ekonominin boyutu %1 arttığında, seçmen katılım oranı %6,6 ($P<0,01$) ve siyasi katkılar %11,2 ($P<0,01$) azalmaktadır.

Anahtar Sözcükler : Kayıt Dışı Ekonomi, Siyasi Katılım, Seçmen Katılımı, Siyasi Katkılar, Amerika Birleşik Devletleri.

1. Introduction

American citizens can participate in the democratic process in two significant ways: voting and making *political contributions*. There are some serious concerns for the health of American democracy stemming from both processes. Despite recent increases in voter turnout, the United States has one of the lowest voter turnout rates in national elections compared to its counterparts (Desilver, 2014; Powell, 1986).

In the U.S., election campaigns are mostly privately funded. Unless a candidate is very wealthy, they finance their campaigns through political contributions from their political supporters. Accordingly, an American citizen also participates in the political process by contributing to the candidate of their choice. The motivation behind contributions varies. Some do it to buy influence (investment), and some simply to help their preferred candidate (consumption) (Ansolabehere et al., 2003; Lake, 2015; Tripathi et al., 2002)¹. In the U.S., political contributions are very unevenly distributed among different income groups. As is reported by Boatright & Malbin (2005), "... According to American National Election Studies (ANES) data, 19% of the wealthiest 5% of Americans said they made contributions in 2000, compared to only 1% of the least wealthy 15% of Americans (Sapiro, Rosenstone, and the National Election Studies, 2001). Campaign contributors are disproportionately White, college-educated, white-collar, and Republican" (p. 790).

There is an extensive and growing literature on both voter turnout and political contributions. This body of work examines a diverse set of factors' effects on participatory political processes. For instance, Popan & Hinojosa (2017) examined psychological variables; Leighley & Nagler (2016) and Martinez i Coma & Nai (2017) ethnic diversity; Potochnick & Stegmaier (2020) citizenship status; Bhatti (2017) education type; Sundström & Stockemer (2015) corruption perceptions; Driskell, Embry & Lyon, (2008) religious beliefs; and Schelker & Schneiter (2017) monetary incentives². This exploratory study investigates the possible impact of yet another factor on political participation: the shadow economy. Our study examines the possible impact of the size of the shadow economy on voter turnout rates as well as political contributions in 50 states (of the U.S.) during four election cycles between 2001 and 2008. We hypothesize that as the shadow economy grows in a state, (1) voter turnout will decrease and (2) political contributions will diminish. These claims stem from the reasoning that those who have engaged in activities in the shadow economy wish to stay unnoticed, unrecognized, and off the radar.

¹ Although it is true that not all political contributions are necessarily related to lobbying, e.g., one may contribute to a political campaign for pure ideological reasons, Ansolabehere et al. show that a considerable amount is indeed connected: "Groups that have both a lobbyist and a PAC account for 70% of all interest group expenditures and 86% of all PAC contributions" (2002: 131).

² For comprehensive meta-analyses of aggregate research on voter turnout, see (Geys, 2006; Stockemer, 2017); individual-level research, (Smets & van Ham, 2013); national and sub-national, (Geys, 2006); and democracies and non-democracies, (Martinez i Coma, 2016). For an overview of political contributions, see (Stratmann, 2005).

2. The Shadow Economy

The shadow economy, also known as the informal economy, is a group of economic activities undertaken in a way that escapes detection by public officials (Wiseman, 2013). The above definition encapsulates the essence of the shadow economy, and it is also used when estimating the size of the shadow economy. People operate solely in the shadow economy for a litany of reasons, but most of the relevant literature lists excessive regulations and tax structure as the two main factors contributing to the size of the shadow economy (Enste & Schneider 2000; Buehn & Schneider 2012). Excessive regulation incentivizes people to work in the shadow economy for two reasons. First, laws that regulate businesses particularly burden the employee (Kus, 2010). In the United States, laws regulate a 40-hour workweek, limiting employees' opportunities to gain additional income for extra work.

Additionally, rigid definitions of what constitutes full-time and part-time workers might lead a business to limit the hiring of full-time employees. Second, regulations might prevent a person from entering the workforce. The most common measure cited in the literature is minimum wage laws (Pommerehne & Schneider, 1985). Minimum wage laws are a tax on unskilled labour. Some businesses may decide that hiring a person is not worth the state's minimum wage law, meaning a large number of Americans cannot access the job market (Gokcekus & Tower, 2003). However, recently, Blanton and Peksen (2019) provided arguments and evidence to support the claim that labour regulations are negatively related to the shadow economy.

Even if a person has the capacity to work in a formal sector, they might still prefer to work in the shadow economy because of the tax burden (Adom et al., 2016): A high tax burden that punishes high wages has been empirically linked to a robust shadow economy. By participating in the shadow economy, a person does not have to pay taxes on income or will pay significantly less than they would if they operated solely in the formal economy. Once again, a person makes a cost-benefit analysis; do the rewards of paying no taxes outweigh the chance of getting caught and charged for tax evasion?

2.1. Voting and the Shadow Economy

When people operate in the shadow economy, they face a disincentive to take risks that could expose their operation. To avoid exposure, they limit their social network and prefer an individualistic work environment (Darbi & Knott, 2016: 409). For a majority of the people operating in the shadow economy, their social network is limited to family members. The lack of an expansive social network curtails a person's information supply (Lim, 2008). People with a limited social network and sparse access to information are considered to have a low supply of social capital (Putnam, 2000). Social capital is related to how a person views and trusts their government (Meagher, 2011). People operating in the shadow economy have lower trust in their government and institutions.

Additionally, if a person remains in the shadow economy for a long time, they might start to feel disenfranchised and unrepresented by the government. This feeling leads to habitus, which is embodied dispositions of a group which effect how a group views the world (Darbi & Knott, 2016: 402). Groups of people, in this case, people operating in the shadow economy, feeling discouraged, might forgo voting because, in their eyes, their votes do not matter (Parenti, 1977). This phenomenon was documented in Nigeria, as the people operating in the shadow economy lost faith in their political institutions and transitioned to a mindset that the shadow economy was the only option for their future (Meagher, 2011). This represents one possible explanation for why a large shadow economy would be related to a low voter turnout.

There is some evidence that a mandatory voting policy can subdue this tendency. When studying the relationship between the informal economy and political activism in Costa Rica, Davis et al. found that there was no negative relationship between operating in the shadow economy and political participation (Davis et al., 1999). However, voter turnout in Costa Rica among those operating in the shadow economy is an outlier. Voting in Costa Rica is mandatory, and those who do not vote face punishment. In the United States, voting is optional, and there is no punishment for not voting. Thus, while the Costa Rica model helps document voter turnout among people operating in the shadow economy, it is not directly comparable to the American system.

Another finding from the Davis et al. study is that people operating in the shadow economy does not engage in political meetings or go to political campaign rallies (Davis et al., 1999: 50). These findings are significant because it highlights that the people operating in the shadow economy are disconnected from the mobilization aspects of politics. Political meetings and campaign rallies are driving factors in recruiting people to participate in the political process. By not participating in political activities, people in the shadow economy are less likely to be contacted by political officials. If a person is never asked to participate, then it is likely that person will not voluntarily perform the act (Leighley, 1995; Leighley, 1996). Therefore, so far, we have presented two plausible explanations for why people in the shadow economy do not vote in elections. The first possibility is that people operating in the shadow economy might have lost faith in their civic institution. Thus, they believe that voting has no impact on their current situation. The second possibility is that the shadow economy does not put people on the radar of political parties or organizers who are the main agents in mobilizing voters.

These two explanations lead to our first hypothesis: As the shadow economy increases, the percentage of people voting decreases.

2.2. Political Contributions and the Shadow Economy

Political contributions are distinct from voting for two reasons. Contributions require an exchange of money and have to be disclosed. Therefore, when compared to voting, contributions make up a small part of the political process. Furthermore, only 10% of

Americans make a political contribution (Grant & Rudolph, 2002). Most of the existing literature focuses on the relationship between political contributions and corruption and/or political influence (Gokcekus & Sonan, 2017; Stockemer et al., 2013; Souraf, 1992). However, there has not been an attempt to examine the connection between the shadow economy and the rate of political contributions. Below we provide a plausible explanation for why participating in the shadow economy is a disincentive for making political contributions.

Political contributions require a solicitation and some form of human interaction (Souraf, 1992). As explained earlier, people who partake in the shadow economy avoid making public gestures that would risk their business arrangements. Individuals working in the shadow economy are unlikely to be on political call-lists or members of political activist groups who are targeted by political candidates for contributions (McClurg, 2003). Similar to the idea of political mobilization, if a solicitation for a contribution is not made, then there is a high probability that a person will not contribute. Therefore, one reason why a large shadow economy could lead to lower rates of political contributions is the lack of political candidates' solicitation.

In making a political contribution, the contributor must overcome two barriers: information costs and financial resources (Grant & Rudolph, 2002). Obtaining information for contribution purposes is challenging. Even well-seasoned political activists are affected by information costs (Brady, 1999). Political information is likely to come from a family network for people who operate in the shadow economy. A family-based social network limits the opportunity for the introduction of new knowledge. Robert Putnam argues that family bonds are less conducive to a person's political growth (Putnam, 2000). Without the proper information, people are less likely to make a political contribution to a campaign.

The second cost of political contributions, financial resources, is directly related to the shadow economy. People operating in the shadow economy have more access to disposable income because they are participating in some form of tax evasion. Therefore, people in the shadow economy should be able to overcome the financial resource burden. However, political contributions represent a liability. All fifty states require disclosure of political donations over \$200. La Raja found that disclosure laws deterred people from making a political contribution (La Raja, 2014). Disclosure laws act as a further deterrent for people operating in the shadow economy. A person operating in the shadow economy risks an IRS audit by disclosing a donation. A key principle for people operating in the shadow economy is to stay in the shadows, and if an action risk exposing their practice, then the benefits need to outweigh the risks significantly. A single political contribution is likely not enough to gain influence with a politician, and therefore people operating in the shadow economy are likely to refrain from making a political contribution.

Hence, we put forward our second hypothesis that the larger a shadow economy, the smaller the political contributions.

Additionally, since political contributions carry a risk of punishment, we derive a third hypothesis: the effect of the shadow economy on political contributions will be larger than the effect on political participation, i.e., voting.

3. Model, Variables, Data

To test our hypotheses, we estimate the following two models³:

$$\ln(\text{Political contributions}_{it}) = \beta_0 + \beta_1 \text{Shadow economy}_{it} + \sum_{j=2}^k \beta_j X_{j_{it}} + v_{it} \quad (1)$$

$$\text{Voter turnout}_{it} = \alpha_0 + \alpha_1 \text{Shadow economy}_{it} + \sum_{j=2}^k \alpha_j X_{j_{it}} + u_{it} \quad (2)$$

\ln is the natural logarithm operator. *Political contributions* are the total per capita contributions in constant 2009 dollars; i stands for state i , i =Alabama, Alaska, ..., , Wyoming; and t stands for a two-year election cycle between 2001 and 2008, t = 2001-2002, 2003-2004, ..., 2007-2008⁴. In the U.S., by law, candidates running for office are required to report the political contributions that they receive to the Federal Election Committee. Reporting is done for each election cycle of two years⁵.

Shadow economy is the size of the shadow economy as a percent of the state's GDP. We borrow shadow economy estimates from Wiseman (2013). Wiseman (2013) follows the general approach in Buehn & Schneider (2012) and estimates the size of the shadow economy using the multiple indicators multiple causes (MIMIC) method for each U.S. state⁶. The *voter turnout* is defined as the ratio of the number of votes to the voting-eligible population (VEP) in each state during each election cycle⁷. The VEP excludes ineligible voters from the denominator and has been used in most state-level studies of voter turnout (McDonald, 2002; Heidbreder & Holbrook, 2010).

We decided to use two sets of control variables to capture the effects of each state's different demographic and geographical characteristics. We included additional relevant variables, i.e., X_{j_s} , in the right-hand side of the equation. In particular, to capture demographics, we included the level of income in state i at time t , $\ln(\text{GDP per capita}$

³ Similar models are utilized by Dreher & Schneider (2010) and Gokcekus & Sonan (2017) to examine the relationship between shadow economy and corruption, and political contributions and corruption, respectively.

⁴ We chose four election cycles between 2001 and 2008 due to data availability: 2001-2002 was the earliest election cycle for which political contributions data were available at the [opensecrets.org](http://www.opensecrets.org); and Wiseman (2013) provides the estimates of the shadow economy for 50 US states over the period 1997-2008.

⁵ Total political contributions include PAC and individual contributions to federal candidates, PACs, parties and outside spending groups. For details, see <http://www.opensecrets.org/bigpicture/statetotals.php?cycle=2000>, (Accessed on 1/3/2018).

⁶ The MIMIC method is a system of equations containing the potential causes of the shadow economy and the indicators of the shadow economy occurring. The sum of the equation is then compared to the GDP of each state and the size of the shadow economy is estimated.

⁷ For details, see Michael McDonald's web page, *Unites States Elections Project* <http://www.electproject.org/home/voter-turnout/voter-turnout-data>, (Accessed on 1/3/2018).

income), in constant 2009 dollars; the ethnic composition, *Black %*, *Hispanic %* of the population; the age composition, *Age (65+) %*; gender composition, *Female %*; educational attainment, *College %*; and party affiliation, *Democrat %*. We included Midwest, Northeast, and West to capture regional differences⁸. Finally, we added u and v in Equation 1 and 2, respectively, as a well-behaving random error term.

Before we go any further, let's reiterate our three hypotheses in terms of the coefficients in Equation 1 and Equation 2:

$$H_1: \beta_1 < 0,$$

$$H_2: \alpha_1 < 0, \text{ and}$$

$$H_3: \beta_1 < \alpha_1.$$

Table 1 provides summary statistics for four election cycles between 2001 and 2008. As summarized in column 1, in the U.S. during the 2001-2008 period, the average size of the shadow economy was 8.0% of GDP; and it was taking values between 6.1% (Oregon, 2007-2008 election cycle) and 10.0% (Mississippi, 2001-2002 election cycle). In the same time period, the average annual political contributions for each state were \$5.73; lowest \$1.59 (Vermont, 2001-2002 election cycle) and highest \$19.86 (Virginia, 2007-2008 election cycle); and there was a 22% increase in average per capita political contributions from the 2001-2002 to 2007-2008 election cycle⁹. Finally, the average voter turnout rate was 53%, from a range of values between 29% (Virginia 2001-2002, and Mississippi 2005-2006 election cycle) and 78% (Minnesota, 2003-2004 election cycle). Figure 1 and Figure 2 depict the negative relationship between shadow economy and turnout rate and political contributions in 50 states in the 2001-2008 period, respectively.

4. Empirical Results

Having 50 states in our sample for four election cycles, we run three sets of regressions, OLS, robust, and random-effects models by utilizing the panel data with 191 observations -in certain years, for some states, there are a few missing observations.

⁸ The default region is South-Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. Midwest-Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; Northeast-Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont; and West-Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Oregon, Utah, Nevada, Washington, Wyoming. These are regional divisions used by the US Census Bureau.

⁹ Political contributions as well as GDP numbers are in constant dollars; in converting nominal values to real values, we utilize Gross Domestic Product: Implicit Price Deflator, Index 2009=100.

First, as a benchmark, the OLS and robust regression results for the political contributions model, Equation (1) are presented in Table 2 column (1) and column (2)¹⁰. The OLS estimate is -5.951, and the robust estimate is -7.436 for the shadow economy variable. That is to say, (1) the relationship between shadow economy and political contributions are negative, and (2) since the dependent variable is in natural logarithms and the independent variable is in percentage, the estimated coefficient of -7.436 ($P < 0.05$) indicates that when the share of the shadow economy in a state (as a percent of GDP) goes up by 1, per capita, political contributions also go down by 7.4%.

The estimation results also indicate that among demographic characteristics of a state, $\ln(\text{GDP per capita income})$ plays a significant role in that state: There is a significant positive relationship between per capita income and political contributions. Moreover, the Midwest regional dummy has a statistically significant, negative effect on political contributions.

The OLS and robust regression results for the voter turnout model, Equation (2) are presented in Table 3 column (1) and column (2). Both OLS and robust regression estimates yield very similar and statistically significant estimated coefficients for the shadow economy variable: -6.594 and -6.934, respectively. That is to say, (1) the relationship between shadow economy and voter turnout is negative too, and (2) since both dependent and independent variables are in percentages, the estimated coefficient of -6.934 ($P < 0.01$) indicates that when the share of the shadow economy in a state (as a percent of GDP) goes up by 1, voter turnout also goes down by 6.9 percent.

The estimation results also indicate that among demographic characteristics of a state, Age (65+), College %, and Hispanic % play a significant role in that state: There is a significant positive relationship between voter turnout and the first two variables; and a negative relationship between voter turnover and Hispanic %.

4.1. Random Effects Model

Although the 50 states are subject to the same federal laws and regulations regarding political contributions and voting rights, we believe that differences across states may have some influence on political participation. At the same time, we would like to include the time-invariant variables, e.g., geography as well as race, gender, and age composition of states in the model¹¹. Accordingly, we rewrite equations (1) and (2) as in the following:

$$\ln(\text{Political contributions}_{it}) = \beta_0 + \beta_1 \text{Shadow economy}_{it} + \sum_{j=2}^k \beta_j X_{j_{it}} + v_i + e_{it} \quad (3)$$

¹⁰ We utilized the robust regression command in Stata, *rreg*, to take into account the presence of outliers or influential observations.

¹¹ In the fixed effect models time invariant variables are absorbed by the intercept. Therefore, we choose random effect model over fixed effect model. For details of panel data estimations, see Wooldridge, 2010.

$$\text{Voter turnout}_{it} = \alpha_0 + \alpha_1 \text{Shadow economy}_{it} + \sum_{j=2}^k \alpha_j X_{j_{it}} + u_i + \epsilon_{it} \quad (4)$$

Before going any further, we first test the null hypothesis that $\text{var}(v_i) = 0$ in equation (3) and $\text{var}(u_i) = 0$ in equation (4). In other words, for each model, variance across the states is zero. This means there is no significant difference across states (i.e., no panel effect). To do so, we ran a Breusch and Pagan Lagrangian multiplier test for random effects. Since $\chi^2(11) = 123.15$ ($P < 0.01$) for equation (3) and $\chi^2(11) = 74.38$ ($P < 0.01$) for equation (4), we reject the null hypotheses and conclude that random effects are appropriate both for the voter turnout and political contributions models. This is evidence that there are significant differences across states; therefore, running a simple OLS regression is not appropriate. Accordingly, in columns (4) of Tables 2 and 3, we present the results of the random-effects models. Four main findings emerge. First, and most importantly, there is a statistically significant, negative relationship between shadow economy and voter turnout: when the size of the shadow economy increases across election cycles and between states by one percent, voter turnout rate declines by 6.6% ($P < 0.01$). Similarly, there is a negative relationship between the shadow economy and political contributions: when the size of the shadow economy increases by one percent, political contributions go down by 11.2% ($P < 0.01$). Second, the relationship between GDPs per capita and political contributions is positive; the estimated coefficient of 1.129 ($P < 0.01$). Third, demographic variables Age (65+) and College % are positive and Hispanic % have a negative statistically significant effect on voter turnout rate. Fourth, only the states in the Midwest region, as a geographical area, have statistically significant less few political contributions than the states in the Southern region.

Finally, regarding our third hypothesis, since the two-sample *t*-statistic is 13.75 ($P < 0.01$), there is a statistically significant difference between the shadow economy's effect on political contributions and voting: the shadow economy negatively affects political contributions more significantly than it does voter turnouts.

5. Concluding Remarks

In this exploratory study, we provide concerning evidence related to the shadow economy: regression results indicate that there is a negative relationship between the shadow economy and the two main ways Americans can participate in their democracy. When the size of the shadow economy changes across election cycles and between states by one percent, voter turnout rate declines by 6.6% ($P < 0.01$), and political contributions go down by 11.2% ($P < 0.01$).

Our findings are preliminary and should be used by future scholars to study this issue more in-depth. Future scholars can conduct interviews and case studies for different populations and time intervals to uncover why participating in the shadow economy correlates with low participation rates. Additionally, further studies can examine certain policies enacted in an election year and its effect on the shadow economy and political participation. The shadow economy is a multidisciplinary issue; scholars in the fields of

politics, economics, psychology, sociology, and anthropology can use our findings and make a significant contribution to their field of study.

These results indicate that the shadow economy's harmful effect is not strictly seen in economic life but also in the political scene. Scholars should start to consider the size of the shadow economy when reviewing America's political system. Without specific policies that target the shadow economy, policymakers can only mitigate the current problems with voter turnout. By reinvigorating people's trust in the government and reaching out to people who have been in the shadow economy, policymakers can start to improve and rebuild trust in civic institutions and bring people out of the shadows. Thus, the shadow economy is more than an economic problem, it also encompasses political participation and government and institutional trust.

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Appendix

Table: 1
Summary Statistics and Data Sources (For 4 Election Cycles between 2001 and 2008)

Variable	Mean	Std. Dev.	Min.	Max.	Source
Per capita political contributions	\$ 5.74	\$ 3.05	\$ 1.59	\$ 19.86	Center for Responsive Politics
Voter turnout	53%	12%	29%	78%	Unites States Election Project
Shadow economy (% GDP)	8.02	0.79	6.14	9.99	Wiseman (2013)
GDP per capita	\$ 45,441	\$ 8,151	\$ 29,056	\$ 68,314	U.S. Department of Commerce, Bureau of Economic Analyses
Black %	10%	9%	0%	37%	U.S. Department of Commerce, Census Bureau
Hispanic %	11%	10%	0%	45%	U.S. Department of Commerce, Census Bureau
Female %	49%	1%	48%	50%	U.S. Department of Commerce, Census Bureau
Age (65+) %	14%	2%	8%	18%	U.S. Department of Commerce, Census Bureau
Democrat %	48%	7%	25%	66%	Gallup
College graduate %	27%	5%	18%	39%	U.S. Department of Commerce, Census Bureau

Figure: 1
Shadow Economy Versus Turnout Rate In 50 States: Pooled Data, 2001-2008

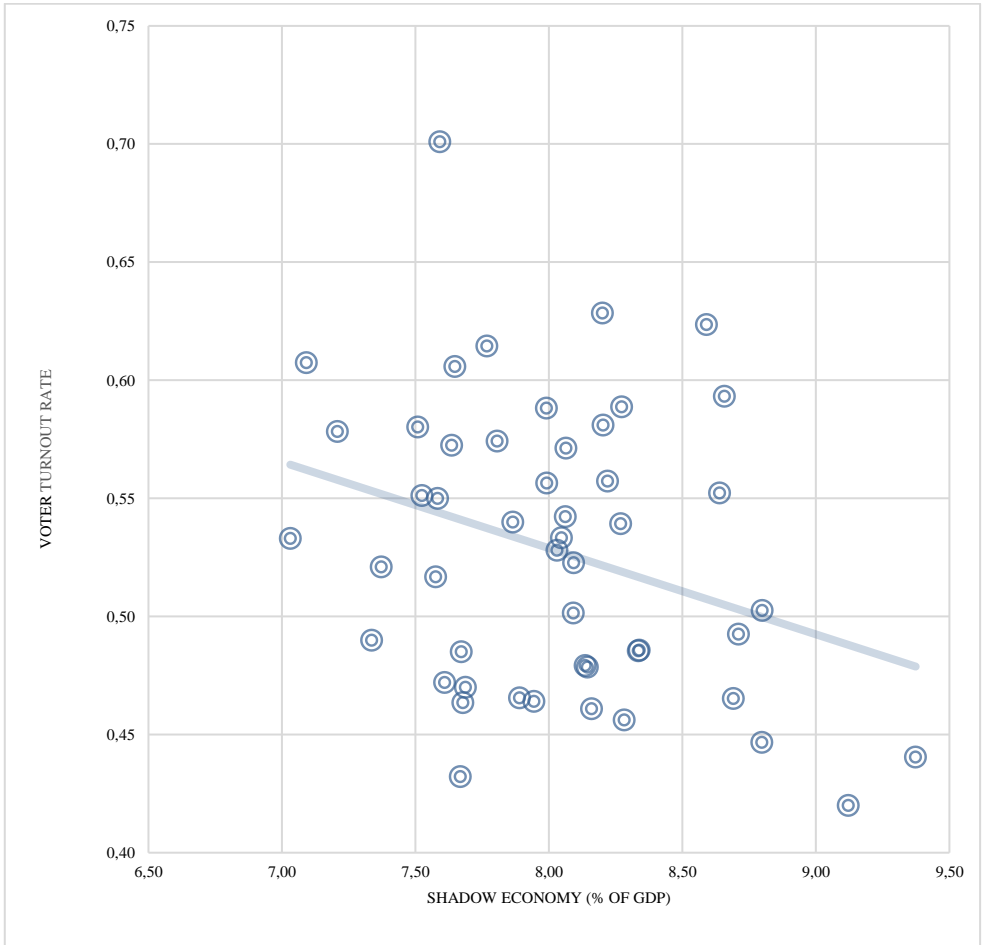


Figure: 2
Shadow Economy Versus Political Contributions In 50 States: Pooled Data, 2001-2008

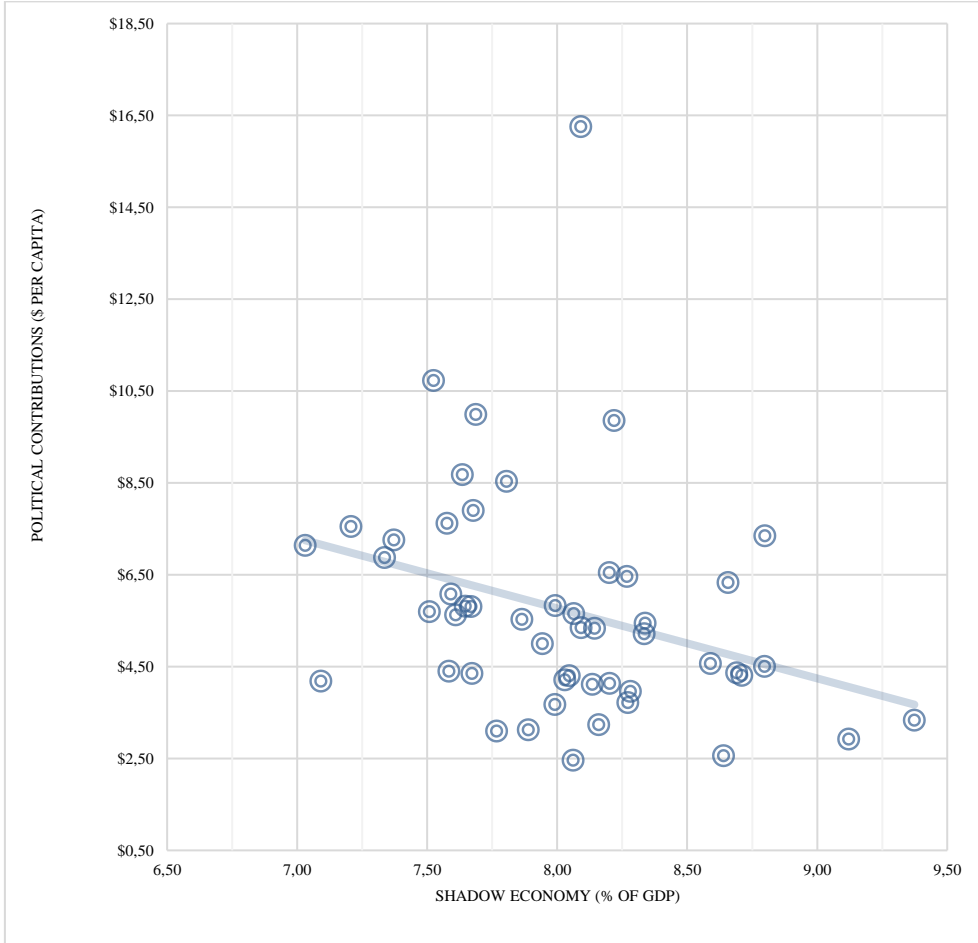


Table: 2
Regression Results (Dependent Variable: ln(per capita political contributions))

	(1)	(2)	(3)
	OLS	Robust	Random effects
Shadow Economy	-5.951 (4.43)*	-7.436 (4.6)**	-11.161 (4.41)***
ln(GDP per capita)	1.489 (0.27)***	1.434 (0.28)***	1.315 (0.32)***
Black %	0.106 (0.479)	0.283 (0.50)	0.128 (0.61)
Hispanic %	0.502 (0.31)**	0.343 (0.32)	0.52 (0.39)*
Female %	-0.952 (5.47)	1.643 (5.67)	-1.221 (6.89)
Age (65+) %	2.001 (2.04)	1.360 (2.12)	1.845 (2.54)
College %	0.012 (0.01)	0.010 (0.01)	0.012 (0.01)
Democrat %	0.007 (0.01)*	0.009 (0.01)**	0.006 (0.01)
West	-0.212 (0.12)**	-0.190 (0.12)*	-0.217 (0.15)
Northeast	-0.217 (0.12)**	-0.167 (0.12)*	-0.192 (0.15)*
Midwest	-0.282 (0.09)***	-0.278 (0.10)***	-0.281 (0.12)***
Constant	-14.200 (4.07)***	-14.711 (4.22)***	-11.717 (4.98)***
No. of Obs.	191	191	191
R ²	0.49	0.47	0.48
F-statistic	15.54	14.22	123.15

Standard errors are reported in parentheses. Significance level: * = $P < 0.10$, ** = $P < 0.05$, *** = $P < 0.01$.

Table: 3
Regression Results (Dependent Variable: Voter Turnout Rate)

	(1)	(2)	(3)
	OLS	Robust	Random effects
Shadow Economy	-6.594 (1.28)***	-6.934 (1.38)***	-6.594 (1.28)***
ln(GDP per capita)	-0.046 (0.08)	-0.049 (0.08)	-0.046 (0.08)
Black %	-0.123 (0.14)	-0.125 (0.15)	-0.123 (0.14)
Hispanic %	-0.242 (0.09)***	-0.245 (0.10)***	-0.242 (0.09)***
Female %	0.935 (1.58)	0.958 (1.70)	0.935 (1.58)
Age (65+) %	1.197 (0.59)**	1.170 (0.63)**	1.197 (0.59)**
College %	0.004 (0.002)**	0.004 (0.003)**	0.004 (0.002)**
Democrat %	0.0001 (0.001)	-0.000 (0.002)	0.000 (0.001)
West	0.012 (0.03)	0.009 (0.04)	0.013 (0.03)
Northeast	-0.007 (0.03)	-0.009 (0.04)	-0.007 (0.03)
Midwest	0.032 (0.03)	0.030 (0.03)	0.032 (0.03)
Constant	0.852 (1.18)	0.898 (1.27)	0.852 (1.18)
No. of Obs.	191	191	191
R ²	0.29	0.27	0.29
F-statistic	6.76	6.10	74.38

Standard errors are reported in parentheses. Significance level: * = $P < 0.10$, ** = $P < 0.05$, *** = $P < 0.01$.

Gokcekus, O. & S. McFall & E. Bagirzadeh (2022), "Shadow Economy and Political Participation in the United States", *Sosyoekonomi*, 30(52), 11-25.

External Debt and Economic Growth in Emerging Economies: Panel Causality Analysis

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Gelişmekte Olan Ülkelerde Dış Borç ve Ekonomik Büyüme: Panel Nedensellik İlişkisi

Abstract

This paper is conducted to obtain information about the explanation power of GDP, consumer price index, and trade openness variables on total external debt and the relationship between these variables for six emerging countries: Argentina, Brazil, Russia, Turkey, Philippines, and South Africa. To control for cross-sectional dependency heterogeneity across cross-sectional units, using panel data on six emerging economies for the period 1990-2019, panel unit root tests, panel cointegration tests such as Gengenbach, Urbain and Westerlund, and Pedroni's PDOLS, DOLSMG, and Heterogenous Dumitrescu & Hurlin Causality Test and Heterogenous VAR Model applied. The empirical results by appropriate estimators show the different effects of GDP, inflation and trade openness on long-run total external debt in the sample countries for the analysis period. There is also a causality from the total external debt to the GDP variable for all panel data. When the VAR model results for the units are examined, the lagged total external debt variable is meaningful in explaining the GDP in Russia and South Africa. In addition, it has been concluded that causality from the total external debt to the inflation and the total external debt variable is meaningful in explaining the inflation in the Philippines, South Africa, and Turkey.

Keywords : External Debt, Economic Growth, Panel Co-integration Test, Panel Causality Test.

JEL Classification Codes : O11, O57, C33.

Öz

Bu makale GSYH, enflasyon ve ticari açıklık değişkenlerinin toplam dış borç üzerindeki açıklama gücünü ve bu değişkenler arasındaki ilişkinin yönü ve nedenselliği hakkında bilgi edinmek için yapılmıştır. Analize dahil olan gelişmekte olan ülkeler Arjantin, Brezilya, Rusya, Türkiye, Filipinler ve Güney Afrika'dır. Kesitsel birimler arası potansiyel heterojenlik, dinamikler, geri besleme etkileri ve yatay kesit bağımlılığı gibi panel veri modelleriyle ilgili zaman serisi analizlerinin eksikliklerini kontrol etmek için, 1990-2019 dönemi için altı gelişmekte olan ekonomiye ait panel veriyi kullanarak panel birim kök testlerine ek olarak, Gengenbach, Urbain ve Westerlund ve Pedroni'nin PDOLS, DOLSMG ve Heterojen Dumitrescu & Hurlin Nedensellik Testi ve Heterojen VAR Modeli gibi panel eşbütünlük testleri uygulanmıştır. Seçilmiş tahmin ediciler tarafından elde edilen ampirik kanıtlar, çalışma dönemi için seçilen ülkelerdeki toplam dış borç üzerinde GSYH, enflasyon ve ticari açıklığın uzun dönemde farklı etkilerini göstermektedir. Ayrıca tüm panel veriler için toplam dış borç değişkeninden GSYİH değişkenine bir nedensellik vardır. Birimler için VAR modeli sonuçları incelendiğinde, gecikmeli toplam dış borç değişkeni Rusya ve Güney Afrika'da GSYİH'yi açıklamada anlamlıdır. Ayrıca Filipinler, Güney Afrika ve Türkiye'de toplam dış borçtan enflasyona bir nedensellik ilişkisi olduğu ve dış borç değişkeninin enflasyonu açıklamada anlamlı olduğu sonucuna varılmıştır.

Anahtar Sözcükler : Dış Borç, Ekonomik Büyüme, Panel Eşbütünlüşme Testi, Panel Nedensellik Testi.

1. Introduction

Ensuring the country's economic growth is one of the most important national priorities, a guarantee of the country's independence, a condition of the stability and effective life of society. In 2019, the increase in external debt of low and middle-income countries was based on a decline in the global economy in sync with the 2008 financial crisis, when global gross domestic product (GDP) growth fell to about 2.4%. Increasing trade barriers, ongoing trade disputes, and growing geopolitical tensions are the main factors affecting the global economy in 2019. External debt stocks exceeded \$8 trillion by the end of 2019. The total accumulation rate (5.4%) was unchanged from 2018. Long-term external debt increased 7% to \$6 trillion, equalling 73% of the entire external debt stock. Short-term foreign debt stocks increased to \$2.2 trillion by the end of 2019 (1.5%) (<<https://openknowledge.worldbank.org/>>).

According to the International Debt Statistics (2021), 2019 year-end to the highest amount of external debt in the top 10 countries are Argentina, Brazil, China, India, Indonesia, Mexico, Russia, Thailand, Turkey, and South Africa. The problem with external debt is the amount of debt and the time to repay it. Borrowing is due to the need to finance rising current account deficits. So, the problem lies in the difficulty of repayment, as the indebted country will demand a positive current account surplus with creditor countries. Economic growth is the production and income increase that occurs in a given period in a country. Economic growth is reflected as more of a quantitative increase. The effect of debt on economic growth is possible by increasing time factor productivity, capital accumulation, and savings rates. However, external loans can be used not for investment projects but also for short-term goals such as closing the gaps in developing economies. Economic growth theories also have a different perspective on borrowing. Neoclassical growth models argue that external debt positively affects economic growth. It is claimed that borrowing is one of the sources that finance capital formation and stimulate economic growth. However, proponents of the counter-theory are aware that there is always a decrease in countries' economic growth due to the debt overhang.

Countries in Latin America recorded the smallest increase in external debt stocks in 2019, 2.3%, reflecting a general slowdown in economic activity across the Latin American region, with moderate debt accumulation by Brazil and Mexico (on average, 3%), but offset by a 1.5% contraction in Argentina's external debt stock. According to the International Debt Statistics 2021 of the World Bank, the percentage of low- and middle-income countries with a debt-to-GNI ratio below 30% fell 23% over the last ten years. 32% of low- and middle-income countries had external debt-to-GNI ratios above 60% at end-2019, compared with 23% in 2010. In 9% of countries, the percentage surpassed 100%, one-third more than the share of countries with a comparable ratio in 2010-Turkey's total external debt stocks by

2019, 440,783\$ million. Turkey's use of IMF credit in 2019 is 1.481 \$ million. The public sector external debt stock is understood by adding the debt stock of municipalities, state-owned enterprises, funds, and other public sector segments that can borrow on their own to the Treasury's debt stock, which carries out the government's borrowing. The private sector and the Central Bank's external debt stock give Turkey's total foreign debt stock.

The primary goal of this empirical investigation is to determine the impact of economic growth and other macroeconomic variables on external debt in emerging countries and the relationship between them. The macroeconomic variables and public revenues and expenditures of emerging markets are highly volatile and thus difficult to forecast. These countries included in this research come from various regions and differ in terms of their initial fiscal situation as well as their level of risk exposure. The analysis included emerging countries with data access. The theoretical and empirical literature is presented in Section 2 of the study. The methodology and data are presented in Section 3, the findings are presented in section 4, and the results are shown in the last section.

2. Literature

According to Chenery and Strout (1966), the primary reason developing and emerging countries accumulate external debt is a lack of savings and investment. Countries with insufficient savings will seek to borrow money from the local or international debt markets to smooth consumption and maintain economic growth. It has been demonstrated in the literature that the impact of external debt on economic growth can be both positive-negative and non-linear. Three groups of theoretical models describe this interaction. According to neoclassical and internal growth models, a reasonable external debt can stimulate economic growth by funding capital accumulation and increasing investments. However, high levels of external debt can hinder economic development by discouraging savings and investments, a phenomenon known as the 'debt overhang effect' (Krugman, 1998). A high level of external debt acts as a tax for future production, reduces the return on investments, deters high-risk, long-term productive private investments, and encourages low risk but short-term inefficient investments (Serven, 1997; Clements et al., 2003). External debt accumulation can also reduce incentives for a government to implement fiscal and structural reforms. Barro's (1989) Ricardian equivalence hypothesis examines the effect of taxes or government bonds on capital accumulation. Especially when the marginal net wealth impact of government borrowing is close to zero, there is no change in the public's debt stocks due to the lack of foreign currency stocks. As a result, changes in the amount of taxes or government bonds received do not affect total demand, interest rates, or capital accumulation as a source of financing for public expenditures. Cline (1985) argued that external debt promotes economic growth. Suppose the marginal yield of each current unit of external debt is equal to or greater than the principal and interest payment. In that case, the external debt will positively affect the borrowing country's economy.

According to Imbs and Ranciere (2005), debt overhang, on average, arises when the debt face value reaches 200% (and 140%) of exports or 60% (and 40%) of GDP in their

analysis of 87 emerging economies. They also argue that institutions, the rule of law, government effectiveness, and bureaucratic quality limit debt growth or stimulate economic growth. On the other hand, another study by Benli (2020) examined the effects of external debt growth and inflation on economic growth in the long run. They use panel data on 35 developing economies from 1987-2017 with panel data estimators (DFE, MG, and PMG) and employ static CCE and dynamic CCE (CS-ARDL and CS-DL) estimators to check whether the results are consistent. Panel data estimators reveal the negative effect of external debt on long-run economic growth in the countries included in the analysis. According to the econometric analysis results of the study, an inverse relationship between inflation and long-run economic growth is consistently observed with negative coefficients from panel data estimators. Another study by Calderón and Fuentes (2013) in Latin America revealed the negative impact of external debt on economic growth over the period 1970-2010.

Celasun et al. (2006) model debt pathways for emerging market countries, considering the exchange rate when calculating the debt ratio and how much of their public debt is denominated in foreign currency. Ehikioya et al. (2020) use the Johansen Cointegration test and the Generalised system Method of Moments to investigate the dynamic relationships between external debt and economic growth in 43 African countries from 2001 to 2018. The findings support a long-run equilibrium relationship between external debt and African economic growth. The result shows that, beyond a specific capacity, the short-run converges to long-run equilibrium, and external debt begins to have a negative impact on African economic growth. On the other hand, Brida, Gómez, and Seijas (2017) used three groups (clubs) of countries obtained for sixteen countries: highly indebted, moderately indebted, and lowly indebted. The employed debt-to-GDP threshold drives economic dynamics for the selected countries between 1977 and 2015. Their findings support the existence of a negative relationship between debt and growth. According to Reinhart and Rogoff (2010), countries with debt-to-GDP ratios greater than 90% limit their ability to grow their economy significantly. Fiscal expansionary policies, even if they are effective in the short term at fostering economic growth, because the corresponding increase in the level of debt may reduce growth in the long run. Eberhardt and Presbitero (2013) and Akram (2011) also found a negative non-linear correlation between debt and growth. Presbitero (2012) discovered that developed countries are better than developing countries at using debt productively. As a result, developed countries are better at managing the side effects of high debt, such as crowding-out effects, a disincentive environment for investment, market and policy volatility, and capital fleeing the country due to currency depreciation fears.

Furthermore, when we look at the studies that investigate the causality relationship between external debt and economic growth, Jilenga and colleagues (2016), Ogunmuyiwa (2011), and Panizza and Presbitero (2014) couldn't find any causality.

3. Data and Methodology

This study analyses the total external debt stock impact on economic growth from 1990 to 2019 for Turkey and the other five emerging countries. The variables used in the analysis are annual data on GDP, total external debt stock (% of GDP), trade openness (exports and imports as % of GDP), and consumer price index (2010=100). All variables used are annual and included in the analysis by taking their logarithmic forms, as seen in Table 1.

Table: 1
Variables and Sources

Symbol	Definition Source	
GDP	Annual GDP (fixed with 2010\$)	World Bank, National account data
EXT.DEBT (%GDP)	Total external debt (% GDP)	World Bank, International debt statistics
TRADE	Total export and import (% GDP)	World Bank, National Account Data
CPI	Consumer Price Index (2010=100)	IMF, International Financial Statistics

To control for the shortcomings of time series analyses and problems related to the panel data models, such as potential heterogeneity across cross-sectional units, dynamics, feedback effects using panel data on six emerging economies for the period 1990-2019, in addition to traditional panel data estimators; second generation unit root tests, panel cointegration tests such as Gengenbach, Urbain and Westerlund and Pedroni's PDOLS, DOLSMG and Heterogenous Dumitrescu & Hurlin Causality Test and Heterogenous VAR Model applied by explaining the reasons.

4. Findings

If there is a correlation between units in the series (cross-section dependency), second-generation tests should be used because first-generation tests do not account for this correlation. For this reason, the correlation between units should be tested first in determining which type of tests will be preferred in unit root analysis. There are several tests suggested in the literature for testing the inter-unit correlation. Pesaran's (2004) CD test and Breusch Pagan LM tests are used in this work.

Table: 2
Cross Section Independence Test Results

	Variables Series Tested							
	LnGDP		LnExt.Debt		LnCPI		LnTrade	
	Statistics	<i>P-value</i>	Statistics	<i>P-value</i>	Statistics	<i>P-value</i>	Statistics	<i>P-value</i>
CD test	19.20	0.000***	3.41	0.001***	11.54	0.000***	6.10	0.000***

p-value* <0.10, *p-value* <0.05, ****p-value* <0.01.

According to Pesaran (2004) CD test probability results, the null hypothesis, which is no cross-sectional dependency, is rejected. And also, in Breusch Pagan's (1980) LM test results, the null hypothesis is rejected, so it is concluded that there is a correlation between units.

Table: 3
Bias-adjusted LM Test of Error Cross-section Independence and Swamy S Test

Test	Statistics	p-value
LM	94.19	0.000***
LM adj*	39.46	0.000***
LM CD*	8.938	0.000***

*two sided test, $H_0: Cov(uit,ujt) = 0$ for all t and $i \neq j$
Swamy S test of parameter constancy $\chi^2(25) = 59.36$ Prob > $\chi^2 = 0.0001$

* p-value <0.10, ** p-value <0.05, *** p-value <0.01.

According to the Swamy S homogeneity test, the null hypothesis is rejected, and the heterogeneity of the parameters is accepted. The cointegration test will be decided according to whether the constant and slope parameters are homogeneous or heterogeneous according to units. Therefore, estimators that do not consider the correlation between units will give biased results, so their use will not be appropriate. It is reasonable to use methods that assume the heterogeneity of parameters and the correlation between units.

Following the literature, the second-generation panel unit-root tests (Moon & Perron, 2004; Pesaran, 2007), which can be used under the presence of correlation between units, should be used. The multivariate Augmented Dickey-Fuller Panel unit root test (MADF), one of the panel unit root tests that consider the correlation between units based on SUR, is used in this section. It differs from homogeneous tests in that it allows for different degrees of integration rather than requiring that all units be integrated in the same order. For this reason, the MADF unit root test is applied to test the stationary of the series.

Table: 4
Multivariate Augmented Dickey-Fuller Test (Madfuller)

Variables	MADF	Approx 5% CV
LnExt.Debt	52.592	27.491
LnGDP	71.829	27.491
LnCPI	357.509	27.491
LnTrade	43.601	27.491

lags(1)

H_0 : all six-time series in the panel are $I(1)$ processes.

According to the results, the null hypothesis could not be rejected because the test statistics remained above the critical value, and it is concluded that the series is stationary. Gengenbach, Urbain, and Westerlund's (2015) panel cointegration test based on the error correction model based on cross-section dependency and heterogeneity estimation according to probability values is used.

Table: 5
Gengenbach, Urbain and Westerlund Panel Cointegration Test Results

Panel EC-Test:			
d.y	Coef.	T bar	P-val
Y(t-1)	-0.723	-3.198	> 0.1
Long-run average coefficients:			
LnExt.Debt	Coef.	p> z	[95% Conf. Interval]
lngdp	-0.0106581	0.991	-1.967317 1.946001
lnncpi	0.3721476	0.121	-.0978945 .8421897
lntrade	0.1914714	0.633	-.5932902 .976233

When the significance of Y_{t-1} is examined for the panel cointegration test, the null hypothesis is rejected. It indicates a long-term relationship between the variables, that is, cointegrated. In estimating the long-term relationship, the heterogeneous panel of the second-generation estimators, the DOLSMG Group-Mean Dynamic Least Squares Estimator, and the DOLS heterogeneous estimators are used. Kao and Chiang (2000) and Pedroni (2001) propose extensions of the Stock and Watson (1993) DOLS estimator to panel data settings. DOLS estimator may be more promising than OLS or fully modified (FM) estimators in estimating the cointegrated panel regressions like our panel (Baltagi, 253). Panel DOLS involves augmenting the panel cointegrating regression equation with cross-section specific lags *and leads* of ΔX_{it} to eliminate the asymptotic endogeneity and serial correlation. Pedroni (2001) extends the grouped estimator concept to DOLS estimation by averaging over the individual cross-section DOLS estimator.

The cointegration parameters are estimated by Pedroni's (2000 and 2001) DOLSMG estimator for the whole panel after transforming by taking the difference from the cross-section averages. The panel DOLS estimator requires estimating the following model by the group mean average OLS (DOLSMG) and (DOLS) for each country. The results are presented in Table 6 for the model where the dependent variable is LnExt.Debt. The long-term relationship between variables is estimated with DOLSMG, and the long-term parameters are statistically significant.

GDP, CPI, and trade openness variables affect total external debt in the long run. The panel DOLSMG estimator shows that a 1% increase in the LnGDP decreases LnExt.Debt - 0.86% and 1% increase in LnCPI and LnTrade respectively stimulate LnExt.Debt by 0.10 and 1.06%.

Table: 6
Pedroni's PDOLS - Group Mean Dynamic Least Squares (DOLSMG) Estimator

Variables	No. of Panel units: 6	
	Beta	t-stat
LnGDP_td	-0.8655	-3.616
LnCPI_td	0.1029	2.478
LnTrade_td	1.067	9.907

* Data has been time demeaned.

According to DOLS results for all units (countries), there is a long-term relationship between external debt, GDP and trade openness in the Philippines and South Africa. While GDP affects total external debt negatively in both countries, trade openness affects external debt positively. In Russia, GDP, CPI, and trade openness positively affect external debt. In Turkey, trade openness affects external debt positively, while inflation (CPI) affects total external debt negatively.

The new panel non-causality tests should be developed to explicitly take into account general forms of dependencies among the individuals of the panel (Dumitrescu & Hurlin, 2012: 9). As in panel unit root test literature, this test statistic is defined as the cross-section average of individual Wald statistics associated with the standard Granger causality tests

based on single time series. This study examines the causality by Heterogenous Dumitrescu & Hurlin Causality Test. The results are presented in Table 6 for all the models where the dependent variable (y) is lnExtdebt. Under the Heterogeneous Causality hypothesis, we assume that N causality relationships exist, as in the HC case, but the dynamics of y are heterogeneous. However, the heterogeneity does not affect the causality result. Considering the Heterogeneous Non-Causality hypothesis, it is assumed that there is a causal relationship running from x to y for a subgroup of individuals. Symmetrically, there is at least one N-1 noncausal relationship in the model. In this case, the heterogeneity deals with causality from x to y (Dumitrescu & Hurlin, 2012: 2).

Let us denote by x and y, two stationary variables observed for N individuals on T periods. For each individual $i=1, \dots, N$, at time $t=1, \dots, T$, we consider the following linear model:

$$Y_{i,t} = \alpha_i + \sum_{k=1}^K \gamma_i^{(k)} Y_{i,t-k} + \sum_{k=1}^K \beta_i^{(k)} X_{i,t-k} + \varepsilon_{i,t}$$

with $K \in \mathbb{N}$ and $\beta_i = (\beta_i^{(1)}, \dots, \beta_i^{(K)})'$. For simplicity, the individual effects α_i are supposed to be fixed in the time dimension. Initial conditions $(y_{i,-K}, \dots, y_{i,0})$ and $(x_{i,-K}, \dots, x_{i,0})$ of both individual processes $y_{i,t}$ and $x_{i,t}$ are given and observable. It is assumed that lag orders K are identical for all cross-section units of the panel, and the panel is balanced.

Table: 7

Heterogenous Dumitrescu & Hurlin Causality Test and Heterogenous VAR Model

Countries	Model 1	Model2	Model3	Model 4
	LnGDP \neq LnExt.Debt	LnExt.Debt \neq LnGDP	LnCPI \neq LnExt.Debt	LnExt.Debt \neq LnCPI
	Prob.	Prob.	Prob.	Prob.
Argentina	0.803	0.407	0.057	0.949
Brazil	0.995	0.527	0.781	0.469
Russia	0.053	0.000***	0.315	0.156
Philippines	0.218	0.914	0.192	0.049**
South Africa	0.013**	0.001***	0.044	0.002***
Turkey	0.249	0.465	0.802	0.006***
	Z-bar = 2.4019 (p-value = 0.0163) Z-bar tilde = 1.9549 (p-value = 0.0506)	Z-bar = 13.8265 (p-value =0.0000) Z-bar tilde = 11.8477 (p value = 0.0000)	Z-bar = 1.5647 (p-value =0.1177) Z-bar tilde =1.2299 (p-value = 0.2187)	Z-bar = 6.2830 (p-value = 0.0000) Z-bar tilde = 5.3156 (p-value = 0.0000)
	Model 5	Model 6		
	LnTrade \neq LnExt.Debt	LnExt.Debt \neq LnTrade		
	Prob.	Prob.		
Argentina	0.254	0.209		
Brazil	0.181	0.299		
Russia	0.364	0.349		
Philippines	0.494	0.189		
South Africa	0.100	0.538		
Turkey	0.541	0.290		
	Z-bar = 0.5408 (p-value = 0.5886) Z-bar tilde = 0.3433 (p-value = 0.7314)	Z-bar = 0.3075 (p-value = 0.7585) Z-bar tilde = 0.1413 (p-value = 0.8876)		

* p-value <0.10, ** p-value <0.05, *** p-value <0.01. (H0: Variable1 does not Granger-cause variable2, H1: Variable1 does Granger-cause variable2 for at least one panelvar (id)).

The table above shows the estimation of the heterogeneous panel var model used in the Dumitrescu and Hurlin causality analysis and the causality test results below. According

to the causality test results, the null hypothesis is rejected in Models 2 and 4. There is causality from the total external debt to the GDP variable. When the VAR model results for the units are examined, the lagged external debt variable is meaningful in explaining the GDP in Russia and South Africa. In addition, it has been concluded that there is causality from the external debt to the CPI variable. According to the VAR model results for the units, the lagged external debt variable is meaningful in explaining the CPI variable in the Philippines, South Africa, and Turkey.

5. Conclusion

While many studies examine the impact of external debt on economic growth, this study attempted to determine which factors influence external debt and how in some emerging market countries. The variables used in the analysis have a long-term relationship, known as cointegration. In estimating the long-term relationship, the heterogeneous panel of the second-generation estimators, the DOLSMG Group-Mean Dynamic Least Squares Estimator, and the DOLS heterogeneous estimators are used. The model results show that GDP, CPI, and trade openness variables affect external debt in the long run. The panel DOLSMG estimator shows that a 1% increase in the LnGDP decreases LnExt.Debt -0.86% and 1% increase in LnCPI and LnTrade respectively stimulate LnExt.Debt by 0.10 and 1.06%.

According to DOLS results for all units (countries), there is a long-term relationship between total external debt, GDP and trade openness in the Philippines and South Africa. While GDP affects total external debt negatively in both countries, trade openness affects external debt positively. In Russia, GDP, CPI, and trade openness positively affect external debt. In Turkey, trade openness affects external debt positively, while inflation (CPI) affects external debt negatively. There is causality from the external debt to the GDP variable. When the VAR model results for the units are examined, the lagged external debt explains the GDP in Russia and South Africa. Furthermore, it has been determined that there is a causal relationship between total external debt and inflation. According to the VAR model results for the units, the lagged external debt variable is significant in explaining inflation in the Philippines, South Africa, and Turkey.

Monetary policies will determine whether or not the debt ratio approaches an exploding point. Monetary policies have an impact on the cost of debt service. If they are too stringent, they may jeopardise fiscal policy's viability. Fiscal policies must be implemented to prevent the debt ratio from rising. It is critical to maintain a healthy level of external debt while also using savings, investments, and reserves.

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Taxation of Virtual/Crypto Assets/Currencies

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Sanal/Kripto Varlıkların/Paraların Vergilendirilmesi

Abstract

The digital economy produces its elements. The most important elements are the coins/assets produced in digital or virtual environments, which cannot be fully conceptualised. In terms of taxation, the most important issues are the definition of these assets, the determination of a term that everyone generally agrees on, and the classification of these assets. This study aims to find the current crypto asset definition, classification, and taxation situation. For this purpose, Turkey and various country implementations and OECD recommendations were examined. A unity of terminology has yet to be reached on this issue, and the term virtual currency was used for these assets in the report published by the OECD in October 2020. As a result of this study, it is found that there is no still unity of implementation in terms of the taxation of these virtual assets, which are still considered illegal in some countries.

Keywords : Taxation, Crypto Asset/Currency, Classification, The Definition of Cryptos, Practices of Selected Countries.

JEL Classification Codes : H21, E42, F33, O19.

Öz

Dijital ekonomi kendi unsurlarını üretmektedir. Bu unsurlardan en önemlisi tam olarak kavramsallaştırılamayan dijital veya sanal ortamlarda üretilen paralar/varlıklardır. Vergilendirme açısından en önemli sorun, bu varlıkların tanımlanması, herkesin onayladığı bir terimin belirlenmesi ve sınıflandırılmasıdır. Bu çalışmanın amacı kripto varlıkların tanımlanması, sınıflandırılması ve vergilendirilmesine yönelik gelinen mevcut durumu tespit etmektir. Bu doğrultusunda Türkiye ve çeşitli ülke uygulamaları ve OECD önerileri incelenmiştir. Bu konuda henüz bir terim birliğine ulaşılamamış olup, OECD'nin Ekim 2020'de yayınladığı raporda bu varlıklar için sanal para terimi kullanılmıştır. Bu çalışmanın sonucunda bazı ülkelerde halen yasadışı olarak kabul edilen sanal varlıkların vergilendirilmesi konusunda henüz bir uygulama birliği olmadığı tespit edilmiştir.

Anahtar Sözcükler : Vergilendirme, Kripto Varlık/Para, Sınıflandırma, Kriptoların Tanımı, Seçili Ülke Uygulamaları.

1. Introduction

The digital tools that became a part of our lives and the goods and services they offer significantly impact societies' economic, social, cultural, and intellectual spheres. This process, which is also called the phenomenon of digitalisation or digital economy, allows businesses of all kinds to easily open to world markets that they could not even anticipate before, not to need a physical workplace, to minimise their costs, to use new business models, to meet new methods except for the production, marketing, and sales they use in the classical method, to gain more profit and, most importantly, to gain competitive advantages.

This situation, which emerged regarding businesses, did not result in more tax revenues for the countries that receive tax on the earnings or the added value obtained as a result of the activities of the businesses. When the digital economy players, who utilise the gaps in the countries' tax laws, started to operate in many countries at the same time and pay minimum or zero tax, this attracted the reaction and attention of the country administrations. In this context, some projects such as the Base Erosion and Profit Shifting (BEPS) project created under the leadership of OECD have been tried to be implemented.

One of the most important changes experienced with digitalisation is, doubtless, the emergence of assets, which can be used as a means of change, savings, investment and that are tried to be called various names such as electronic money, digital money, virtual money, digital token, digital value. The most prominent of these assets is Bitcoin. Its most important feature is decentralised and can be transferred directly between individuals over the internet without intermediaries in peer-to-peer banking (Alpago, 2018). Suppose it is necessary to make a definition within this scope. In that case, it is a decentralised digital entity where transactions take place directly between users with no mediator and are confirmed by cryptography and saved in an anonymous ledger named blockchain (Majumdar, 2019: 263-4). However, there is no consensus on the generality of the world related to the definition and classification of these assets in the last years. Even in some countries, these assets are banned. In countries where they are not prohibited, it is seen that it is regarded as money and a digital asset, securities, or real estate due to the problems arising from the definition. Regardless of the name, the taxation of these digital assets varies depending on the definition, in other words, the classification.

In this study, after a brief historical development of digital assets, which is an important element of the digital economy, an evaluation will be made within the scope of the recent discussions on the definition of digital assets, and in the following titles, how the taxation of digital assets is carried out and implemented in selected countries in the current system will be revealed.

2. A Short Background of Digital Economy and Crypto(S)

The digital economy is a product of information and communication technology transformation. It is an economy that is cheaper, more powerful, has broad standards,

improves business processes, is open to innovation, and can adapt quickly to developments (OECD 2015: 13). Developing computing technologies cover all aspects of modern life. Besides contributing to entertainment, health, education, banking, and urbanisation, they also impact the easier generation of new ideas. People establish relationships with the government and society (BCS, 2016: 6). The development in information technologies has led to innovative and facilitating steps in the banking sector. The banking system has turned into a faster, more transparent, and more secure structure within this scope.

With the help of information technologies, products can easily reach larger markets, product diversification and adjustment of their features are faster and easier compared to earlier periods, and customer-oriented product presentation has become quicker and more successful (OECD, 2015: 41). The global value of e-commerce, an important element of the digital economy, was estimated to be around \$ 29 trillion in 2017 by UNCTAD (UNCTAD, 2019: 15). This data alone is sufficient to show the economic size of the digital economy in the coming years.

The virtual/digital world, which produces its ecosystem, has succeeded in producing its currencies, in other words, means of change and putting them into daily life. While these coins/assets can be released to the market by the governments, they are mostly anonymous and can be used in digital shopping units. Cryptocurrencies can be used to purchase assets and services in online games and purchase real goods and services, just as real money. The most significant property of such currencies is that they have encryption and require peer-to-peer authentication. In other words, these currencies are encrypted (OECD, 2015: 44).

The "digital exchange tool" that comes with crypto technology, the most important product of information technologies, is assets referred to as crypto money or digital money. The preparation of the emergence of cryptography and privacy-protecting technologies, digital currencies, was carried out by cryptographer David Lee Chaum. In his doctorate thesis titled "Computer Systems Established, Maintained, and Trusted by Mutually Suspicious Groups", as presented in 1982, Chaum revealed the first blockchain protocol and algorithm (Chaum, 1982: 3). He later developed a cryptographic system called "untraceable Electronic Cash (eCash)", with the article he wrote in 1990 (Chaum et al., 1990: 319-27). He played a significant role in the emergence of digital assets and their features. In this context, he developed DigiCash, another system that would make economic transactions safer using cryptography. DigiCash was one of the first public and private key cryptography implementations used by digital currencies today. The "Blind Signature" technology, which emerged within the scope of the studies of Chaum, both increased security for DigiCash users and made electronic payments untraceable by third parties (Chaum, 1983: 200).

In 1991, the first study of creating a cryptographically secure chain of blocks by placing time-stamps on digital data was done by Stuart Haber and Scott Stornetta (Haber & Stornetta, 1991: 110). Haber and Stornetta made the first studies of secure cryptographic blocks with this study.

In 1998, Nick Szabo developed a decentralised digital currency called Bit Gold, using the Blockchain system that forms the basis of crypto money today. Stefan Konst (2000: 1-81) published a general theory for cryptographically secure chains and suggested implementing them.

Satoshi Nakamoto (2008: 1-9) introduced blockchain technology with his article titled "Bitcoin: A Peer-to-peer Electronic Cash System". Nakamoto implemented the first blockchain by proposing a new solution to the issue of "The Byzantine Generals", known as the problem of how to share information in an insecure and potentially fraudulent distributed processor network, without using a central authority, with the concept of "proof of work", which led to the emergence of bitcoins within the scope of crypto assets (Dursun, 2021: 1).

Blockchain is a special kind of decentralised digital ledger concept. This occurs with a technology that guarantees the inalienability of these records by ensuring that the records are confirmed and stored in peer-to-peer (P2P) computers in the form of duplicate copies and incoordination. Thus, it fulfils its vision of operating in a safe, unchangeable, transparent, democratic, and auditable manner (BTV, 2019: 14). All transactions made since Bitcoin's first appearance in 2009 are stored digitally in the blockchain (Çarkacıoğlu, 2016: 42).

Therefore, the virtual currency system is not subject to any centre or country and has a legal system and legal regulation. The market value of virtual currencies is defined according to the supply and demand of the currency. These currencies are open source, international and anonymous. Users only use virtual currency (such as Bitcoin BTC) wallet identification numbers when making transactions. Besides, users do not have any personal data in the system. This feature makes digital coins anonymous. Thus, third parties or government authority (Esener, 2017: 1). Each digital coin generated has a correspondence in international currencies. When Bitcoin was first produced in 2009, its value was \$ 0.1, while its value in February 2021 reached \$ 48.780 (Coindesk, 2021: 1). Various vendors, producers, consumers, and even governments have begun to accept these assets as tools for both investment and shopping (Crypyo Para, 2021: 1).

Cryptocurrencies, one of the best-accepted implementation solutions of blockchain technology, became the main focal point of regulatory activities as they first reported their names with Bitcoin in chronological terms. But at the same time, it is considered that regulating cryptocurrencies by letting them have a legal status will restrain the cryptocurrencies from using for illicit activities such as drug trafficking, tax evasion, or money laundering, thereby improving their value in the long term (Houben & Snyers, 2020: 13).

3. Classification of Cryptocurrencies

3.1. From Crypto Asset to Cryptocurrency: Conceptual Distinction and Classification

The definition of the crypto money (cryptocurrencies) concept and the concept of crypto asset, considering its functions, is currently based on international organisations and countries. In fact, from the report titled "Taxing Virtual Currencies An Overview of Tax Treatments and Emerging Tax Policy Issues" published by the OECD in October 2020 (OECD, 2020: 3), it is seen that the OECD preferred to stay one step behind and monitor what countries are doing in this regard and the OECD report and its content on the classification issue will set the stage for new discussions. The related report will be a source for future academic and practical studies as was in the previous reports of the OECD. Of course, addressing the subject today will be appropriate and beneficial in terms of the direction it will follow in the future, depending on the advancements in technology and market conditions. We can define crypto assets as an asset developed for serving financial tools as an alternative in a general expression.

At the beginning of 2020, while there were more than 5100 crypto assets with an entire market capitalisation of over \$ 250 billion, this number is increasing day by day, and there are also crypto markets for crypto assets, whether legal or illegal (Houben & Snyers, 2020: 25). In practice, cryptocurrency is often used instead of the concept of crypto asset; this is the effort to create electronic or digital cash through cryptography technology as an option to the current payment system. However, at the point reached today, the concept of crypto assets has comprehensive content that includes the concept of cryptocurrency. It will be useful to discuss the issue by segregating the word "cryptocurrency" into pieces to understand the matter better. In the most general terms in the digital environment, "crypto", the first part of the word "cryptocurrency", means "hidden or secret", reflecting the security technology used to record who owns what and make payments between users. The second part, "currency", is the broadest sense of "some kind of electronic cash". However, cryptocurrencies are not the "cash" currencies we currently use. These currencies are electronically available and are based on a peer-to-peer system. No central bank or government agency manages the cryptocurrency system or steps in if something goes wrong (Bank of England, 2021: 1; Houben & Snyers, 2020: 19).

Today, although the concept of "crypto-assets" is used to refer to a wide variety of assets, there is no generally accepted definition of what constitutes a crypto asset. Therefore, the first question to be answered on our subject should be "what is an asset"? Statistically, we can call assets to generate economic benefit by being retained. OECD (2018) argued that for digital/crypto assets, this ownership requirement, namely the retention condition (such as owning crypto keys), is generally met (Castrén et al., 2020: 6). The second question that is beneficial to answer should be, "Are crypto assets economic assets?" Crypto assets are considered economic assets because those who own them can earn gains/losses, and with these assets, they also provide economic benefits to their owners in other ways. Moreover,

these assets have monetary values, and their prices are determined by the markets they trade (IMF, 2019: 8).

According to national account guidelines, an asset is a "financial asset" if it grants its owner the right to receive a payment at a previously agreed amount and generates a corresponding demand for another asset. From this point of view, when considering whether crypto assets are financial or not, the term "crypto-asset" is a sub-category of "digital asset" and covers both non-issued assets (non-financial assets such as Bitcoin) and issued assets (financial assets considered under the term "stablecoin") (Castrén et al., 2020: 3).

The studies on the definition of the crypto asset are based on a clear understanding of the crypto asset and the terminology covering all features. The transfer of the determined terminology into legal systems is important in terms of unity in policy and implementation. In this context, different crypto asset definitions have been made for monitoring and auditing studies conducted by regulatory authorities and standards-setting institutions or for other purposes (Houben & Snyers, 2020: 13):

- The European Central Bank (ECB) Crypto Assets Task Force has very narrowly defined the concept of crypto assets as digitally recorded assets that do not represent a financial claim or financial liability for any natural or legal person.
- The International Organization of Securities Commission (IOSCO) defined the crypto-asset concept primarily as a type of special asset that is based on cryptography and DLT or similar technology as a part of a perceived or inherent value, in other words, as an asset that can represent an asset such as currency, commodity or security or to be a derivative of a commodity or security.
- The Financial Stability Board (FSB) has introduced a similar definition and defined the concept as a type of private entity primarily based on cryptography and distributed ledger or similar technology as part of its perceived or inherent value.
- Following the definition of the FSB, the European Securities and Markets Authority (ESMA) defines the crypto asset as a type of private asset primarily based on cryptography and DLT or similar technology as part of its perceived or inherent value. ESMA uses this terminology to refer to both virtual currencies and digital tokens. According to ESMA, a crypto asset also means an asset not issued by a central bank (ESMA, 2019: 42).

In addition, in a report published by the European Parliament, crypto-assets were defined as a special digital asset, and it was stated that it has the following characteristics (Houben & Snyers, 2020: 13-4):

- a) It is recorded in a type of digital distributed ledger secured by cryptography.
- b) They are not issued or guaranteed by the central bank or public authority.

c) They can be used as a bartering tool and/or for investment purposes and/or to access a good or service.

The descriptive studies conducted failed to come up with a term that everyone agreed on. However, determining which elements/features a crypto asset will carry is important in approaching the next step.

3.2. Taxonomy of Crypto-Assets

It is essential to separate digital assets/currencies into those issued by a central bank and those issued by the private sector based on sovereignty. Central Bank Digital Currencies (CBDCs) are digital assets or digitalised instruments issued by a central bank for payment instruments based on sovereign power. On the other hand, digital assets/currencies created by the private sector or individuals consist of Cryptocurrencies and Tokens. It is possible to divide them into subclasses as Traditional "non-backed" cryptocurrencies, Stablecoins, Investment Tokens, and Utility Tokens (EFRAG, 2020: 6). These digital assets have high price volatility since they do not depend on any element (gold, silver, or economic data) and do not represent an obligation. Thus, these currencies are called "non-backed" currencies. The highly volatile nature of traditional "non-backed" cryptocurrencies makes it impossible for classical currencies to fulfill their role (i.e., function as a medium of exchange, value store, and account unit).

We can say that digital stablecoins have started to be introduced to overcome the disadvantages of "non-backed" coins in the traditional sense. In a simpler sense, a stablecoin is a subcategory of cryptocurrencies fixed to the value of a fixed asset or the price of a basket of assets. Like traditional "non-backed" cryptocurrencies, stablecoins aim to fulfill currencies' roles. Examples of stablecoins currently in circulation include Tether (USDT), Multicollateral DAI (DAI), and Gemini Dollar (GUSD) (Houben & Snyers, 2020: 20).

However, they have certain functions that stablecoins do not have. These transactions owned by tokens are in the form of providing access to a certain product or service or achieving a certain purpose with the dividend-like rights of their owners. While the cryptocurrency is divided into categories within, there are multiple token categories. Tokens can also be subclassified into "investment tokens" and "utility tokens" based on various attributes. Investment tokens, also known as security tokens or asset tokens, provide their holders with rights and/or powers similar to dividends.

On the other hand, utility tokens provide their owner access to a specified implementation, product, or service, generally ensured via a newly developed infrastructure. They only give access to a product or service developed by the token issuer and are not considered a payment instrument for products or services. Thus, utility tokens are different from cryptocurrencies (Houben & Snyers, 2020: 21).

3.3. Is Virtual Money the Same as Digital Money? Are Virtual Currencies A Digital Currency?

Because of legal conditions, there are two basic kinds of virtual currency: "centralised and decentralised money". In this sense, the centralised or decentralised concept is about generating the currency. Within this scope, a centralised currency has a centralised manager or storage. The centralised management of a virtual currency is typically the person or organisation that issues that currency. The role is similar to a central bank in a regulated currency system. XRP is one of the examples of a centralised virtual currency.

On the other hand, decentralised currencies have no third-party centralised manager or storage. Instead, it works as an authenticator of decentralised virtual currency transactions in a distributed system. Many decentralised virtual currencies are based on blockchain networks such as Ethereum, Bitcoin, and Litecoin. A blockchain network connects cryptography with a list of records known as blocks. When a transaction is requested, the request is broadcast on the web, including on many computers (nodes). After the network confirms the transaction, a stable and unchangeable block containing the transaction information is added to the current blockchain. The process is concluded and recorded accordingly (CFI, 2021: 1; Sia-Partners, 2020: 1).

Again, digital currencies are related to the M2 and M3 categories of the financial system, where M1 refers to physical banknotes and coins in circulation. In this case, more than 95% of currencies worldwide are digital. The virtual currency was initially meant only for currencies that did not exist in the real world and was only exchanged online (usually in gaming systems). Later, virtual currencies began to expand in the physical world, blurring the lines between virtual and digital currencies (Sia-Partners, 2020: 1). Digital currency has become a broad concept that refers to all monetary assets in digital form. A digital currency can be regulated or unregulated. In this concept, a regulated digital currency can be issued by a country's central bank and converted into an independent currency. Regulated digital currencies are subject to the country's monetary policy to which it is subject (CFI, 2021: 1).

It is produced and controlled by a private issuer rather than a central bank. Because of that, it is not subject to the foreign exchange policy of any person, institution, or country. As mentioned, virtual currencies can be centralised or decentralised. Some virtual currencies include cryptography, while others do not. Cryptocurrency is a virtual currency that applies cryptography technology to secure and verify currency transactions (CFI, 2021: 1; OECD, 2020: 11). In light of these assessments, it can be said that the concept of digital currency includes virtual currency terms.

4. Taxation of Crypto Assets

The taxation of cryptocurrency depends on the nature of these assets and how they are acquired or used. Cryptocurrency, in general in countries that issue regulations and make explanations thereabout, is used as an investment property, financial instrument, intangible

asset or property, financial asset, commodity, etc. For example, they are accepted and considered as real estate for investment purposes in Norway, Denmark, and Finland, as fixed capital in Australia, as financial tools in Germany, as non-tangible assets in Luxemburg, Switzerland, as non-material property in Singapore, as investment capital in Sweden, as an asset in New Zealand, as a financial asset in Venezuela and as security in Canada (Library of Congress, 2021: 123-4).

The definition of crypto assets is significant for understanding how they fit within current tax regimes. They are considered crypto assets in most jurisdictions, a form of property for tax purposes. Countries are choosing different methods to categorise these currencies within the accepted definition: most of the countries analysed refer to them as intangible assets. Some consider them commodities or financial instruments. Some countries have a dissimilar method and consider these currencies as "a digital representation of value" (e.g., Poland) or as foreign fiat currencies (e.g., Italy) (OECD, 2020: 15).

For example, in South Africa, cryptocurrencies are not considered tax-based currencies, and any income obtained with cryptocurrencies is also subject to tax. The South African Revenue Service (SARS) recognises cryptocurrencies such as Bitcoin as "intangible assets" as opposed to currency or property. In this context, cryptocurrencies are classified as intangible assets, meaning that, in theory, SARS considers the divestment of cryptocurrency to be a capital gains tax event (McClure, 2020: 1).

On the other hand, many countries recommend different taxation procedures depending on whether the cryptocurrency mining activities carried out by individuals are small-scale (generally considered as a hobby), large-scale, or commercial scale. For example, mining is taxed with being accepted as income from a hobby in Finland and Denmark unless it is done on a commercial scale. Again, Norway taxes the revenue from mining and cryptocurrencies and the profits from their sales when performed on a commercial scale. In contrast, mining is generally a non-taxable hobby (Library of Congress, 2021: 88).

Again, many countries have explicitly put in their legislation that reward tokens produced by individuals on a small scale or from mining as a hobby cannot be taxed until traded or in any way. For example, in Australia and Canada, where a person is mining cryptocurrency as a hobby, tokens are not taxed until traded. Still, when these tokens are later traded, they are taxed under "capital gain tax" (CIAT, 2020: 1).

In Singapore, on the other hand, these activities of an individual engaged in mining activities are considered hobby activities. Unless the person makes a habitual and systematic effort to profit from the activities, the earnings from the sale of the individual's tokens are not taxed. In some countries, the individual may be required to pay income tax on the mining rewards even if the mining is not undertaken for a business or profit-making. For example, in New Zealand, profits from the subsequent sale or exchange of mining rewards are taxed. In the UK, if the mining activity is not conducted within the scope of commercial activity,

the value of a crypto asset obtained due to mining is taxed as "miscellaneous income" at the time of purchase. Again, in the UK, in the sale (sale) of crypto assets, "capital gains tax" is applied to sellers (Library of Congress, 2021: 118-20; Koinly, 2020: 1). In the United States of America, cryptocurrency is accepted as a "capital asset", and any crypto sale is subject to "capital gains tax" (Zelaya, 2020: 1). Few countries accept virtual currencies as a type of currency (foreign or local) for tax purposes. This varies but is often related to decentralisation, lack of support, price volatility, and limited use as a medium of exchange. In most countries that publish a declaration/guide on the matter, cryptocurrencies are described as property for taxation purposes for income tax purposes.

Australia, France, Chile, Czech Republic, Luxembourg, Nigeria, Spain, Sweden, Switzerland, and the United Kingdom define virtual currencies for tax purposes as intangible assets other than goodwill. Argentina, Brazil, Croatia, Denmark, Israel, Japan, Slovak Republic, and South Africa define virtual currencies as financial instruments or assets for tax purposes. Austria, Canada, China, and Indonesia define virtual currencies as a commodity or virtual commodities for tax purposes. Belgium, Cote d'Ivoire, Italy, and Poland define virtual currencies for tax purposes as currency. Japan defines it as legal payment. The United States defines virtual currencies for tax purposes as capital assets (OECD, 2020: 23).

Few countries consider virtual currencies similar to 'currency' in taxation, such as Belgium, Ivory Coast, Italy, and Poland. Cryptocurrency sales are not taxed in Portugal. Essentially, this is because Portugal sees cryptocurrencies as a means of payment, i.e., another currency rather than an asset (Portugalhomes, 2020: 1). France, which also describes virtual currencies as "financial assets", taxes the earnings that arise when these assets are converted into "traditional" currency but exempts transactions of crypto to crypto from tax (Mitchell, 2019:1). There is no unity or cohesion among countries (Yereli & Orkunoglu-Sahin, 2018: 227).

4.1. Virtual Currencies in Terms of Income Tax Application

In terms of income tax, most countries that made regulations consider virtual currencies as an asset; it is most commonly seen that they are evaluated as intangible assets other than goodwill, financial asset, or commodity. For this reason, assets are treated as "capital gain generating assets" in most countries and, in rare cases, as "business or miscellaneous income".

Most countries have expressed the opinion that, in terms of income tax, the activity of the disposal of virtual currencies generating earnings should be taxed as a tax-generating event. Again, in almost all countries, the payment of goods, services, or wages through barter transactions is considered a taxable event. It is stated that there is no difference in taxation between performing the transaction as barter and in return for cash (OECD, 2020: 32).

For example, in July 2020, a bill on the taxation of virtual currencies was published in Korea, and it was announced that virtual currencies would be taxed as "other income". Therefore, within the scope of the proposed taxation procedure, which will be enforced as of October 2021, the capital gains obtained from virtual assets will be subject to an annual income tax of 20%, except 2.5 million KRW per year (Zelaya, 2020: 1).

Again, the Australian Tax Office defines virtual currencies as "Bitcoin or other crypto or digital currencies with similar properties to Bitcoin" and subjects the earnings obtained in the event of trade of these currencies to "capital gain tax" (Koinly, 2020: 1).

In many countries, taxation on transactions in virtual currencies also varies depending on the taxpayer's situation. Occasional transactions or transactions made in personal earning capacity are commonly taxed as "capital gains tax" (OECD, 2020: 29).

Commercial transactions with cryptocurrencies used by traders in Croatia are considered financial transactions. The income from the sale of cryptocurrencies is subject to personal income tax based on "capital gain" (IRGLOBAL, 2018: 1).

4.2. Wealth Taxes and Virtual Currencies

As virtual currencies are typically considered property for tax purposes, with the possible exception of VAT, they are also likely to be subject to property taxation in countries that levy inheritance, gift, wealth, or transfer taxes. However, the guidance available rarely provides information on whether and how these taxes apply to virtual currencies. For example, the UK considers virtual currencies assets/property taxed under inheritance tax law (Castrén et al., 2020: 6-8). In contrast, although no regulation has yet been made in Korea, the Government announced at the end of 2017 that virtual currencies and other virtual assets would be deemed taxable in other property classes under the inheritance tax rules. Also, in Finland, virtual currencies acquired through inheritance are taxed on acquisition costs. Subsequent earnings on disposal may also be taxed under capital gains taxes.

Finally, Belgium, Luxembourg, Norway, Spain, and Switzerland accept virtual currencies as "assets" taxed under wealth tax. For example, in Luxembourg, an annual wealth tax of 0.5% is levied on the market value of crypto assets. In Switzerland, virtual currencies are taxable capital under movable capital assets and are subject to cantonal wealth taxes (OECD, 2020: 40).

4.3. Virtual Currencies in Terms of The Value Added Tax (VAT)

It can be said that the VAT implementation policies of the countries on virtual currencies are more coherent and more transparent than their income tax application policies. First of all, in many countries, the exchange of virtual currencies is not subject to VAT. In addition, using virtual currencies to buy goods or services is not subject to VAT.

From the perspective of EU countries, mining activities are generally considered outside the scope of VAT, as in Germany, Ireland, Slovenia, and Sweden. However, in France, income from mining activities is taxed as a supply of services (Zmudzinski, 2019: 1).

Similarly, there are some differences in the approach adopted by the EU Member States on taxation of certain services regarding digital assets. For example, Germany considers the provision of wallet services that means as defined as a software program or physical device that allows cryptocurrency users to store crypto, send, and receive crypto transactions (Bankrate, 2021), and clearing services for crypto assets offered to third parties as a taxable event within the scope of VAT, other countries bring tax exemptions to wallet services and/or clearing services for a fee. In contrast, Slovenia treats online foreign exchange services as a taxable event at the standard VAT rate while excluding the provision of wallet services and the exchange of virtual currencies from the scope of VAT. Likewise, in Italy, foreign exchange services are exempted from VAT in line with the treatment applied to other foreign currencies (OECD, 2020: 23; Library of Congress, 2021: 62).

Suppose we were to provide examples of VAT applications on virtual currencies among non-EU European countries in the UK. In that case, mining is excluded from the scope of VAT since there is no connection between the services ensured and the price, and there is no customer case in mining services. At the same time, exchanges in virtual currencies are without a scope, and VAT can be paid for the supply of goods or services for which virtual currencies are exchanged (OECD, 2020: 14). Also, in Norway, virtual currencies are used as a means of payment. The exchange of virtual currencies is exempt from VAT, provided that the virtual currency is used as an alternative payment method. Mining rewards are exempt from VAT, but those who sell data processing power to others to allow mining are subject to VAT.

Likewise, in Switzerland, virtual currency proceedings are not covered by VAT if they are exchanged for other virtual currencies or fiat currency. Similarly, exchanges related to other goods and services are liable to VAT only for the supply of goods or services. However, barter transaction is outside the scope of VAT. Outside of Europe, almost all countries tend to comply with a similar strategy, excluding exchanges in virtual currencies from VAT and treating the buying of goods and services with virtual currencies as a taxable sale rather than a barter activity. In Australia, virtual currencies were previously seen as a taxable exchange event. However, in July 2017, the Law was amended to consider the purchase of goods and services with virtual currencies as an exchange activity and to accept virtual currencies and/or fiat currency exchanges as financial services exempt from Goods and Services Tax (GST). Again, only the mediation fee from sales is liable to VAT in Columbia. Virtual currencies are considered individual assets, and for this reason, they are not liable to VAT. In Israel, individual investors in virtual currencies are not regarded as taxpayers of VAT, but anybody included in mining activities is described as a seller and liable to VAT. Virtual currencies are tax-oriented financial businesses excluded from VAT (OECD, 2020: 38).

In Japan, an exciting example, before July 2017, sales of virtual currencies were liable to VAT if the transferee was located in Japan. However, since July 2017, a regulation has been issued for not charging VAT on stock exchanges, provided that the relevant token meets the crypto asset definition under the relevant law. Essentially, virtual currencies in Japan are treated the same way as government currencies in terms of VAT (OECD, 2020: 37).

Again, in Singapore, as of January 1, 2020, virtual currencies are considered VAT-exempt transactions when they are exchanged with other virtual currencies or legal currencies and are exempt from taxes if used as a means of payment for goods and services. In addition to the services provided by intermediaries, a mining service offered to identifiable parties for evaluation is also subject to tax. In South Africa, according to the 2018 guidance document of the Reserve Bank of South Africa, all transactions involving the issuance, acquisition, collection, purchase, sale, or transfer of ownership of crypto assets are financial services exempt from VAT. On the contrary, New Zealand is one of the few countries to adopt a different approach to VAT processing over virtual currencies; the GST transaction of crypto assets traded is determined case-by-case and may be fully taxable, exempt, or zero-rate depending on the circumstances. Cryptocurrency exchanges are exempt from GST, but this will apply to all transactions or only New Zealand resident buyers. Again, related services that are not the provision of crypto assets on their own (such as mining, clearing services, or general business or computing services) continue to be subject to current GST rules or are taxed at the standard rate subject to GST (OECD, 2020: 38).

5. Taxation and Regulation of Crypto Assets in Turkey

Turkey is one of the countries that use cryptocurrencies, with a daily transaction volume exceeding \$ 1 billion in 2021. There is only legislation regarding the identification and classification of crypto assets. In April 2020, Central Bank in Turkey declared regulation to prohibit the use of cryptocurrencies as a tool for payments for goods and services. According to the Banking Regulation and Supervision Agency (BDDK) statement, cryptocurrencies are not evaluated as virtual money within the Law on Payment and Securities Reconciliation Systems, Payment Services, and Electronic Money Institutions (Hg.org, 2022: 1).

As explained above, cryptocurrency is described as an asset, but it is forbidden to use as a tool for payment methods. This shows that Turkey participates in various countries that partly prohibit cryptocurrency. At the same time, crypto firms in Turkey now have to comply with Anti Money Laundering and Combating the Financing of Terrorism Standards (AML/CFT) obligations by Law № 5549 on the Prevention of Laundering Proceeds of Crime and the International Financial Action Task Force (FATF) Recommendations. Crypto companies in Turkey were not subject to AML/CFT regulations. But after regulations, AML obligations have been expanded for Turkish crypto firms anymore. In the amended Regulation on Measures Regarding Prevention of Laundering Proceeds of Crime and Financing of Terrorism, crypto companies and businesses have been forced to enact the same

AML/CFT policies as other financial institutions in Turkey. As AML regulator in Turkey, Financial Crimes Investigation Board (MASAK) supervises Turkish crypto firms related to crypto trading and crypto exchange platforms, crypto wallets, etc. According to the regulations, goods and services would no longer be paid for with cryptocurrency. According to the rules, it is impossible to pay with cryptocurrency for goods and services. However, cryptocurrency trading is allowed so that everyone can buy and sell cryptocurrencies as investment tools. At the same time, it became unlawful to buy, sell, or transfer cryptocurrencies via payment/e-money services on crypto platforms such as PayU, iPara, and PaymentWall (Sumsb, 2022: 1).

Since cryptocurrencies have an important potential revenue for Turkey, other countries' studies on the taxation of cryptocurrencies continue. Debates on the qualification and taxation of cryptocurrencies continue in Turkey as in many countries. The most important issue is that the earnings subject should be determined to tax the income from cryptocurrency (Ersoy & Kartın, 2021: 1).

6. Conclusion

Rapid developments in information technology affect all societies politically, socially, culturally, and economically. The digital economy develops its ecosystem globally, which was created by information technologies at the beginning of this digital age and is very open to development and evolution. Digital / virtual assets/currencies, one of the most important elements created by the digital economy and which have not yet been fully defined, cause significant changes in both economies and legal systems and taking steps in these matters. Numerous studies and reports are prepared nationally and internationally to comprehend the digital economy, identify possible damages to societies, legal systems, environment, health, and social structure, and take measures.

The theoretical foundations of digital/virtual assets/currencies, which constitute the subject of the study, began in 1982 in general. It was launched in 2009 to produce a virtual asset called Bitcoin. Since 2009, many crypto assets/currencies under different names have been produced. The fact that these assets and the trade with these assets reach huge volumes worldwide and retain significant amounts of gains are important and some difficulties in the efforts of countries to acquire taxes from such incomes. One of these difficulties is the lack of unity of terms and definitions. Some countries define these assets as virtual/digital / cryptocurrencies, while others define these assets as commodities, and others as real estate, financial assets, and tokens. These specified assets are not of a single type but are produced for different features, purposes, and functions. Beyond this uncertainty in definition, these assets are prohibited in some countries such as Algeria, Egypt, and Bolivia. In such uncertainty, the OECD monitors the process and, from time to time, prepares reports and makes recommendations to enable the resolution of the digital ecosystem in a way that does not hinder the development thereof. One of the most recent studies in this context is "Taxing Virtual Currencies: An Overview of Tax Treatments and Emerging Tax Policy Issues", published on 12 October 2020. In this study, OECD provided guiding information on the

identification and classification of crypto assets and preferred the concept of virtual currency as the top concept for crypto / digital assets.

There is no consensus when taxing digital currencies on a country basis. For example, in terms of income tax, if people in Germany hold cryptocurrencies for more than a year, they are not subject to any capital gains tax from these assets. Similarly, Malta does not tax on long-term retainment of cryptocurrencies, just like Germany. Since there is no capital gains tax in Singapore and Malaysia, cryptocurrency holders are not subject to tax. As another example, there is no income tax application for any cryptocurrency retained, sold, or purchased by individuals in Switzerland for their private assets. However, in the USA, crypto assets are accepted as "property" rather than "currency". When the earnings obtained from transactions with crypto assets reach a certain amount, they are subjected to tax depending on the regular taxation regime of the properties. In the UK, crypto assets are recognised as foreign currency, and the tax rules applicable to currency gains and losses apply to crypto-asset transactions.

Although it is possible to see different applications regarding the VAT application, we can say that there is consistency compared to the income tax application. After the European Court of Justice (ECJ) decision that cryptocurrencies are currencies, not property, it was stated that the purchase and sale of cryptocurrencies are not subject to VAT. No VAT is applied to trading cryptocurrencies in EU member states. Regarding VAT application, it can be stated that countries implement policies closer to each other in terms of virtual currencies compared to income tax.

When we look at the matter in terms of wealth taxes, the number of countries that subject crypto assets to wealth tax is relatively low, as a few countries impose wealth taxes.

In Turkey, crypto assets/currency is legally described as an asset but is prohibited as a payment method. In this aspect, Turkey joined a list of countries that partially prohibits cryptocurrency. Since cryptocurrencies have a potential tax revenue for Turkey Tax Office, studies on the taxation of cryptocurrencies have carried on. In a taxation context, cryptocurrencies may be determined as "security", "commodity", or "money" in the Turkish Tax System.

If cryptocurrencies are determined as securities, they must be treated as "financial assets". In this case, buying and selling cryptocurrencies are subject to income tax. When cryptocurrencies are described as securities, they are not subject to VAT, but if the value increase exceeds TRY 25,000 for 2022, the excess will be subject to income tax. If cryptocurrencies are considered a commodity, they can be taxed in two methods. If there is a continuity factor in the activity, the gain will be commercial gain. If there is no continuity element in action, this gain is accepted as an incidental income. If it is accepted as an accidental income, TRY 58,000 of the revenue will be considered an exception for 2022, and if it exceeds this amount, the excess will be subject to income tax. At the same time, if cryptocurrencies are considered a commodity, VAT will happen in terms of the Value Added

Tax Law, and cryptocurrencies will be subject to VAT. If the cryptocurrencies are described as a currency, they will not be subject to taxation. Lawmakers in Turkey will decide how cryptocurrencies will be accepted and taxed at the parliament.

Finally, legal systems, especially tax systems, need to define virtual/crypto assets/currency and reach a term everyone agrees with. Even though countries have different practices based on the sovereign rights regarding the taxation of the gains from the use of virtual assets for production, consumption, and savings purposes, the main reason for these different practices is not sovereignty, but the fact that the world of virtual assets is not fully understood and controlled.

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Is It Possible to Reduce Cigarette Consumption by Taxes? A Comparison Between Turkey and The European Union

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Sigara Tüketimini Vergiler ile Azaltmak Mümkün Mü? Türkiye ve Avrupa Birliği Arasında Bir Karşılaştırma

Abstract

This study investigates whether tax structures are significant determinants of cigarette consumption patterns. The study analysed the tax burden on cigarettes in Turkey, and the tax rates were compared with the European Union (EU) countries. Then, it compares smoking trends in Turkey and EU countries. In the study, data from the statistical office of the European Union and the official institutions of Turkey were used. This study concludes that, in contrast to EU countries, ad valorem taxes in Turkey have a larger share than specific taxes. In addition, taxes on cigarettes have a deterrent effect in EU countries but not in Turkey. Thus, taxation techniques may be as important as tax rates in changing consumer preferences.

Keywords : Tax Burdens on Cigarettes, Cigarette Consumption, Comparative Tax Systems.

JEL Classification Codes : H20, K34.

Öz

Bu çalışma, vergi yapılarının sigara tüketim kalıpları üzerinde önemli bir belirleyiciliği olup olmadığını sorgulamaktadır. Çalışmada ilk olarak Türkiye’de sigara üzerindeki vergi yükü analiz edilmiş ve vergi oranları Avrupa Birliği ülkeleri ile karşılaştırılmıştır. Daha sonra Türkiye ve AB ülkelerindeki sigara içme eğilimlerini karşılaştırmaktadır. Çalışmada Avrupa Birliği istatistik ofisinden ve Türkiye'nin resmi kurumlarından alınan veriler kullanılmıştır. Bu çalışma, AB ülkelerinin aksine Türkiye’de nispi vergilerin spesifik vergilerden daha büyük bir paya sahip olduğu sonucuna varmaktadır. Ayrıca sigara üzerindeki vergilerinin, AB ülkelerinde caydırıcı bir etki yaratmasına karşın Türkiye’de böyle bir etkinin olmadığı görülmektedir. Dolayısıyla değişen tüketici tercihlerinde vergi oranları kadar vergilendirme teknikleri de önemli olabilmektedir.

Anahtar Sözcükler : Sigara Üzerindeki Vergi Yükü, Sigara Tüketimi, Karşılaştırmalı Vergi Sistemleri.

1. Introduction

Cigarette consumption remains a significant problem worldwide, including in Turkey. Much research has confirmed that smoking is the leading cause of significant health problems and has suggested public policies to reduce cigarette consumption (Horn & Waingrow, 1966: 21-26; Lewit et al., 1997: 17-24; Evans et al., 1999: 1-59). Governments often impose national and international measures to limit cigarette consumption. In 2003, for example, the World Health Organization addressed the problem of increased cigarette consumption by adopting the supranational-binding Framework Convention on Tobacco Control (FCTC). Unfortunately, this had little effect on smoking rates worldwide as it failed to curb the exposure of children and young people to addiction, and tobacco companies have remained highly profitable. According to Chung-Hall et al. (2019: 119), the FCTC has significantly affected tobacco control, but its implementation needs to be accelerated. Liber et al. (2015: 83) showed that minimum price laws on cigarettes in Malaysia did not significantly change licit or illicit cigarette prices. They, therefore, emphasised the importance of excise taxes to reduce cigarette consumption. Research shows that it will gradually increase without efforts to reduce cigarette consumption. Janda and Strobl (2019: 3), for example, predict that the number of smokers in the Czech Republic will increase by 4-8% until 2028 compared to 2013, with an increase of 7-26% in tax revenues.

Although it is desirable to reduce cigarette consumption for public health reasons, cigarette production is also a source of income for many countries. The tobacco industry strongly resists government control policies to neutralise government tobacco policies and increase demand. The tobacco lobbies show excellent resistance and resort to various tactics, especially against laws and regulations to implement control policies. The tobacco industry can be characterised by 5Ps (product, price, place, person, and promotion). In other words, it focuses on the right product, price strategy, people in the right place, and increasing attractiveness through promotions (Gilmore, 2012: 121). The tobacco industry seriously fears advertising bans, so it exerts effort to prevent such initiatives. Cigarettes have become the most important sector for transnational tobacco companies, especially since approximately 92% of their revenues are from the global tobacco market (Gilmore, 2012: 119). For example, as advertising bans became more common worldwide, the companies implemented a perception operation through Formula 1 races to suggest the importance of smoking in creating a strong adult male image and a relationship to active, exciting sports.

Similarly, in response to widespread advertising bans, companies achieve product placement through free product distribution or maintain advertising through sponsorship of organised events (Bilir et al., 2009: 44). Despite the economic benefits of tobacco sales, Immurana et al. (2021: 1) concluded that tobacco control policies enhance economic growth in both the short and long run because they lead to a healthier society. In Estonia, for example, tobacco-related costs outweighed the fiscal benefits in 2018 (Saar & Koitla, 2021: 286).

Tax policy is considered the most effective strategy to reduce tobacco consumption. Comparison of the effects of specific and ad valorem taxes is also a significant issue in public finance as most countries apply a mix of both types. Specific taxes impose a fixed amount per cigarette, whereas ad valorem taxes increase in proportion to the cost of the product. Various studies have investigated how different tax structures (ad valorem or specific) affect cigarette consumption and whether specific taxes raise prices too much (Immurana et al., 2021: 1; Shah et al., 2019: 2842; Delipalla & O'Donnell, 2001: 885).

After WHO published the FCTC in 2003, Turkey adopted it in 2004 with Law No.5261, published in the Official Gazette, number 25681. Since then, many measures have been implemented to reduce cigarette use, such as advertising bans, prohibition of cigarette sales to children, tobacco use in indoor areas, and the fight against counterfeit goods. Despite all these precautions, however, Turkey has been unsuccessful in reducing cigarette consumption.

In this framework, this study analyses the taxation system applied to cigarettes in Turkey and compares this with equivalent practices in European countries. In addition, it has been investigated whether the tax structure significantly determines cigarette consumption patterns. The analysis shows that cigarette consumption increases despite the heavy taxation of cigarettes in Turkey. To illustrate this, it first calculates the tax burden on cigarettes in Turkey and is compared with the European Union (EU) countries. Then, using the data obtained from the European Union Statistical Office (Eurostat) and Turkey's official institutions, smoking trends in EU countries and Turkey were compared.

The findings show that as the tax burden on cigarettes increases in European countries, cigarette consumption decreases. In contrast, cigarette consumption in Turkey is increasing despite the higher tax burden. This study is focused on determining whether these differences in cigarette consumption are related to the tax structure without considering other factors affecting cigarette consumption. The findings indicate that taxation technique is as important as tax levels in changing consumer preferences. In Turkey and EU countries, excise duty on cigarettes is collected as specific (lump-sum) and ad valorem taxes. However, while European countries¹ mostly levy specific excise duty fees, Turkey prefers ad valorem excise duty fees. In other words, in Turkey, ad valorem taxes on cigarettes have a much higher share than specific taxes. In conclusion, as in many EU countries, increasing the percentages of proportional and special taxes may be more effective in reducing cigarette consumption in Turkey.

2. Theoretical Background

Once smoking became viewed as an ill-advised activity leading to irrecoverable costs, even for those who do not consume cigarettes, public financing of the treatment of smoking-related diseases became a policy debate. According to orthodox welfare

¹ Table 6 compares the averages of ad valorem and specific taxes in 28 European countries with data for Turkey.

economics, if the consumption of a product has negative external effects, it is justifiable to subject that product to negative discrimination and taxes. In principle, consumption of that product should decrease, thereby curbing the behaviour causing negative outcomes and increasing social welfare (Hoffer et al., 2014: 47). Governments have introduced various tax policies to control tobacco consumption, reduce general public health spending, and prevent smoking-related environmental, hygiene, and safety issues. Generally, the individual country can use taxation policies to generate income, redistribute income, and deter or encourage certain activities (Avi-Yonah, 2011: 1). One such policy recommendation is excise taxes, or indirect taxes, on tobacco and alcohol since addictive products, especially cigarettes, have low price flexibility. In other words, demand is primarily independent of price. However, this can depend on age: Kjeld et al. (2021: 1) found that increased cigarette prices affect young people's smoking preferences.

Lee et al. (2004, para.4) showed that higher excise taxes on cigarettes reduced cigarette consumption and increased tax revenues in Taiwan. Van der Zee et al. (2020: 267) showed that higher value-added and excise tax encouraged illicit cigarette consumption in six South African townships. However, it should also be noted that advice from physicians to quit smoking is much more effective than raising tobacco prices (Wang et al., 2021: 2).

Tobacco consumption has an especially devastating impact on the poor and significantly contributes to wealth inequality. Here, the effect of taxes on cigarettes on consumption becomes important. In some cases, low-income populations are generally more responsive to cigarette excise taxes than high-income populations. Consequently, cigarette consumption among the poor decreases, breaking the relationship between cigarette consumption and poverty. However, low-income individuals may still not reduce their cigarette consumption despite an increased tax burden on cigarettes. In addition to the financial cost of higher prices, health costs burden people to increase further financial inequality (Prieger & Kulick 2018: 1706; Chaloupka et al., 2012: 172). Finally, cigarette consumption patterns may also be independent of tax levels, particularly among less educated, younger, and rural individuals. These groups are more likely to be influenced by non-price policies such as advertising bans public service announcements from raising public awareness (Çetinkaya et al., 2014: 1176).

European Parliament reports often emphasise that prohibiting tobacco products creates a black market and serious public health and safety concerns. The reports, therefore, advise focusing on the tobacco industry black market. Taxes on cigarettes can provide a significant income stream for governments and cause tax revenue losses to the black market (European Commission, 2017: 1). Furthermore, with the international liberalisation of certain tobacco companies in investment and trade, tobacco farming has shifted to low- or middle-income countries, and tobacco consumption rates have not decreased. In contrast, higher-income countries have experienced a decrease in tobacco consumption, especially those with tobacco control policies (Yılmaz et al., 2015: 4).

Public finance research has frequently compared the effect of specific and ad valorem taxes on cigarette consumption. In theory, cigarette consumption can be reduced by raising specific taxation to higher prices than consumers prefer (Delipalla & O'Donnell, 2001: 885). However, Schröder and Sorensen (2020: 1022) show that specific cigarette taxes shift market shares and profits toward firms with costs and prices above the industry average at the expense of low-cost firms, whereas ad valorem taxes only reduce the number of firms in the industry due to demand.

3. Materials and Methods

This study compares the complex tax structures for cigarettes in Turkish and EU legislation. It then calculates and compares the current tax burden on cigarettes in Turkey and European countries (Table 6). It also examines changes in tax burdens on cigarettes and cigarette consumption between 2016 and 2020. The study draws on data from the European Union Statistical Office (Eurostat) and Turkey's official institutions to calculate the tax burden on cigarettes in Turkey and EU countries.

3.1. Tax Burden on Cigarettes in Turkey

3.1.1. Excise Duty

Both EU countries and Turkey impose excise duties on certain products, whether and/or ad valorem taxes. Excise duties generate high revenues for states to fulfil social objectives. In 2002, Turkey enacted an excise duty on several products (e.g., cigarettes, fuel, alcohol, and other luxury goods) under the Law on Excise Duty No. 4760 and subsequent amendments under EU harmonisation. The scope of excise duty in Turkey is outlined in list no. (I), (II), (III), and (IV) of this law, which classify excisable goods based on manufacturing, import status, and first acquisition. Four separate tariffs are taxed in addition to the Law on Excise Duty (mineral oil and fuel under Tariff no. 1, vehicles under Tariff no. 2, alcohol and tobacco products under Tariff no. 3, and white goods and furniture under Tariff no. 4).

Table: 1
Excise Duties in Turkey, 2011-2019 (Billion TRY)

	2011	2012	2013	2014	2015	2016	2017	2018	2019*
Petroleum/natural gas products	33.5	35.9	45.1	45.6	50.8	56.2	63.6	55.5	45
Motor vehicles	8.5	8.4	10.5	12.8	17	18.8	22	17.3	7.2
Alcoholic beverages	3.8	4.6	5.1	5.8	6.7	7.9	10	12.4	10.7
Tobacco products	15.8	19.9	21.3	23	26.9	32.2	37.4	42.7	38.9
Cola drinks	0.28	0.27	0.29	0.31	0.34	0.36	0.4	0.85	0.74
Consumer durables and other goods	2	2.4	2.9	3.3	3.9	4.7	4.8	4.9	3.6
Communication	0.04	0.04	0.03	0.03	0.04	0.03	0.04	0.05	0.04
Electricity/coal-gas	0.74	0.91	1.1	1.1	1.3	1.1	1.2	1.5	1.5
TOTAL	64.9	72.6	86.5	92.2	107.2	121.6	139.6	135.5	108

* First three quarters only. Note: Excise duties collected under Laws no. 6111, 6736, and 7143 are not included in the table as these values are minimal.

Source: <<https://muhabat.hmb.gov.tr/genel-yonetim-butce-istatistikleri>>, 07.04.2020.

Table 1 shows Turkish excise duties for eight items: petroleum and natural gas products, motor vehicles, alcoholic beverages, tobacco products, cola drinks, consumer durables, communication tax, and electricity and coal-gas consumption. The largest share of petroleum and natural gas products is tobacco products, which contributed approximately 40% of revenues in the first three quarters of 2019.

The total share and tax revenues of excise duties on tobacco products have increased, likely due to public health and environmental awareness concerns. Indeed, informing the public that smoking is one of the leading causes of fundamental health problems and designing public policies to reduce cigarette consumption has been emphasised in every period and society. Studies have repeatedly suggested public policies to reduce cigarette consumption (Horn & Waingrow 1966: 21; Lewit et al., 1997: 17; Evans et al. 1999: 1). Table 2 shows total excise duties on tobacco products in Turkey from 2011 to 2019, which reached 36% in the first three quarters of 2019. In other words, approximately two-fifths of total excise duty comes from taxes on tobacco products, increasing from 0.61% in 2011 to 0.78% in 2019. Figure 1 shows this recent increase more clearly.

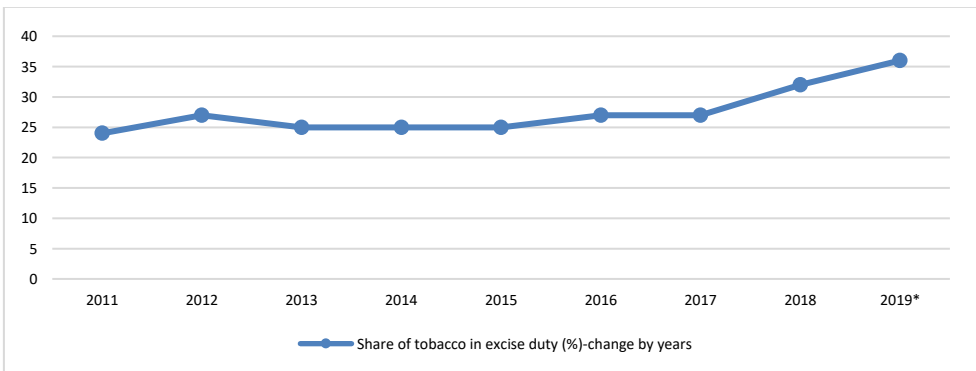
Table: 2
Excise Duties on Tobacco Products in Turkey, 2011 to 2019 Third Quarter

Year	Excise Duty (Billion TRY)	Total Excise Duty (Billion TRY)	Total Tax Revenue (Billion TRY)	Share of Tobacco in Excise Duty (%)	Share of Tobacco in Total Tax Revenue (%)
2011	15.8	64.9	260	24	0.61
2012	19.9	72.6	286	27	0.70
2013	21.3	86.5	334	25	0.64
2014	23.3	92.2	362	25	0.64
2015	26.9	107.2	419	25	0.64
2016	32.2	121.6	471	27	0.68
2017	37.4	139.6	550	27	0.68
2018	42.7	135.5	636	32	0.67
2019*	38.9	108	496	36	0.78

* Through third quarter.

Source: <<https://muhasebat.hmb.gov.tr/genel-yonetim-butce-istatistikleri>>, 17.05.2020.

Figure: 1
Share of Tobacco Excise Duties, 2011 through 2019 Third Quarter



Source: <<https://muhasebat.hmb.gov.tr/genel-yonetim-butce-istatistikleri>>, 17.05.2020.

Excise duties were first imposed on tobacco products in Turkey in August 2002 through ad valorem taxation based on the retail price. During this period, the tax rate was lower than in recent years. After 2005, the taxation of tobacco products was changed by introducing a specific tax and ad valorem taxation, which increased the tax burden on tobacco products. Following the amendment made under the Presidential Decision dated 13 May 2020 (no. 2537), the minimum specific tax rate increased slightly above the application on 15 August 2019. In 2020, the particular minimum tax for a single cigarette increased by 17.18%, from 0.3899 TRY on 15 August 2019 to 0.4569 TRY on 13 May 2020.

Table 3 shows changes in excise duty on cigarettes.

Table: 3
Changes in Excise Duty for Cigarettes in Turkey

Date	Ad Valorem Excise Duty (%)	Minimum Specific Tax (TRY/Pack)	Specific Tax (TRY/Pack)
01.08.2002	49.5		
08.01.2003	55.3		
26.02.2004	55.3		
09.08.2004	28		
25.07.2005	58	1.20	
29.12.2009	63	2.65	
12.10.2011	65	2.90	
01.01.2013	65.25	3.15	0.09
03.07.2013	65.25	3.23	0.0922
01.01.2014	65.25	3.75	0.13
01.07.2014	65.25	3.94	0.1366
01.01.2015	65.25	3.99	0.1866
01.07.2015	65.25	4.21	0.1968
01.01.2016	65.25	4.42	0.2468
01.07.2016	65.25	4.56	0.2546
01.12.2016	65.25	4.56	0.3246
01.01.2017	65.25	4.86	0.3246
01.07.2017	65.25	4.86	0.3246
01.07.2018	63	5.60	0.42
05.01.2019	67	0	0.42
15.08.2019	67	0.3899	0.4539
13.05.2020	67	0.4569	0.4539

Source: Çakmaklı et al., 2018; <https://www.gib.gov.tr/sites/default/files/fileadmin/mevzuatek/otv_oranlari_tum/ozeltuketimoranlari-OpenPage.htm>, 17.05.2020.

The Turkish taxation system uses ad valorem and minimum specific taxes for cigarettes. The tax amount may not be less than the tax amount calculated according to the minimum exact tax amount determined for each cigarette in a unit pack. The minimum specific tax amount helps prevent the sale of cigarettes at low prices. The retail price of the cigarette is multiplied by the ad valorem tax rate. If the result is greater than the minimum specific tax, the ad valorem tax is used. If it is lower, the minimum exact tax amount is used.

The excise duty on one pack of cigarettes is calculated by adding the specific tax determined for one box of 20 cigarettes to either the ad valorem tax amount or minimum exact tax amount, whichever is greater. The particular tax amount is calculated proportionally if the unit pack has different cigarettes. Therefore, the ad valorem tax amount is the price of cigarettes multiplied by the ad valorem tax rate. In contrast, the minimum specific tax amount is the number of cigarettes multiplied by the minimum specific tax rate.

Thus, in 2020, the excise duty on a pack of 20 cigarettes with a retail price of TRY 20.00 was TRY 13.85 (2.26 Euro), as shown in the following calculations²:

$$\text{Ad valorem tax: } \text{TRY } 20.00 * 0.67 = \text{TRY } 13.40$$

$$\text{Minimum specific tax: } 20 * 0.4569 = \text{TRY } 9.138$$

Using the most recent specific tax of 0.4539 from Table 3, the specific tax per pack of cigarettes is TRY 0.45. Because the ad valorem tax amount (TRY 13.40) is more than the minimum specific tax amount (TRY 9.138), the excise duty amount equals the ad valorem tax amount plus the specific tax amount:

$$\text{TRY } 13.40 + \text{TRY } 0.45 = \text{TRY } 13.85 \text{ (2.26 Euro)}$$

Using a retail price of TRY 30.00, the excise duty is TRY 20.55 (3.35 Euro), as shown in the following calculation (using the previous exchange rate):

$$\text{Ad valorem tax: } \text{TRY } 30.00 * 0.67 = \text{TRY } 20.10$$

$$\text{Minimum specific tax: } 20 * 0.4569 = \text{TRY } 9.138$$

Using the same specific tax of TRY 0.45, the ad valorem tax amount (TRY 20.10) is greater than the minimum specific tax amount (TRY 7.60). Therefore, the excise duty amount is the ad valorem tax amount plus the specific tax amount:

$$\text{TRY } 20.10 + \text{TRY } 0.45 = \text{TRY } 20.55 \text{ (3.35 Euro)}$$

Consequently, the increase in the minimum specific tax for a single cigarette to TRY 0.4569 on 13 May 2020 caused the minimum tax for a pack of 20 cigarettes to increase to TRY 9.138 ($20 * 0.4569$). In other words, the increase in the minimum specific tax increased the base price of relatively cheaper cigarettes sold in the market.

3.1.2. Value Added Tax

Value-added tax (VAT) is an important indirect tax for Turkey's budget revenues. This tax has been in effect since 1 January 1985, under Law No. 3065, which stipulates collections on expenditure with a share of 34% of total tax revenue for 2018. VAT is applied at three rates (1%, 8%, and 18%) for different commodity groups. By the laws on the excise duty and VAT, excise duty is calculated first, then VAT is calculated on the total amount (including excise duty). Thus, a significant criticism of this tax is that it is a tax on a tax.

In Turkey, VAT on tobacco products is subject to a special tax base, unlike other goods and services. This tax is calculated by taxpayers selling to retailers, including the economic profits of those dealers, and declared in the period in which deliveries are made

² *These equations use an indicative exchange rate of 1 Euro=TRY 6.1263, as announced by the Central Bank of Turkey at 15:30 on 02 January 2019.*

to these dealers (Value Added Tax General Application Communiqué III/A-4.4). In other words, when retailers buy cigarettes from wholesalers, the retailers pay VAT in advance on behalf of individual consumers. For a pack of cigarettes priced at TRY 20.00, the price with only the excise duty (as of 20 January 18) was TRY 16.95 (20/1.18) while the VAT was TRY 20.00 - TRY 16.95 = TRY 3.05. Thus, VAT at TRY 3.05 corresponds to 15.25% of the retail price (TRY 20.00), or 0.49 Euro³. For a pack of cigarettes priced at TRY 30.00, the cost with only the excise duty (as of 30 January 18) was TRY 25.42 (30/1.18), while the VAT was TRY 30.00 - TRY 25.42 = TRY 4.58. Thus, the VAT on TRY 4.58 corresponds to 15.25% of the retail price (TRY 30.00), or 0.74 Euro.

3.1.3. Total Tax Burden

Two separate taxes are levied on cigarettes in Turkey, namely excise duty and VAT. This is an important indicator of the excessive tax burden on cigarettes. However, even more, remarkable is that tax is also collected on the tax on cigarettes. First, excise duty is applied on cigarettes, then VAT is levied on the retail sales price, including the special consumption tax. In other words, VAT is also collected from the excise duty on cigarettes. In addition, two forms of excise duty are applied: ad valorem and specific.

Because the tax burden on cigarettes in Turkey is quite high, calculating the tax burden becomes quite complex. Continuing with the previous example, VAT of TRY 3.05 is added to a cigarette sold at TRY 20.00 (20 * 0.1525). Thus, the total tax burden on a pack of cigarettes is the excise duty (13.85) + value-added tax (3.05) = TRY 16.90, where approximately 84.5% of a pack of cigarettes selling for TRY 20.00 is paid to the state as tax. The same calculation in Euros is the excise duty (2.26) + value-added tax (0.49) = 2.75 Euro. Consider a pack of cigarettes retailing for TRY 30.00. Here, 30 * 0.1525 is used to calculate the value-added tax: excise duty (20.55) + value-added tax (4.58) = TRY 25.13. In this case, approximately 83.76% of the cost is paid to the state as a tax. The same calculation in Euro is excise duty (3.35) + value-added tax (0.74) = 4.09 Euro, where approximately 83.64% is paid to the state as a tax (the different rates for Euros and TRY are due to rounding of the resulting amounts).

In short, the above examples show that, in Turkey, where tobacco use is common, the total tax burden may fall for products with a high market price.

In addition, despite the increasing tax burden on cigarettes, cigarette consumption has not fallen, as shown in Table 4, which summarises cigarette sales in Turkey between 1925 and 2019. Instead, cigarette consumption has increased steadily.

³ These equations use an indicative exchange rate of 1 Euro = TRY 6.1263, as announced by the Central Bank of Turkey at 15:30 on 02 January 2019.

Table: 4
Cigarette Consumption in Turkey, 1925-2019

Year	Amount (Billion Pieces)	Year	Amount (Billion Pieces)	Year	Amount (Billion Pieces)
1925	2.42	1991	76.50	2006	107.91
1930	7.13	1992	78.50	2007	107.45
1935	9.07	1993	88.40	2008	107.86
1940	10.07	1994	91.30	2009	107.55
1945	9.17	1995	95.80	2010	93.35
1950	15.76	1996	96.60	2011	91.22
1955	22.43	1997	101.10	2012	99.26
1960	27.13	1998	108.60	2013	91.66
1965	31.84	1999	114.40	2014	94.68
1970	39.40	2000	111.70	2015	103.21
1975	52.20	2001	111.80	2016	105.48
1980	57.00	2002	110.00	2017	106.22
1984	63.00	2003	108.16	2018	118.54
1985	63.00	2004	108.87	2019	119.75
1990	73.30	2005	106.72		

Source: <<https://www.tarimorman.gov.tr/TADB/Menu/22/Tutun-Ve-Tutun-Mamulleri-Daire-Baskanligi>>, 07.04.2020.

3.2. Tax Burden on Cigarettes in European Countries

Both EU countries and Turkey impose high taxes on cigarettes. In the 1970s, EU member states harmonised tax rates and taxation structures for cigarettes to allow free movement and fair competition. Previously, EU members had applied significantly different rates and taxation structures to tobacco products. Under this framework, a minimum excise tax on cigarettes is applied to harmonise tax rates. At the same time, both the European Union and member states can set higher rates according to their national needs. The minimum amount includes both specific and ad valorem elements. The 2011 European Union Council Directive specifies the minimum and maximum amounts (between 7.5% and 76.5% of the total tax burden, expressed as a fixed amount per 1,000 cigarettes) that member countries must apply to cigarettes. The minimum must include an ad valorem tax, expressed as a percentage of the maximum retail price⁴. Additionally, the total excise duty must be at least 90 Euro per 1,000 cigarettes, while the weighted average should be at least 60% of the retail price. However, member states with an excise duty of 115 Euro or more are exempt from the 60% criteria.

EU members must also apply VAT to cigarettes, though they do not have to use any other tax VAT and excise duty on processed tobacco. Specific and ad valorem tax rates are the same for imported and domestic cigarettes. As in Turkey, the minimum excise duty on cigarettes in EU countries consists of the specific tax per product, the ad valorem tax on the retail price, and VAT⁵ (Bouw 2017:13). Table 5 shows an example of taxation for a pack of 20 cigarettes.

⁴ <https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-tobacco_en>, 04.10.2020.

⁵ <<https://taxfoundation.org/cigarette-tax-europe-2019>>, 25.04.2020.

Table: 5
Sample Taxation for A Pack of 20 Cigarettes in the EU

Base Retail Price	EUR 0.7
+ Excise duty specific	EUR 1.0
+ excise duty ad valorem	EUR 0.8 (27% of the retail price)
= Total excise duty	EUR 1.8 (60% of the retail price)
= Total excise price	EUR 2.5
+ 20% VAT	EUR 0.5
= Retail price	EUR 3.0

Source: <https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-tobacco_en>, 30.04.2020.

EU legislation only sets harmonised minimum rates so that members can apply higher excise duty rates based on their needs. For example, some regions, such as Azores and Madeira in Portugal, have lower rates (European Commission, 2020: 72).

3.3. Comparison of Total Tax Burden and Consumption in Europe and Turkey

This section compares total tax burdens and consumption in European countries and Turkey in Table 6.

Table: 6
Total Tax Burden on Cigarettes in Europe and Turkey as of 1 January 2020

Country	Specific Excise Duty % WAP*	Ad Valorem Excise Duty % TIRSP**	VAT %	VAT % TIRSP	Total Excise Duty % WAP*	Total Excise Duty + VAT % WAP
Finland	18.1	52	24	19.35	70.1	89.46
Estonia	40.27	30	20	16.66	70.27	86.93
Ireland	57.38	8.91	23	18.69	66.29	84.99
Greece	39.13	26	24	19.35	65.13	84.48
France	14.47	52.7	20	16.66	67.17	83.84
England	50.01	16.5	20	16.66	66.51	83.17
Poland	32.32	32.05	23	18.69	64.37	83.07
Czechia	35.33	30	21	17.35	65.33	82.69
Bulgaria	40.74	25	20	16.66	65.74	82.41
Latvia	43.89	20	21	17.35	63.89	81.25
Slovenia	39.91	21.87	22	18.03	61.78	79.82
Spain	10.86	51	21	17.35	61.86	79.21
Croatia	25.13	34	25	20	59.13	79.13
Hungary	34.64	23	27	21.25	57.64	78.9
Belgium	21.25	40.04	21	17.35	61.29	78.65
Malta	39.78	23.4	18	15.25	63.18	78.43
Netherlands	55.57	5	21	17.35	60.57	77.92
Denmark	56.9	1	25	20	57.9	77.9
Italy	8.56	51.23	22	18.03	59.8	77.83
Lithuania	34.87	25	21	17.35	59.87	77.22
Slovakia	37.52	23	20	16.66	60.52	77.19
Austria	22.94	37.5	20	16.66	60.44	77.11
Romania	46	14	19	15.96	60	75.96
Portugal	41.7	15	23	18.69	56.7	75.39
Cyprus	25.11	34	19	15.96	59.11	75.08
Sweden	53.71	1	25	20	54.71	74.71
Germany	32.57	21.69	19	15.96	54.26	70.22
Luxembourg	8.11	46.65	17	14.52	54.76	69.28
Turkey***	1.5	67	18	15.26	68.5	83.76

* WAP: weighted average price; ** TIRSP: tax-inclusive retail selling price; *** calculations for Turkey show the tax burden calculated on cigarettes sold at an average TRY 30.00 (4.89 Euro) per pack. As cigarette prices change, the total tax burden changes. The tax burden on cigarettes in countries outside Turkey was created using <http://ec.europa.eu/taxation_customs/tdb/advSearchForm.html>, 25.04.2020.

Both EU countries and Turkey collect excise taxes on cigarettes as specific and ad valorem taxes. Some studies suggest that specific taxes on goods with sales control yield

more effective results than ad valorem taxes (Delipalla & O'Donnell 2001:885; Shang et al. 2019). In Turkey, the ad valorem tax of 67% has a more significant share than the specific tax rate of 1.5%, as seen in Table 6 for 2019. Table 6 also shows that EU countries have a better balance between ad valorem and specific taxation, for example, Austria (22.94 versus 37.5%) and Germany (32.57 versus 21.69%).

Table 7 shows changes in the annual average tax burden on cigarettes in 28 EU countries and Turkey between 2016 and 2020. Based on 2020 and the individual 5-year country averages, Finland has the highest tax burden, including excise duty and VAT, while Luxembourg has the lowest. The bottom line of the table shows the overall average rates for each year and the individual 5-year country averages. Turkey has a higher 5-year average (81.9%) than the EU average (79.6%).

Table: 7
Tax Burdens on Cigarettes in Turkey and European Countries, 2016-2020

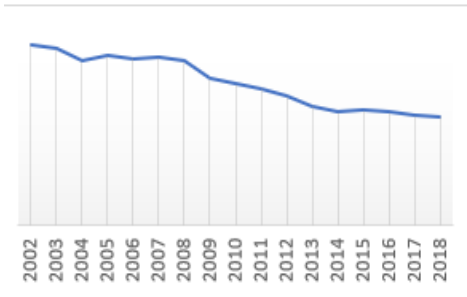
Country	2016 (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)	Average (%)
Finland	84.5	87.5	88.6	89.7	89.4	88.0
Estonia	81.0	85.8	85.8	87.6	86.9	85.4
Ireland	.	85.4	89.1	82.4	84.9	85.5
Greece	83.0	89.4	85.6	84.8	84.4	85.5
France	.	80.8	85.1	84.0	83.8	83.4
England	82.1	86.4	88.7	91.6	83.1	86.4
Poland	81.2	80.4	80.0	79.6	83.0	80.9
Czechia	79.0	78.2	78.3	76.9	82.6	79.0
Bulgaria	84.2	84.7	85.1	83.1	82.4	83.9
Latvia	80.3	83.7	83.9	83.5	81.2	82.5
Slovenia	78.4	81.3	81.2	79.8	79.8	80.1
Spain	79.2	79.5	79.2	79.2	79.2	79.3
Croatia	78.0	80.0	79.9	80.9	79.1	79.6
Hungary	75.9	75.8	75.2	77.2	78.9	76.6
Belgium	78.0	78.1	79.3	79.1	78.6	78.7
Malta	78.9	79.4	79.4	79.3	78.4	79.1
Netherlands	77.4	76.4	78.3	77.2	77.9	77.5
Denmark	78.8	79.6	79.8	78.7	77.9	79.0
Italy	76.7	77.1	77.1	77.5	77.	77.3
Lithuania	79.3	79.8	79.5	79.1	77.2	79.0
Slovakia	78.5	79.2	77.8	78.2	77.1	78.2
Austria	77.4	78.7	78.5	77.1	77.1	77.8
Romania	78.6	73.3	72.5	73.5	75.9	74.8
Portugal	78.3	79.9	76.1	76.4	75.4	77.3
Cyprus	76.1	75.5	75.	75.3	75.0	75.5
Sweden	74.0	74.7	74.2	74.0	74.7	74.3
Germany	74.4	73.5	72.49	71.37	70.2	72.4
Luxembourg	69.4	69.5	69.4	69.3	69.2	69.4
Total (%)	78.7	79.9	79.9	79.7	79.5	79.6
Turkey*	81.3	81.5	79.6	83.7	83.7	81.9

Source: <http://ec.europa.eu/taxation_customs/tedb/advSearchForm.html>, 01.03.2020.

Note: Calculations for Turkey show the tax burden calculated on cigarettes sold at an average TRY 30.00 per pack, as calculated by the authors.

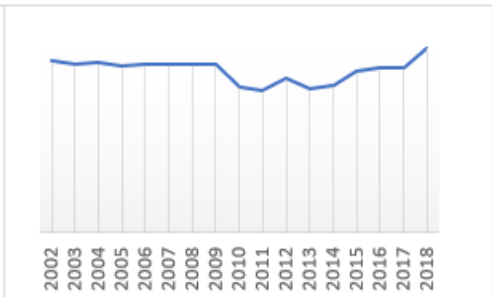
Given these high tax rates, it is helpful to assess changes in cigarette consumption. Figures 2 and 3 show changes in total cigarette consumption in EU countries⁶ and Turkey⁷ between 2002 and 2018. Total cigarette consumption in EU countries has fallen (Figure 2) but not in Turkey (Figure 3), increasing in recent years. Thus, higher taxes have not deterred smoking in Turkey, so that other measures may be needed.

Figure 2: Total Cigarette Consumption in European Countries, 2002–2018



Source: https://ec.europa.eu/taxation_customs/sites/taxation/files/docs/body/tobacco_products_releases-consumption.pdf (accessed on 17 May 2020)

Figure 3: Total Cigarette Consumption in Turkey, 2002–2018



Source: <https://www.tarimorman.gov.tr/TADB/Menu/22/Tutun-Ve-Tutun-Mamulleri-Daire-Baskanligi> (accessed on 17 May 2020)

4. Discussion and Conclusion

Taxation is one of the most important governmental tools to finance public spending and other endeavours, such as improving public health (e.g., taxing harmful products to discourage their purchase) and environmental protection (e.g., taxing non-renewable energy sources to encourage the use of environmentally friendly alternatives). Expenditure taxes, such as excise duty and VAT, have important roles in changing consumer consumption habits. However, the low-price elasticity of demand for addictive products like cigarettes, and the inconsistent outcomes of these policies, have made them controversial. This study examined the tax structure on cigarettes in Turkey by calculating the current tax burden and comparing it with similar burdens in EU countries. It also compared changes in tax burdens on cigarettes and changes in cigarette consumption in recent years. The findings align with

⁶ Annual data in Figure 2 are based on totals from 28 European countries, as discussed in Tables 6 and 7. Accordingly, the total amounts by years are as follows (numbers in parentheses show the values for a quantity in billions): 2002 (777), 2003 (761), 2004 (705), 2005 (728), 2006 (718), 2007 (722), 2008 (706), 2009 (632), 2010 (606), 2011 (590), 2012 (553), 2013 (512), 2014 (486), 2015 (493), 2016 (484), 2017 (471), and 2018 (465). Source: https://ec.europa.eu/taxation_customs/sites/taxation/files/docs/body/tobacco_products_releases-consumption.pdf, 17.05.2020.

⁷ Data in Figure 3 are based on values in Table 1. Source: <https://www.tarimorman.gov.tr/TADB/Menu/22/Tutun-Ve-Tutun-Mamulleri-Daire-Baskanligi>, 07.04.2020.

results from other studies (Uğur & Kömürçüler, 2015; Çetin & Özkan, 2018; Beşer & Aşkan, 2019), showing that taxes on cigarettes have increased government revenue in Turkey without reducing cigarette consumption. In contrast, higher taxation has correlated with falling cigarette consumption in EU countries.

Differences in excise duty's specific and ad valorem tax mix determine optimal tax rates. They can reduce cigarette consumption as differences in these rates likely affect consumption decisions. Specific taxes are considered more effective than ad valorem taxes in reducing sales (Imamura et al., 2021: 1; Delipalla & O'Donnell, 2001: 885; Shang et al., 2019: 28). Both EU member states and Turkey collect excise duty on cigarettes as specific and ad valorem taxes. However, there are significant differences in their proportions, suggesting that Turkey might more effectively reduce cigarette consumption by adopting the practice in many EU countries of gradually decreasing ad valorem taxes while increasing specific taxes. Such a policy might also reduce the injustice that the tax burden decreases as the market price of cigarettes increases.

The results also show that Turkey's latest tax regulations, enacted on 13 May 2020, slightly increased the minimum specific tax, which determines the base retail price of cigarettes (i.e., to prevent sales under a specific price). Cheaper cigarettes, which are consumed mainly by low-income populations, are also likely to have a negative impact by decreasing real incomes, thereby widening income inequality. Evaluating future regulations from such a perspective is essential for achieving the intended goals of these taxes.

In sum, Turkey imposes high taxes on cigarettes, as do many EU countries. However, whereas cigarette consumption has decreased in EU countries, it has increased in Turkey despite a rapid increase in tax rates. There may be many reasons for this difference in consumer behaviour (e.g., the prevalence of smuggling, user characteristics, tobacco industry tactics, and ineffectiveness of tobacco control policies). Future studies should investigate such aspects of cigarette consumption in Turkey to determine why increased taxes have not reduced consumption.

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Technological Innovations and Firm Internationalisation

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Teknolojik İnovasyonlar ve Firmaların Uluslararasılaşma Faaliyetleri

Abstract

This paper explores the relevance of technological innovations for the internationalisation of manufacturing firms. It differentiates between two technological innovations: eco-innovations and generic-technological innovations (i.e., intelligent manufacturing). By pooling the Flash Eurobarometer-415 and -433 surveys, we use a broad firm-level sample of 4954 European and non-European (the US and Switzerland) manufacturing firms. Applying the Heckman selection model, the findings indicate that eco-innovations positively affect the decision of the firms to internationalise whilst showing no significant impact on the level of international operations. On the other hand, generic-technological innovations positively affect both the decision and the level of global operations.

Keywords : Internationalisation, Eco-Innovation, Intelligent Manufacturing, Generic-Technological Innovations.

JEL Classification Codes : Q50, Q55, D22, F18.

Öz

Bu makale, teknolojik inovasyonların imalat firmalarının uluslararası operasyonlarına etkisini incelemektedir ve iki tür teknolojik yeniliğe odaklanmaktadır: eko-inovasyonlar ve jenerik-teknolojik yenilikler (akıllı üretim). Flash Eurobarometer-415 ve Flash Eurobarometer-433 anketlerini bir araya getirerek, 4954 adet Avrupa ve Avrupa dışı (ABD ve İsviçre) imalat firmasından oluşan firma düzeyinde geniş bir örneklem kullanılmaktadır. Ekonometrik analizlerde Heckman seçim modeli uygulanmaktadır. Bulgulara göre eko-inovasyon, firmaların uluslararasılaşma kararlarını olumlu etkilemektedir, ancak uluslararası operasyonların düzeyi üzerinde önemli bir etki göstermemektedir. Jenerik-teknolojik yenilikler ise uluslararası operasyonların hem kararını hem de seviyesini olumlu yönde etkilemektedir.

Anahtar Sözcükler : Uluslararasılaşma, Eko-İnovasyon, Akıllı Üretim, Jenerik-Teknolojik İnovasyon.

1. Introduction

The importance of internationalisation is well acknowledged by scholars, practitioners, and policymakers. As firms develop their exporting skills and enter international markets, they can tap into non-utilized operating capacity, improve their production efficiency, experience an improvement in competitiveness, and ensure survival and growth (Westhead et al., 2001; Matanda & Freeman, 2009; Azar & Ciabuschi, 2017). Since export operations are vital for both firms and economic prosperity, understanding what drives export performance stands as an essential area of research for both academics and policymakers (Sousa et al., 2014).

It is well established in the literature that there is a strong relationship between innovation and firm growth (Walker, 2004; Damanpour et al., 2009), and innovations bring a competitive advantage. Firms innovate as a response to changing market environments, gain early mover advantages, and operate efficiently. Innovations are accepted as the main growth strategy tools for firms willing to enter new markets (Gunday et al., 2011; Wang et al., 2008) and are claimed to improve firms' exports by increasing their productivity and new product developments (Alvarez, 2004). There are different typologies offered in the literature for the distinction between different types of innovations. The technological vs non-technological distinction is the most common one (Damanpour et al., 2009; Camisón & Villar-López, 2014). While technological innovations refer to improvements in the operating systems (i.e., product and process innovations), non-technological innovations include marketing and organisational innovations.

This paper focuses on technological innovations and their components, generic technological innovations vs eco-innovations. Technological innovations help firms rapidly adjust to technological changes in highly competitive global markets, bring more efficient production, offer new products and processes, and enhance their competitive advantage (Kafouros et al., 2008; Zahra & Covin, 1995; Gunday et al., 2011). The strong form of the Porter Hypothesis documents that firms can grow and simultaneously address environmental and growth objectives through their development of eco-innovations (Porter, 1991; Porter & Van Der Linde, 1995). Despite the volume of studies on the innovation-performance relationship, there is scarce evidence on the relationship between technological innovations (both generic ones and eco-innovations) on firm performance (Demirel & Danisman, 2019). The impact of such innovations on firm exports has received relatively less attention than other economic performance indicators such as profitability and market prices. To improve our understanding of how firms accomplish a superior export performance, we argue that it is crucial to consider technological innovations in this paper.

This study contributes to the scant literature by linking the international business and innovation literature and revealing the positive effects of generic technological innovations and eco-innovations on export performance. We pool the Flash Eurobarometer-415 and the Flash Eurobarometer-433 surveys and use a broad firm-level sample of 4954 European and non-European (the US and Switzerland) manufacturing firms. We apply the Heckman

selection model, and our findings indicate that eco-innovations positively influence the decision to internationalise. Still, we document no significant impact on the level of international operations. On the other hand, generic-technological innovations positively affect both the decision and the level of global operations. Overall, our findings reveal that technological innovations are an important first step for manufacturing firms to start international operations, both in sustainable and generic form. Generic-technological innovations are further helping to boost their level of exports.

The rest of the paper is organised as follows. Section 2 presents related literature; Section 3 provides data and methodology. Section 4 discusses the findings, and Section 5 concludes.

2. Related Literature

Innovation includes the generation and adoption of a new idea or behaviour transformed into new products or services, new process technologies, new organisational forms, or new managerial approaches (Damanpour & Aravind, 2011; Azar & Ciabuschi, 2017). It is acknowledged in the literature that innovation improves firm performance (Walker, 2004; Damanpour et al., 2009; Fazlıođlu et al., 2019; Dalgıç & Fazlıođlu, 2021) and brings a competitive advantage in international markets (Pla-Barber & Alegre, 2007; Singh, 2009). Firms innovate to respond to changing market environments, gain early mover advantages, eliminate performance gaps, operate efficiently, and respond to environmental demands. Such efforts lead to superior firm performance (Damanpour & Evan, 1984; Damanpour et al., 2009) and enhance a firm's export status (Alvarez, 2004).

The resource-based view (RBV) constitutes a theoretical background to analyse innovations and their effect on firm performance (Damanpour et al., 2009; Yang et al., 2009). According to the RBV, firms with specific capabilities gain a competitive advantage and perform better. The success of these capabilities depends on their uniqueness, value, durability, and inimitability (Amit & Schoemaker, 1993; Barney, 1986, 1991; Peteraf, 1993). A capability denotes the deployment and reconfiguration of resources to achieve better performance, and it can be either technological or non-technological innovation capability (Demirel & Kesidou, 2019). Technological innovations are achieved through capabilities that improve a firm's operating systems, production processes, and service operations, including product and process innovations. Non-technological innovations mainly impact the management systems and comprise marketing and organisational innovations.

Our interest in this paper is on technological innovations and how they impact the export performance of firms. Technological innovation capability is an important source of competitive advantage (Coombs & Bierly, 2001, 2006). Technology-based models posit that firms' quality of products and services do drive their competitive advantage. These models are based on a firm's capabilities, such as investments in new technology implementations new product and process developments (Nelson, 1993; Metcalfe, 1994). Bustos (2011), in a model of heterogeneous firms allowing for firms investing in innovations, find that they can

reduce their marginal costs and improve their technology, thereby experiencing product upgrading, lower production costs, lower prices on sales, and an increase in their exports. Technological innovation capabilities help conduct any relevant technical function within the firm, such as developing new products or services and more effective operations. It is a vital determinant of firm performance (Ortega, 2010; Tsai, 2004). However, a growing literature documents that it is not always possible for firms to reap benefits from innovations. The impact of innovation on firm growth is observed to be conditional on certain firm-level factors (Coad et al., 2016), specific innovation strategies (Coad & Rao, 2008), and the industry structure (Mazzucato & Parris, 2015). Nevertheless, in this paper, we expect to observe a positive impact of generic technological innovations on export performance (both the decision to export and the level of exports) in line with the view above that they spur competitiveness of firms and impact firm exports positively.

Regarding the influence of eco-innovations on firm performance, there has been a debate on the impact of environmental regulations on competitiveness. Two hypotheses stand out in the environmental economics literature: the pollution haven hypothesis (PHH) and the Porter hypothesis (PH). PHH takes environmental policies as a constraint to factor endowment in the Heckscher-Ohlin theoretical framework. It argues that firms face higher production costs under more stringent environmental policies, which deteriorates the international competitiveness and leads dirty industries to delocalised towards countries with less stringent environmental regulations, causing pollution havens (Copeland & Taylor, 2004; Levinson, 2010; Levinson & Taylor, 2008). On the other hand, PH takes a dynamic approach and argues that environmental regulations cost-cutting productivity gains. They reduce or offset the regulatory costs, stimulate innovations and enable firms to obtain international leadership in technology (Porter and van der Linde 1995; van den Bergh et al., 2000; Wagner, 2007). Regulations adjust the behaviour of firms at the frontier of efficiency. They create a favourable environment for green product demand, scarce resources are priced, and thereby unexploited technologies are generated (Wagner, 2007). Environmental focus brings more investment in developing cleaner technologies and generates input savings that offset compliance costs and improve export performance.

Empirical evidence regarding the influence of eco-innovations on firm growth is ambiguous. In line with the abovementioned economics of innovation literature, eco-innovation literature documents that it is not always likely to capture economic gains from eco-innovations (Stucki et al., 2018). These studies find that the positive impact is contingent on specific firm or innovation characteristics, and some of the studies show insignificant or negative results (Filbeck & Gorman, 2004; Rexhäuser & Rammer, 2014; Popp, 2005). Other studies support the positive effects of environmental and innovation strategies on firm performance. Costantini and Mazzanti (2012) find support for PH for the EU15 countries over the 1996-2007 period and see that green exports are flourished under environmental policies and environmental innovation efforts. They state that when complemented by relevant public policies and firm-level innovation efforts, the environmental protection activities of firms turn into a net benefit instead of "cost" through the efficiency gains in the

production stage. Since the findings are mixed in the literature, we do not have a priori expectation of eco-innovations impact on firm exports.

3. Data and Methodology

3.1. Data and Variables

This paper uses a unique data source by pooling the two recent Eurobarometer surveys: Flash Eurobarometer-415 on 'The Innovation Trends at EU Enterprises' and Flash Eurobarometer-433 on 'EU business innovation trends'. These two surveys cover the same questions but are conducted on anonymous and unmergeable firms. These surveys have been requested by the European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship, and SMEs. Flash Eurobarometer-415 was conducted in 2015 and Flash Eurobarometer-433 in 2016. The two surveys cover more than 25,000 enterprises, employing one or more persons (excluding the owner) from various sectors and are conducted in 28 European Union and two non-European (the US and Switzerland) countries. The firms that participated in the surveys include small and medium enterprises (SMEs) (with the number of employees fewer than 250) and larger firms. The selected respondents are general managers, financial directors, or significant owners. Our focus is on manufacturing firms, consisting of 4954 firms from 30 countries, when generating our sample. The manufacturing sector was selected because the survey questions for our variables of interest were directed only to manufacturing firms. All interviews were carried out through phones using the TNS e-call centre. Table 1 presents the country breakdown of the sample. The highest number of firms is in Switzerland (248), and the lowest is in Malta (82).

Table: 1
Country Breakdown

Country	Number of firms	% of total	Country	Number of firms	% of total
Austria	180	3.63	Latvia	153	3.09
Belgium	145	2.93	Lithuania	161	3.25
Bulgaria	171	3.45	Luxembourg	31	0.63
Croatia	191	3.86	Malta	82	1.66
Cyprus	92	1.86	The Netherlands	129	2.6
Czech Republic	205	4.14	Poland	207	4.18
Denmark	171	3.45	Portugal	173	3.49
Estonia	189	3.82	Romania	213	4.3
Finland	150	3.03	Slovakia	210	4.24
France	158	3.19	Slovenia	243	4.91
Germany	165	3.33	Spain	150	3.03
Greece	177	3.57	Sweden	159	3.21
Hungary	211	4.26	Switzerland	248	5.01
Ireland	127	2.56	The UK	167	3.37
Italy	176	3.55	The USA	120	2.42
			Total	4954	100

Note: This table presents the country breakdown of the sample.

Table 2 presents a brief description of the variables used in our analysis. The dependent variable is firm internationalisation (INT LEVEL), a continuous variable calculated as the share of turnover from sales outside their own country. Table 3 presents the descriptive statistics, and we observe that, on average, the share of sales revenue from

international markets is 31% in our sample. We use an alternative internationalisation variable, INT DUMMY, generated as an indicator variable that equals 1 for firms with sales abroad; 0 otherwise. On average, 58% of the firms in our sample have sales abroad.

The first independent variable of interest is eco-innovation (EI) which takes a value of 1 if the company has implemented sustainable manufacturing technologies or planning to adopt them in the next year; 0 otherwise. Sustainable manufacturing technologies cover the technologies that use energy and materials more efficiently and help diminish emissions. Table 3 shows that, on average, 38% of the firms in our sample either implement or plan to implement eco-innovations. For robustness, we generate an alternative eco-innovation variable by excluding the firms with plans for implementation and including only those who have already adopted one. We call this variable EI V2 equals one if they have already adopted sustainable manufacturing technologies, 0 otherwise. On average, 31% of the firms in our sample have already implemented eco-innovations.

Table: 2
Variables

Dependent variable	Description
Internationalisation level (INT LEVEL)	The share of turnover from sales outside their own country.
Internationalisation Dummy (INT DUMMY)	Equals one if the company sells products or services outside their home country; 0 otherwise.
Independent variables	
Eco-innovation (EI)	Takes a value of 1 if the company has adopted or planning to adopt sustainable manufacturing technologies in the next year; 0 otherwise. Sustainable manufacturing technologies cover the technologies which use energy and materials more efficiently and reduce emissions.
Eco-innovation (EI V2)	Takes a value of 1 if the company has already adopted sustainable manufacturing technologies; 0 otherwise.
Technological innovation (TECH INV)	Equals one if the firm has implemented or planning to implement the following technologies in the next 12 months; 0 otherwise: ICT-enabled intelligent manufacturing or high-performance manufacturing.
Technological innovation (TECH INV V2)	Equals one if the firm has already implemented the following technologies, 0 otherwise: ICT-enabled intelligent manufacturing or high-performance manufacturing.
Technological innovation (TECH INV IM)	Equals one if the firm has implemented or planning to implement ICT-enabled intelligent manufacturing (IM) in the next 12 months; 0 otherwise.
Technological innovation (TECH INV HP)	Equals one if the firm has implemented or planning to implement high-performance manufacturing (such as high precision machine tools, advanced sensors, and 3D printers) in the next 12 months; 0 otherwise.
Size (SIZE)	The natural logarithm of the number of employees
Firm age (YOUNG)	Equals one if the company is young, i.e., less than five years old; 0 otherwise.
Part of a group (GROUP)	Takes a value of 1 if the firm belongs to a group; 0 otherwise.
M&A activity (M&A)	Equals one if the firm has participated in a merger and acquisition (M&A) in the last three years and 0 otherwise.
R&D intensity (RD)	Equals 1 if the firm has invested more than 5% of their turnover in R&D in the last three years, 0 otherwise.
Firm growth (GROWTH)	Takes a value of 1 for firms with turnover growth of more than 5%; 0 otherwise.
Design importance (DESIGN IMP)	Takes a value of 1 for firms with design as a central element in their company strategy; 0 otherwise.
Market testing (MARKET TEST)	It is a proxy for public support for market testing. It equals 1 when firms think that market testing of a product or service before launch would have the most positive impact on their company as public support for commercialisation of their innovative goods or services; 0 otherwise.

Note: This table shows the list of variables used in the analysis and their brief descriptions.

Table: 3
Descriptive Statistics

Variable	Obs.	Mean	Min	Max	Stand. Dev.	Median
INT LEVEL	4954	0.31	0	1	0.37	0.1
INT DUMMY	4954	0.58	0	1	0.49	1
EI	4954	0.38	0	1	0.49	0
EI V2	4954	0.31	0	1	0.46	0
TECH INV	4954	0.45	0	1	0.50	0
TECH INV V2	4954	0.37	0	1	0.48	0
TECH INV IM	4954	0.26	0	1	0.44	0
TECH INV HP	4954	0.35	0	1	0.48	0
RD	4954	0.13	0	1	0.33	0
DESIGN IMP	4954	0.17	0	1	0.38	0
SIZE	4954	3.62	0	11.51	1.74	3.58
YOUNG	4954	0.08	0	1	0.27	0
GROUP	4954	0.31	0	1	0.46	0
M&A	4954	0.13	0	1	0.33	0
GROWTH	4954	0.41	0	1	0.49	0
MARKET TEST	4954	0.10	0	1	0.30	0

Note: The table shows summary statistics for the variables.

The second independent variable of interest is generic technological innovations (TECH INV), which takes a value of 1 if the firm has implemented or planning to implement ICT-enabled intelligent manufacturing or high-performance manufacturing in the next 12 months, 0 otherwise. ICT-enabled intelligent manufacturing involves technologies that digitalise the production process. High-performance manufacturing includes technologies that combine precision, flexibility, and zero-defect, such as high precision machine tools, advanced sensors, and 3D printers. For robustness checks, we generate an alternative variable TECH INV V2, which equals one if the firms have already adopted these technological innovations; and we do not consider the ones that are planning to adopt. Besides, we decompose the variable TECH INV into its two components, TECH INV IM and TECH INV HP. TECH INV IM equals one if the firm has implemented or planning to implement only ICT-enabled intelligent manufacturing, 0 otherwise. TECH INV HP takes a value of 1 if the firm has implemented or planning to implement only high-performance manufacturing. Table 3 shows that, on average, 45% of the firms in our sample either implement or intend to implement generic technological innovations (TECH INV). 37% have already adopted generic technological innovations (TECH INV V2), 26% either implement or plan to implement intelligent manufacturing (TECH INV IM). Finally, 35% either implement or intend to implement high-performance manufacturing (TECH INV HP).

We control for some firm characteristics, which are well-accepted determinants of internationalisation and firm performance in the literature (Cassiman & Golovko, 2011; Ganotakis & Love, 2011; Azar & Ciabuschi, 2017; Demirel & Danisman, 2019). These include firm size (SIZE), which is the natural logarithm of the number of employees; firm age (YOUNG), coded as equals one if the company is young, i.e., less than five years old; group firms (GROUP), which takes a value of one if the firm belongs to a group. Besides, we use control variables for M&A activity which equals one if the firm has participated in a merger and acquisition (M&A) in the last three years and 0; otherwise, firm growth (GROWTH) equals one for firms with turnover growth more than 5%. Finally, we control for R&D investment (RD), which equals one if the firm has invested more than 5% of their

turnover in R&D in the last three years, and Design importance (DESIGN_IMP), which is equal to 1 for firms, which state that design is a central element in their company strategy (Danisman, 2022). The survey questions indicate that design covers "a range of applications within companies, providing means to integrate functionality, appearance and user experience, for goods and services. Design can also provide a means to build corporate identity and brand recognition". Table 3 shows that, on average, 8% of the firms are young (YOUNG), 31% belong to a group, 13% have participated in M&As, 41% have turnover growth of more than 5%, 13% of them invest more than 5% of their turnover in R&D activities; and 17% think that design is a core component of their overall strategy.

Finally, we use the variable market testing (MARKET_TEST) to identify the selection equation. MARKET_TEST is a proxy for public support. It equals 1 when firms perceive that market testing of a product or service before launch would have the most positive impact as public support for commercialisation of their innovative goods or services; 0 otherwise. Market testing opportunities from the public are not directly expected to affect internationalisation. Still, it would affect the initial decision to enter international markets and, therefore, be excluded from the outcome equation. On average, 10% of the firms in the sample believe that market testing would positively impact the commercialisation of innovative goods and services (see Table 3).

Table 4 displays the correlation coefficients among the variables and shows no major collinearity problems.

3.2. Methodology

As Table 3 shows, our dependent variable INT LEVEL is left-censored, with a median of 0.1 and a lower zero threshold. Therefore, the analysis cannot be estimated with an OLS regression, which would bring inconsistent estimations of the coefficients due to selection bias and truncation (Amemiya, 1985). We resolve this problem by utilising a two-step Maximum Likelihood Heckman model (Heckman, 1979). First, a selection equation is estimated, and then the outcome equation adjusts for selection bias (Greene, 2003). Therefore, we can distinguish between the factors that affect the decision of the firm to internationalise; and those that affect the level of internationalisation. Country fixed effects with robust standard errors are used.

The outcome equation is as follows:

$$INT\ LEVEL_i = Z_i' \beta_i + \varepsilon_i \quad (1)$$

where INT LEVEL is the level of internationalisation, explained by the vector Z and a random error term ε . The vector Z includes the control variables described above. However, the dependent variable, INT LEVEL, is not always observed. It is observed if the below selection equation is greater than zero:

$$INT\ DUMMY_i^* = Z_i' \alpha + MARKET_TEST_i + \varepsilon_i > 0 \quad (2)$$

where the selection equation shows whether or not the firm internationalizes.

INT DUMMY indicates the internationalisation propensity, explained by the vector Z and a random error term ε . As stated; we have an additional variable for identification, MARKET_TEST.

Table: 4
Correlation Table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) INT LEVEL	1							
(2) INT DUMMY	0.6982*	1						
(3) EI	0.0989*	0.1043*	1					
(4) EI V2	0.1019*	0.0979*	0.8497*	1				
(5) TECH INV	0.1782*	0.1948*	0.2544*	0.1987*	1			
(6) TECH INV V2	0.1786*	0.1761*	0.1987*	0.1440*	0.8415*	1		
(7) TECH INV IM	0.0983*	0.1246*	0.2633*	0.2217*	0.6517*	0.6182*	1	
(8) TECH INV HP	0.1839*	0.1919*	0.2399*	0.1945*	0.8050*	0.7032*	0.3135*	1
(9) RD	0.0982*	0.1193*	0.0761*	0.0620*	0.1146*	0.1026*	0.0701*	0.1177*
(10) DESIGN IMP	-0.016	-0.0188	0.0384*	0.0335*	0.0540*	0.0620*	0.0768*	0.0444*
(11) SIZE	0.3261*	0.2781*	0.1917*	0.1937*	0.1982*	0.1856*	0.1455*	0.1683*
(12) YOUNG	-0.0628*	-0.0740*	-0.0303*	-0.0263	-0.0076	-0.0101	0.0007	-0.0177
(13) GROUP	0.2750*	0.2104*	0.1092*	0.1237*	0.1210*	0.1184*	0.0998*	0.1067*
(14) M&A	0.0876*	0.0746*	0.0746*	0.0766*	0.0652*	0.0822*	0.0683*	0.0483*
(15) GROWTH	0.1312*	0.1456*	0.0702*	0.0775*	0.1073*	0.1003*	0.0552*	0.1151*
(16) MARKET TEST	0.0322*	0.0473*	0.0729*	0.0623*	0.0795*	0.0807*	0.0441*	0.0719*
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(9) RD	1							
(10) DESIGN IMP	0.0982*	1						
(11) SIZE	0.0672*	0.0332*	1					
(12) YOUNG	-0.0138	-0.0211	-0.1275*	1				
(13) GROUP	0.0666*	0.0477*	0.4123*	-0.0535*	1			
(14) M&A	0.0562*	0.0338*	0.2009*	0.0012	0.2074*	1		
(15) GROWTH	0.0801*	0.0373*	0.0742*	0.0433*	0.0818*	0.0493*	1	
(16) MARKET TEST	0.0813*	0.0577*	0.0964*	-0.0173	0.0597*	0.0165	0.0222	1

* Denotes significance at the 5% level.

4. Results

Table 5 presents the findings of the Heckman selection model on the impact of eco-innovations and generic-technological innovations on firm internationalisation. We use a two-step Maximum Likelihood Heckman model where a selection and an outcome equation are estimated, the former adjusting for selection bias (Greene, 2003). This way, we can distinguish between the factors that affect the decision of the firm to internationalise and those that affect the level of internationalisation. Country fixed effects with robust standard errors are implemented. Panel A presents the regression findings using the outcome equation where the dependent variable is INT LEVEL, and Equation (1) is used. Panel B displays the findings using the selection equation, and our dependent variable is the indicator variable, decision to internationalise (INT DUMMY). We use the variable public support for market testing (MARKET TEST) to identify the selection equation. This variable is expected not to affect the level of internationalisation, but such market testing would affect the initial decision to internationalise. Thus, it can be omitted from the outcome equation. Rho and Sigma are tabulated at the bottom of the table, which are the estimated coefficients of the decomposed lambda estimation on the Inverse Mill's Ratio. We see that the estimated Rho

coefficients are not statistically significant, implying no selection bias. The reported model χ^2 test is a Wald test with a null hypothesis stating that all coefficients in the regression model are zero. The coefficients of the Wald test are all significant, showing the validity of the Heckman models.

Columns 1&2 use EI and EI V2 as proxies for the adoption to explore the influence of eco-innovations on firm growth. It is observed that eco-innovations positively and significantly improve the decision to internationalise (Panel B) but not the level of international operations (Panel A). This is in line with the PH hypothesis stating that firms can grow out of their eco-innovation efforts, and at the same time, they can address environmental and economic goals (Porter & Van Der Linde, 1995). Eco-innovations generate win-win outcomes and help the firms to take the initial decision to internationalise. Once the initial decision is taken, however, they do not significantly determine the level of international operations.

Columns 3-6 explore the impact of generic-technological innovations on firm internationalisation. Column 3 uses TECH INV as a proxy, and Column 4 uses an alternative for robustness, TECH INV V2. TECH INV is an indicator variable and shows whether firms implement or plan to implement ICT-enabled intelligent manufacturing or high-performance manufacturing. TECH INV V2 considers only the case if firms have already implemented these technologies, and those which plan to use such technologies are not considered. Columns 5 and 6 decompose into the two components, TECH INV IM and TECH INV HP. It is observed from Table 5 Columns 3&4 Panels A&B that generic-technological innovations significantly increase both the decision and the level of international operations. Columns 5&6 show that it is mainly the high-performance manufacturing component (TECH INV HP) that increases both the decision to internationalise and its level. This is in line with the view that technological innovation capabilities help to develop new products or services, expand more effective operations, and act as strategic tools for firms willing to enter new markets or boost their international operations (Gunday et al., 2011; Wang et al., 2008; Ortega, 2010; Tsai, 2004).

The influence of control variables on internationalisation is in line with expectations (Cassiman & Golovko, 2011; Ganotakis & Love, 2011; Azar & Ciabuschi, 2017; Demirel & Danisman, 2019). R&D investments are positively and significantly associated with both the decision and the level of internationalisation. Larger firms are more likely to internationalise (both the decision and the level) than smaller firms. Firm age is negatively and significantly associated with internationalising, but not the level. Group firms are more likely to internationalise in terms of the decision to do so and its level. And finally, growing firms tend to internationalise more (both at the decision and the level).

Table: 5
Effect of Eco-innovations and Technological Innovations on Internationalisation

	(1) EI	(2) EI V2	(3) TECH INV	(4) TECH INV V2	(5) TECH INV IM	(6) TECH INV HP
Panel A: Outcome Equation - Dependent variable: INT LEVEL						
EI	-0.005 (0.01)	0.001 (0.01)				
TECH INV			0.022* (0.01)	0.040*** (0.01)		
TECH INV IM					-0.004 (0.01)	
TECH INV HP						0.033*** (0.01)
RD	0.046*** (0.02)	0.046*** (0.02)	0.044*** (0.02)	0.044*** (0.02)	0.047*** (0.02)	0.043*** (0.02)
DESIGN IMP	0.001 (0.02)	0.001 (0.02)	0.000 (0.02)	-0.000 (0.02)	0.001 (0.02)	0.001 (0.02)
SIZE	0.052*** (0.00)	0.051*** (0.00)	0.050*** (0.00)	0.050*** (0.00)	0.052*** (0.00)	0.050*** (0.00)
YOUNG	-0.022 (0.03)	-0.021 (0.03)	-0.022 (0.03)	-0.023 (0.03)	-0.022 (0.03)	-0.023 (0.03)
GROUP	0.096*** (0.01)	0.096*** (0.01)	0.096*** (0.01)	0.096*** (0.01)	0.095*** (0.01)	0.095*** (0.01)
M&A	0.003 (0.02)	0.003 (0.02)	0.003 (0.02)	0.002 (0.02)	0.003 (0.02)	0.004 (0.02)
GROWTH	0.029** (0.01)	0.028** (0.01)	0.027** (0.01)	0.026** (0.01)	0.029** (0.01)	0.027** (0.01)
Constant	0.058 (0.04)	0.060 (0.04)	0.050 (0.04)	0.046 (0.04)	0.053 (0.04)	0.049 (0.04)
Panel B: Selection Equation- Dependent variable: INT DUMMY						
EI	0.102** (0.04)	0.084* (0.04)				
TECH INV			0.334*** (0.04)	0.318*** (0.04)		
TECH INV INTELLIGENT					0.235*** (0.05)	
TECH INV HP						0.374*** (0.04)
RD	0.447*** (0.06)	0.451*** (0.06)	0.413*** (0.06)	0.423*** (0.06)	0.441*** (0.06)	0.407*** (0.06)
DESIGN IMP	-0.061 (0.05)	-0.060 (0.05)	-0.078 (0.05)	-0.079 (0.05)	-0.074 (0.05)	-0.074 (0.05)
SIZE	0.177*** (0.01)	0.178*** (0.01)	0.168*** (0.01)	0.171*** (0.01)	0.175*** (0.01)	0.171*** (0.01)
YOUNG	-0.231*** (0.07)	-0.232*** (0.07)	-0.244*** (0.07)	-0.240*** (0.07)	-0.241*** (0.07)	-0.234*** (0.07)
GROUP	0.252*** (0.05)	0.252*** (0.05)	0.247*** (0.05)	0.247*** (0.05)	0.250*** (0.05)	0.249*** (0.05)
M&A	0.018 (0.06)	0.020 (0.06)	0.012 (0.06)	0.006 (0.06)	0.014 (0.06)	0.016 (0.06)
GROWTH	0.292*** (0.04)	0.292*** (0.04)	0.275*** (0.04)	0.280*** (0.04)	0.292*** (0.04)	0.270*** (0.04)
MARKET TEST	0.058 (0.07)	0.061 (0.07)	0.038 (0.07)	0.041 (0.07)	0.059 (0.07)	0.039 (0.07)
Constant	-0.718*** (0.11)	-0.710*** (0.11)	-0.770*** (0.11)	-0.744*** (0.11)	-0.723*** (0.11)	-0.768*** (0.11)
Rho	0.114 (0.06)	0.106 (0.06)	0.117 (0.06)	0.132 (0.05)	0.125 (0.06)	0.119 (0.05)
Sigma	0.319 (0.00)	0.319 (0.00)	0.319 (0.01)	0.319 (0.01)	0.320 (0.01)	0.319 (0.01)
Observations	4954	4954	4954	4954	4954	4954
Wald test Chi-Square	3.78***	3.09***	4.43***	6.13***	4.83***	4.74***
Log-pseudo likelihood	-3739.022	-3740.463	-3705.675	-3708.347	-3728.464	-3699.519

Note: This table presents the findings of the Heckman selection model on the impact of eco-innovations and generic-technological innovations on firm internationalisation. Panel A presents the regression findings using the outcome equation where the dependent variable is INT LEVEL. Panel B displays the findings using the selection equation, and our dependent variable is the indicator variable, decision to internationalise (INT DUMMY). Columns 1&2 use EI and EI V2 as proxies of eco-innovation. Columns 3&4 use TECH INV and TECH INV V2 as proxies of generic technological innovations. Columns 5 and 6 decomposes into the two components, TECH INV IM and TECH INV HP. Standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01

Overall, our findings indicate that technological innovations, whether in the eco-innovations or generic form, are crucial for firms to implement a decision to internationalise. Generic-technological innovations are further helpful for manufacturing firms to enhance international operations.

5. Conclusions

This study contributes to the scant literature by bringing together the international business and innovation literature and generating new evidence regarding the mechanisms of how different types of technological innovations may improve global operations. We classify technological innovations into generic- and eco-innovations. Using the Flash Eurobarometer-415 and the Flash Eurobarometer-433 surveys and a firm-level sample of 4954 European and non-European (the US and Switzerland) manufacturing firms, we apply the Heckman selection model to investigate this relationship. Our findings show that technological innovations, both in the sustainable and generic form, are significantly and positively associated with internationalisation. Generic-technological innovations further boost the level of international operations.

Our findings have important implications for firms that want to enter new markets or expand their international operations. We document that it is beneficial for such firms to focus on technological innovations in the form of generic and sustainable innovations. Our study calls for policy interventions that could ensure that firms with environmental innovations have the necessary resources and capabilities. Especially smaller and younger firms that lack the necessary skills and access to finance need to be supported more for their eco-innovation efforts, which would help them go into international markets.

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Do International Agricultural Commodity Prices Have an Effect on the Stock Market Index? A Comparative Analysis Between Poland and Turkey

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Uluslararası Tarımsal Emtia Fiyatlarının Borsa Endeksi Üzerinde Etkisi Var mıdır? Polonya ve Türkiye Arasında Karşılaştırmalı Bir Analiz

Abstract

This study analysed the effects of international wheat, rice, sugar, and beef prices on Turkish and Polish stock exchange markets through the quantile regression and cointegration regressions methods from December 2008-November 2020. As a result of the analysis, it cannot be said that agricultural commodities do not affect stock market indices. Also, empirical evidence suggests that the impact of agricultural commodities on the Turkish stock market is more significant than on the Polish stock market. This may be because Poland's economic ecosystem is more industrialised than Turkey's. Further, these findings indicate that agricultural commodities have both similar and different effects on the stock market indices of these two countries.

Keywords : Agricultural Commodity, Stock Market Index, Quantile Regression.

JEL Classification Codes : Q14, G10, C30.

Öz

Bu çalışmada, uluslararası buğday, pirinç, şeker ve sığır eti fiyatlarının Türkiye ve Polonya borsalarına etkileri kantil regresyon ve eşbütünleşme regresyonları yöntemleri ile Aralık 2008-Kasım 2020 dönemi için analiz edilmiştir. Analizler sonucunda tarımsal emtiaların borsa endeksleri üzerinde hiçbir etkisinin olmadığı söylenemez. Ayrıca amprik kanıtlar, tarımsal emtiaların Türkiye borsası üzerindeki etkisinin Polonya borsasına göre daha fazla olduğunu göstermektedir. Bunun nedeni Polonya'nın ekonomik ekosisteminin Türkiye'den daha fazla sanayileşmiş olması olabilir. Ayrıca, bu bulgular tarımsal emtiaların bu iki ülkenin borsa endeksleri üzerinde hem benzer hem de farklı etkileri olduğunu göstermektedir.

Anahtar Sözcükler : Tarımsal Emtia, Borsa Endeksi, Kantil Regresyon.

1. Introduction

Billions of people rely on agricultural products as their primary food source. Agricultural products are also used as raw materials and semi-finished products. Besides this significant role, the farm industry also provides considerable employment worldwide.

According to the U.N. (2019) report, the world population is expected to reach 9.8 billion in 2050 and 11.2 billion in 2100, a major food problem. In addition, the enrichment of the countries and thus their citizens and the increase in their welfare levels is another factor that can increase the demand for agricultural products. Global warming (FAO, 2017: 61; Jiang et al., 2020: 197), depletion of water resources (Hashemi, 2015: 308), climate change (El-Beltagy & Madkour, 2012: 1-2), a decline in arable land (Gomiero, 2016: 4) and rural-to-urban migration (Satterthwaite et al., 2010: 2814) can have a negative impact on the cultivation and collection of agricultural products. Global imbalances likely to arise in the supply of and demand for farm products can cause a severe increase in the prices of farm products. In this respect, the international prices of agricultural products, which are called the strategic products of the future, have the potential to have significant effects on the economies and financial markets of the countries. The impact of agricultural commodities on the stock markets can be realised through two channels, direct and indirect. Accordingly, increases or decreases in agricultural commodity prices may cause an increase or decrease in the income of enterprises engaged in agricultural production or marketing listed on the stock exchange, which may directly affect the stock market performance of the relevant enterprises. Secondly, increases or decreases in agricultural commodity prices affect the economic indicators of countries, such as exports, imports, employment, and inflation. Positive/negative developments in macroeconomic indicators arising from these commodities may indirectly cause increases or decreases in the stock market index.

This study examines the behaviour of the stock market index by considering international agricultural commodity prices. Accordingly, the study's first aim is to model the impact of international agricultural commodity prices on the stock market index. Hence, international wheat, rice, sugar, and beef prices are included in analyses as explanatory variables. Previous scientific studies examined the interaction between the stock market index and wheat, sugar, and cotton prices. There is scarcely any study that takes beef prices to handle. This aspect adds an original dimension to the study by including the beef price variable in the analysis. There are several reasons for choosing these agricultural products. First of all, crops such as rice and wheat (Siwar et al., 2014; Dawe, 2010), which are at the forefront of fighting hunger and poverty in the world, play an important role in solving the problem of food and nutrition security (Sahu et al., 2015). Today, wheat is the most widely grown crop globally, on more than 218 million hectares. Its trade in the world exceeds any other crop. Wheat occupies a central place in human nutrition, providing 20% of daily protein and food calories (Giraldo et al., 2019). While Poland ranks 10th among exporting countries with 1 billion dollars of wheat export in 2020, Turkey ranks 3rd among importing countries with 2.3 billion dollars of imports as of the same year. Rice is the second most widely grown cereal crop and is the staple food for more than half of the world's population

(Bandumula, 2018; Siwar et al., 2014). In addition, rice is the main source of employment and livelihood for one-fifth of the world's population, or more than one billion households in Asia, Africa, and the Americas (Gadal et al., 2019). Poland and Turkey are net importers of rice. Sugar produced from sugar beet and sugar cane is an important agricultural product used directly or indirectly as a sweetener in food and beverages and bioenergy production. The European Union ranks 3rd in sugar production globally, and Poland ranks 3rd in sugar beet production after France and Germany as of 2019 (Vladu et al., 2021). Emphasising the economic, social, and environmental importance of sugar production for Poland (Hyrzsko & Szajner, 2017), they stated that the sugar industry is a strategic part of the food economy. In Turkey, as of 2019, sugar imports are higher than its exports, and Poland ranks 3rd among the countries from which sugar imports (metric tons) (USDA, 2019). On the other hand, beef is the most important source of animal protein in Turkey. Domestic red meat production has remained insufficient due to the increasing population and number of tourists. Turkey imports this deficit in live cattle and red meat, meeting 76% of its red meat imports from Poland in 2018 (Et ve Süt Kurumu, 2018). Poland is one of the important red meat exporting countries globally and in Europe. In the reports^{1,2,3}, published by international economic organisations and international finance and consultancy firms, attention is drawn to the serious economic potential of these two countries in the future. For example, in the long-term forecasts in these reports, it is estimated that Turkey will be the 12th largest economy globally with a GDP of approximately 3 trillion Dollars in 2030 and the 11th largest economy in the world with a GDP of 5.2 trillion Dollars in 2050. Similarly, it is noted that Poland will be the 26th largest economy in the world in 2030, with a GDP of 1.5 trillion dollars. These reports also state that Poland is the largest food supplier in Europe. For these reasons, it was focused on these two countries with significant historical, geopolitical, and economic potential in their regions. It was desired to reach empirical evidence about the possible effects of changes in agricultural product prices on the financial markets of these countries. The second aim is to determine which agricultural commodities have the most influence and direction on the stock markets by conducting a comparative analysis between these two countries. This study makes an important contribution to the literature. It uses conditional quantile regression and cointegration regression methods to study the effect of international agricultural commodity prices on the stock market indices of the two countries. According to the main conclusion, it cannot be said that agricultural commodity prices do not affect the stock market index. These findings are similar to the previous studies (Kotyza et al., 2021; Nguyen et al., 2020; Iyke & Ho, 2021; Boako et al., 2020; Bohl & Sulewski, 2019; Misecka et al., 2019; Chen, 2016; Girardi, 2015). In addition, the effects of agricultural commodities on the BIST100 index are more than the WIG20 index. Also, empirical evidence suggests that these effects differ significantly in size and direction. In this respect, the effect of

¹ <https://stats.oecd.org/Index.aspx?DataSetCode=EO109_LTB>, 25.05.2021.

² HSBC Global Research, *The World in 2050: Quantifying the shift in the global economy*, <https://warwick.ac.uk/fac/soc/pais/research/csgr/green/foresight/economy/2011_hsbc_the_world_in_2050_-_quantifying_the_shift_in_the_global_economy.pdf>, 25.05.2021.

³ PwC, *The long view: how will the global economic order change by 2050?*, <<https://www.pwc.com/gx/en/world-2050/assets/pwc-world-in-2050-summary-report-feb-2017.pdf>>, 25.05.2021.

agricultural products on the stock market index is not homogeneous and may vary from country to country. It can be said that the effect of agricultural commodities on the stock market is the exporter-importer status of that product, the intensity of domestic demand, and cultural factors.

The study is organised into five sections. The first theoretical section provides an overview of the relationship between agricultural commodity prices and the stock market index. The second section summarised the findings obtained from previous studies, and a literature review was done. The third section explains the empirical methodology of the response of the Polish and Turkish stock exchanges to international agricultural commodity prices. The fourth section includes the research results on the effects of farm commodities on the stock market indices of these two countries and the size and direction of these effects. The final section of the manuscript presents the results.

2. Literature Review and Hypothesis Development

A literature summary on the subject made over different periods and methods is presented in Table 1 below.

Table: 1
Summary of Empirical Studies Examining the Effects of Agricultural Commodities on Equity/Stock Market Index

Study	Period	Method	Findings
Kotzyza et al., 2021	2000 2020	Bai-Perron regression model with structural breaks	The relationship between the S&P GSCI Sugar Index and the S&P 500 VIX index, which was not significant before the 2008 global financial crisis, took a substantial and negative direction with the crisis period. In addition, no structural change was observed in the relationship between these variables during the COVID-19.
Bahloul & Khekmakhem, 2021	2007 2020	Basic statistical analysis, VAR and GARCH	There is a positive correlation between agricultural commodity indices and Islamic stock indices. A strong spillover transfer has occurred between commodities and Islamic stock indices with the pandemic process.
Nguyen et al., 2020	1988 2017	Basic statistical analysis, AFMA, and GARCH	As a result of the analysis, it was emphasised that there is a positive correlation between wheat and cotton prices and the stock market index.
Ouyang & Zhang, 2020	2006 2019	Basic statistical analysis, ARMA, and GJR-GARCH	It is stated that there is a positive correlation between wheat and cotton prices and Shanghai Stock Exchange and S&P 500 index.
Iyke & Ho, 2021	1650 2005	Basic statistical analysis, Unit root test, and ARCH	Rice has a positive effect on financial markets except for the USA, wheat has a predominantly positive impact, and meat positively affects these markets.
Mohanty & Mishra, 2020	2015 2016	OLS, Joint, and multiple variance ratio tests	It was stated that cotton oil and stock market index were negatively correlated before the merger of different stock exchanges in India in 2015 and positively related after the merger.
Liang & Ma & Li & Li, 2020	1991 2019	Basic statistical analysis, PCA, factor analysis, MSFE	It is stated that sugar, cotton, and wheat positively correlate with the S&P 500 index.
Kaur & Dhiman, 2019	2007 2017	ARDL bounds test and causality tests	It has been suggested that there is a positive relationship between wheat prices and the stock market index.
Bohl & Sulewski 2019	2006 2017	Statistical analysis, ARCH, and GARCH	A positive relationship was found between wheat prices and the S&P 500 index.
Misecka et al., 2019	2009 2015	ARDL bounds test	They found a negative relationship between wheat prices and the S&P 500 index in the short and long terms.
Main & Irwin & Sanders & Smith, 2018	1990 2014	Cost-of-carry Model	It was stated that cotton and rice have a negative effect on the risk premiums of commodity futures contracts.
Vandone & Peri & Baldi & Tanda, 2018	2001 2014	Multifactor market model, GARCH	It is seen that agricultural commodities significantly affect stock prices, and these effects change over time. It was stated that agricultural betas became positive during the 2008 crisis, and stocks were positively sensitive to changes in agricultural product prices.
Candila & Farace, 2018	1993 2018	ARCH, GARCH, VIRF	There is a positive spillover effect from sugar and wheat prices towards stock market indices in Latin American countries (5 countries).
Öztek & Öcal, 2017	1990 2012	STCC-GARCH	It was stated that there is a positive but weak correlation between the S&P AG agricultural commodity index and the S&P 500 index.

Al-Maadid & Caporale & Spagnolo, 2017	2003 2015	VAR-GARCH	Before the 2006 food crisis, wheat and sugar negatively correlated with the S&P 500 index and a positive correlation after the crisis.
Nicola & Pace & Hernandez, 2016	1970 2013	Correlation analysis, M-GARCH	It was stated that there was a positive relationship between the S&P500 index and rice, wheat, and sugar prices.
Jordan & Vivian & Wohar, 2016	1985 2011	ARDL, Principal component analysis, MSE	As a result of the study, it was stated that there is a positive interaction between wheat prices and the Canadian stock market.
Chen, 2016	1983 2013	VECM, VAR	He stated a positive relationship between wheat prices and stock prices and the stock market index.
Girardi, 2015	1986 2013	Dynamic conditional correlation analysis and ARDL Bounds test	According to the findings, there is a positive relationship between the S&P 500 index and wheat, soybean oil, rice, and sugar.
Black, Klinkowska & Mcmillan & Mcmillan, 2014	1973 2012	Basic statistical analysis, Unit root test, Cointegration tests, RMSE, MAE	It was pointed out that there was a significant and negative relationship in the first half, and there was no meaningful relationship in the last half of the analysis period between the S&P 500 and S&P GSCI index.
Sadorsky, 2014	2000 2012	VARMA-AGARCH, DCC-AGARCH	It has been stated that there is a positive relationship between stocks and wheat prices.
Mensi & Beljid & Boubaker & Managi, 2013	2000 2011	ARCH, MGARCH & VAR-GARCH	They revealed a positive correlation between wheat prices and the S&P 500 index.
Creti & Joets & Mignon, 2013	2001 2011	DCC-GARCH	It was stated that there is a positive correlation between cotton and wheat prices with the volatility of the S&P 500; however a negatively correlated relation during the 2007-2008 crisis period.

According to the information obtained from the literature summary shown above, it has been observed that the agricultural commodities considered within the scope of the research have the potential to affect the stock market index. Hypotheses developed in line with the a priori information provided by the literature review and the correlation analysis are specified in Table A1 in Appendix.

3. Methodology

This article seeks to answer the following research question: "Do international agricultural commodity prices impact the stock market index?" Accordingly, it is aimed to use a quantile regression model to investigate the effects of international prices of wheat, rice, sugar, and beef which may be the driving forces of the stock market index, at different quantiles. This model, developed by Koenker and Bassett (1978), is widely used in finance and economics letters, given its ability to reveal the skew connection between financial and economic factors and to model the quantities of a random variable as functions of observed factors (Dawar et al., 2021: 289). Using quantile regression can provide a correct investigation of the connection between variables than the OLS model (Youssef & Mokni, 2020: 5). In other words, instead of determining the effect of the explanatory variable on the mean value of the explained variable, quantile regression helps determine the effect of the independent variable on the dependent variable across different quantiles. Quantile regression shows multiple regression functions corresponding to each quantile of the dependent variable (Hoang et al., 2019: 82). Compared to OLS regression, quantile regression has some advantages. First, instead of merely conditional expectations (mean values) of the dependent variable, quantile regression can define the whole picture of the conditional distribution of the dependent variable (Sirin & Yilmaz, 2020: 6). Different quantiles usually have different regression coefficients; in other words, explanatory variables have different effects on different amounts of dependent variables (Zhang et al., 2021: 244; Dawar et al., 2021: 289; Azimli, 2020: 2; Lin & Xu, 2018: 16; Mishra & Moss, 2013: 364). Quantile regression does not ask for random error terms to exactly fulfil classical

econometric suppositions, such as zero mean, homoscedasticity, and normal distribution (Xu & Lin, 2020: 2). For non-normally distributed variables, the predicted values of the parameters in quantile regression are more powerful (Huang et al., 2020: 4; Youssef & Mokni, 2020: 4; Zivkov et al., 2020:16). The mathematical representation of the quantile regression model can be demonstrated as follows (Sevillano & Jareno, 2018).

$$y_i = x_i' \beta_\theta + u_{\theta i}, \quad (1)$$

where y_i denotes the explained variable, β_θ denotes the $k \times 1$ unknown vector of regression parameters to be predicted for different values of θ (which can vary from 0 to 1), x_i denotes the $k \times 1$ vector of independent variables, and $u_{\theta i}$ denotes unknown error terms. Conditional quantiles of the y_i variable to x_i can be expressed as follows.

$$Q_\theta(y_i | x_i) = x_i' \beta_\theta \quad (2)$$

To estimate the β_θ vector, an optimisation problem is considered in which the following function is minimised concerning β :

$$\left\{ \sum_{t: y_t > x_t} \theta |y_t - x_t' \beta| + \sum_{t: y_t < x_t} (1 - \theta) |y_t - x_t' \beta| \right\} \quad (3)$$

The QR applies the generalised moments or linear programming method with the simplex algorithm. In this way, the sum of the weighted absolute error terms is minimised, and the positive and negative residuals are differently weighted according to the chosen quantile. In light of this information, the quantile regression model created in this study to measure the effect of international wheat and rice prices on the stock market index is given below.

$$\begin{aligned} \logbist100_{j,t} &= \beta_{0,t}^\theta + \beta_{1,t}^\theta \logrice + \beta_{2,t}^\theta \logwheat + \beta_{3,t}^\theta \logsugar + \beta_{4,t}^\theta \logbeef + e_{j,t} \\ \logwig20_{j,t} &= \beta_{0,t}^\theta + \beta_{1,t}^\theta \logrice + \beta_{2,t}^\theta \logwheat + \beta_{3,t}^\theta \logsugar + \beta_{4,t}^\theta \logbeef + e_{j,t} \end{aligned} \quad (4)$$

where $\beta_{0,t}^\theta$, $\beta_{1,t}^\theta$, $\beta_{2,t}^\theta$, $\beta_{3,t}^\theta$ and $\beta_{4,t}^\theta$ denote estimated quantile regression coefficients and θ denotes the regression quantile that takes values between 0.1 and 0.9. Besides, t represents time, \mathcal{E}_j represents the random error of unit (such as company, stock market) j .

Fully Modified Least Squares Method (FMOLS), Dynamic Least Squares Method (DOLS), and Canonical Cointegration Regression (CCR) models, known as cointegration regression, are methods that provide information about the direction, magnitude, and

significance of this relationship between variables while the existence of a long-term relationship is detected. The most important advantage of these methods is that they eliminate the internality problem and use the covariance of the error terms to eliminate the issues arising from the long-term correlation. Phillips and Hansen (1990) proposed the FMOLS estimator uses preliminary estimates of symmetric and one-sided long-run covariance matrices of residuals. Let the cointegration equation be expressed as follows, including (y_t, X_t') vectorial time series.

$$y_t = X_t' \beta + D_{1t}' \gamma_1 + u_{1t} \quad (5)$$

In the model $\hat{\lambda}_{12}^+ = \hat{\lambda}_{12} - \hat{\omega}_{12} \hat{\Omega}_{22}^{-1}$ is a bias correction term, and $Z_t = (X_t', D_t')$, the FMOLS estimator is expressed by the equation (6).

$$\hat{\theta}_{FMOLS} = \begin{bmatrix} \hat{\beta} \\ \hat{\gamma}_1 \end{bmatrix} = \left(\sum_{t=2}^T Z_t Z_t' \right)^{-1} \left(\sum_{t=2}^T Z_t y_t^+ - T \begin{bmatrix} \hat{\lambda}_{12}^{+'} \\ 0 \end{bmatrix} \right) \quad (6)$$

The Dynamic Least Squares Method (DOLS) was developed by Saikkonen (1991) and Stock-Watson (1993). The method determines the long-term coefficients between the variables by adding ΔX_t premise and lagged values of the difference of the independent variables to the model.

$$y_t = X_t' \beta + D_{1t}' \gamma_1 + \sum_{j=-q}^r \Delta X_{t+j}' \delta + u_{1t} \quad (7)$$

Estimating the DOLS model using equality (7) is performed with the help of $\hat{\theta}_{DOLS} = (\hat{\beta}, \hat{\gamma}_1')$ ordinary least squares in the form of prime. Park (1992) expressed that the canonical least-squares method is close to FMOLS estimation. Here is the estimator of CCR,

$$\hat{\theta}_{CCR} = \begin{bmatrix} \hat{\beta} \\ \hat{\gamma}_1 \end{bmatrix} = \left(\sum_{t=2}^T Z_t^* Z_t^{*'} \right)^{-1} \sum_{t=1}^T Z_t^* y_t^* \quad (8)$$

expressed as equation (8).

4. Findings

4.1. Data, Preliminary Examination, And Basic Statistical Tests

Focusing on the effects of agricultural commodity prices on the stock market index, this study compared the wheat, rice, sugar, and beef prices with Turkey's stock market

BIST100 price index and Poland's stock market WIG20 price index between 2008 M12 and 2020 M11. Commodity prices data were retrieved from the World Bank official website, BIST100 index data from the Central Bank of Turkey, and WIG20 data from the MarketWatch website. All data in the study are seasonally adjusted using Census X-13 and Moving Average Methods. The data were included in analyses by taking their logarithms. Descriptive statistical information is required to obtain general and concise information about the data used in the study. Table 2 presents summary statistics for stock market indices and international series of agricultural commodity prices as results of the correlation analysis between the two stock markets and these commodities.

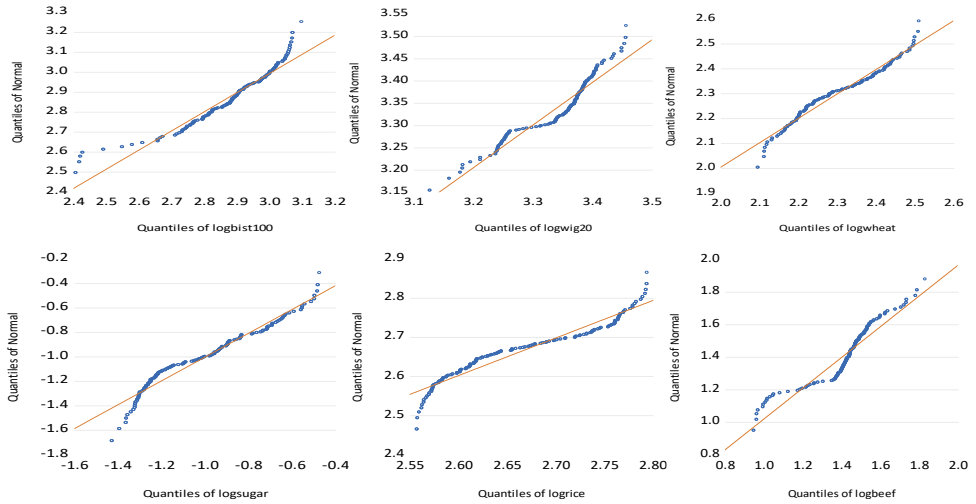
Table: 2
Basic Statistical Information and Correlation Analysis Results

	logbist100	logwig20	logwheat	logsugar	logrice	logbeef
Panel A: Basic statistical data						
Mean	2,874	3,339	2,298	-1,000	2,665	1,414
Median	2,892	3,361	2,279	-1,004	2,648	1,439
Maximum	3,096	3,455	2,510	-0,474	2,793	1,828
Minimum	2,405	3,126	2,095	-1,428	2,556	0,945
Std. Dev.	0,140	0,068	0,108	0,254	0,074	0,172
Skewness	-1,136	-0,812	0,196	0,329	0,246	-0,861
Kurtosis	4,736	2,991	1,932	1,993	1,641	4,252
Jarque-Bera	49,095	15,831	7,762	8,682	12,530	27,204
Probability	0,000***	0,000***	0,020**	0,013**	0,001***	0,000***
Panel B: Correlation analysis						
Correlation vs logbist100	1	0,165	-0,274	-0,427	-0,630	0,789
Correlation vs logwig20	0,165	1	0,464	0,195	-0,093	0,376

Note: Significance: *** 1%, ** 5%.

The same or close mean and median values indicate a symmetrical distribution, suggesting that the variables are normally distributed. Another clue as to whether the data are normally distributed is the skewness and kurtosis values close to 0 and 3 (You et al., 2017: 5). However, as seen in Panel A, all variables' skewness and kurtosis values are far from these. Indeed, since Jarque-Bera test probability values are $p < 0.01$ for logbist100, logwig20, logrice, and logbeef and $p < 0.05$ for logsugar and logwheat, it can be said that not all variables show a normal distribution, at this point, another tool can be used the Q-Q plot. A Q-Q plot is a probability plot that visually checks if data follow a normal distribution. The closer the points to the $y=x$ line on the Q-Q plot, the more likely data are typically distributed (Xu & Lin, 2020: 6; Lin & Xu, 2018: 20). Otherwise, skewed data distribution is indicated. Figure 1 below presents the Q-Q probability distribution plots of the variables.

Figure: 1
Q-Q Probability Distribution Graphs of Variables



As can be inferred from Figure 1, all variables do not exactly lie on the $x=y$ line, and therefore, these variables are not normally distributed. According to another result in Panel A, the variable with the highest standard deviation is sugar. This finding suggests that the sugar variable is the highest risk and return (loss) investment instrument. Indeed, among the available variables, the most significant difference between maximum and minimum values belongs to this variable. According to Panel B, there is a positive correlation between the Polish stock exchange and other agricultural commodities except for rice. There is a negative correlation between the Turkish stock market and other agricultural commodities, except beef.

4.2. Stationary and Cointegration Analysis

At this stage of the study, the stability of the data was tested with unit root tests. Time series data; when their mean, variance, and covariance do not change over time and remain the same, they are called stationary (Hor, 2015: 110). In the study, conventional ADF and ADF unit root tests with structural break were used to determine the stationarity of the series, and the results are presented in Table A2 in Appendix. Accordingly, all variables are stationary in their I (1) first difference. It was necessary to carry out cointegration tests to determine whether the variables will be included in the Quantile regression analysis with their level values or their first differences and whether there is a long-term equilibrium relationship between the variables. Therefore, cointegration analysis was performed with the Johansen Cointegration test, which allows the determination of the cointegration relationship between stationary variables at I (1) levels. The results are presented in Table A3. According to the Johansen cointegration results for Turkey, there is no relationship between the trace

statistics and the most extensive eigenvalue statistics. The null hypothesis is that a connection at most is rejected at the 5% significance level. According to the test results, there are two cointegration vectors between the series. The null hypothesis stating that there is no cointegration relationship between the variables for Poland is rejected. According to these results, there is a cointegrated relationship between the stock market index in Turkey and Poland and the variables of international rice, wheat, sugar, and beef prices. As stated by (Greene, 2019: 1080; Gujarati, 2011: 236), variables can be used in regression analyses with level values since they tend to be stable in the long run.

4.3. Quantile Regression Analysis

All variables used in the study are not normally distributed, as inferred from the J-B test results and the Q-Q distribution plots. The quantile regression method has absolute advantages in investigating the relationship between non-normally distributed variables. For this reason, the quantile regression method was employed in the study to model the effect of international agricultural products on the stock market index. Quantile regression can determine the exact impact of independent variables on the explained variable across various quantiles. At this stage of the study, nine different quantiles (0.1, 0.2, ..., 0.9) were determined to apply the regression analysis. The findings obtained for Turkey and Poland from the quantile regression analysis in Table 3 follow.

Table: 3
Quantile Regression Estimation Results

Variables	Quantile Levels								
	0,10	0,20	0,30	0,40	0,50	0,60	0,70	0,80	0,90
Panel A: Turkey									
c	5,074 (0,000)***	4,235 (0,000)***	3,613 (0,000)***	2,842 (0,000)***	2,402 (0,000)***	2,707 (0,000)***	2,454 (0,000)***	2,107 (0,000)***	2,196 (0,000)***
logrice	-1,016 (0,000)***	-0,621 (0,013)**	-0,368 (0,123)	-0,140 (0,468)	0,017 (0,912)	-0,137 (0,365)	-0,077 (0,576)	0,104 (0,470)	0,088 (0,621)
logwheat	-0,022 (0,809)	-0,162 (0,091)*	-0,190 (0,042)**	-0,171 (0,058)*	-0,202 (0,015)**	-0,125 (0,097)*	-0,104 (0,131)	-0,170 (0,016)**	-0,186 (0,024)**
logsugar	0,137 (0,000)***	0,052 (0,407)	-0,006 (0,921)	-0,078 (0,137)	-0,119 (0,008)***	-0,133 (0,000)***	-0,160 (0,000)***	-0,200 (0,000)***	-0,191 (0,000)***
logbeef	0,421 (0,000)***	0,463 (0,000)***	0,450 (0,000)***	0,505 (0,000)***	0,553 (0,000)***	0,502 (0,000)***	0,529 (0,000)***	0,520 (0,000)***	0,539 (0,000)***
Pseudo R ²	0,597	0,523	0,477	0,463	0,464	0,473	0,488	0,473	0,457
Adj.R ²	0,585	0,509	0,462	0,448	0,449	0,458	0,473	0,458	0,441
S. E. of regress.	0,135	0,104	0,087	0,077	0,078	0,082	0,089	0,100	0,117
Panel B: Poland									
c	3,805 (0,000)***	3,600 (0,000)***	3,869 (0,000)***	3,482 (0,000)***	3,600 (0,000)***	3,895 (0,000)***	3,749 (0,000)***	3,504 (0,000)***	3,081 (0,014)**
logrice	-0,625 (0,000)***	-0,578 (0,000)***	-0,670 (0,000)***	-0,463 (0,000)***	-0,427 (0,002)***	-0,443 (0,004)***	-0,292 (0,135)	-0,232 (0,381)	-0,088 (0,814)
logwheat	0,492 (0,000)***	0,518 (0,000)***	0,520 (0,000)***	0,427 (0,000)***	0,356 (0,000)***	0,273 (0,003)***	0,177 (0,067)*	0,217 (0,050)**	0,217 (0,107)
logsugar	0,071 (0,057)*	0,039 (0,147)	0,024 (0,293)	0,028 (0,328)	0,038 (0,308)	0,067 (0,195)	0,059 (0,407)	0,053 (0,555)	0,051 (0,683)
logbeef	0,055 (0,274)	0,060 (0,130)	0,038 (0,300)	0,091 (0,015)**	0,070 (0,089)*	0,056 (0,190)	0,038 (0,475)	0,036 (0,503)	0,074 (0,366)
Pseudo R ²	0,361	0,381	0,364	0,298	0,229	0,174	0,152	0,157	0,197
Adj.R ²	0,343	0,363	0,346	0,278	0,207	0,151	0,128	0,133	0,174
S. E. of regress.	0,081	0,068	0,061	0,053	0,051	0,055	0,064	0,071	0,083

Notes: Significance: *** 1%, ** 5%, * 10%, Figures in parentheses are p-values.

The effect of rice on the Turkish stock market is heterogeneous. There is a negative and significant effect at low quantile levels and a positive and insignificant effect at high quantile levels. Although rice is produced and exported in Turkey, it is mainly imported. Reasons such as rice being an important food in the country and high demand are expected to reflect on the sales positively; thus, publicly listed companies that produce, sell, or import-export rice are profitable. Rice has a negative relationship with the Polish stock market index. This relationship is statistically significant, especially at low and medium quantile levels. Accordingly, rice has the power to have a negative effect on the stock market of both countries.

The effect of wheat on the Turkish stock market index is homogeneous. This effect is statistically meaningful in all other quantile levels except for the 1st and 7th quantile levels. According to (İstikbal, 2020: 88), Turkey, which ranks 11th in the world production of wheat, is the sixth-largest country in the world in terms of the economic value of wheat. Wheat is the second most-produced product in the country with an annual capacity of 20 million tons and is a major export item. Turkey has become the largest flour exporter, processing wheat purchased from abroad and transforming it into agricultural products that create added value. Accordingly, an increase in international wheat prices negatively affects the index, based on the thought that this may decrease the income of publicly listed companies or affiliates of these companies. Wheat, moreover, has a statistically meaningful, positive impact on WIG20 at all other quantiles except the 9th level. However, this effect decreases as quantiles increase. Accordingly, wheat is considered a more important product than rice for Poland's economy. Indeed, as (Iwanska et al., 2020: 1) report, wheat accounts for 22% of all the agricultural land in Poland and is the most important crop. In terms of farm production and income, Poland, an important country, exported the 15th highest dollar value worth of wheat in 2019, with an export income of 431.5 million dollars. On the other hand, Turkey exported the highest dollar value worth of wheat in the same year, with an export income of 2.3 billion dollars⁴.

The international price of sugar has a negative effect on the Turkish stock market. This effect is significant at all other quantile levels except 10% and 20% quantile levels. According to 2019 data, while Turkey's sugar exports about 10 million dollars, it imports 65 million dollars. This imbalance in foreign trade figures regarding sugar is negatively priced in the stock market. Sugar has no statistically significant effect on the Polish stock market. However, there appears to be a positive effect at all quantile levels. This may be due to the fact that Poland has also been a net exporter of the foreign sugar trade, especially in recent years.

Beef positively affects the Turkish stock market, which is statistically significant at all the quantile levels. In previous years, Turkey has been self-sufficient concerning beef supply and demand, while its importer's position since 2010. As there are not much more alternatives to red meat, the need for beef is very high in Turkey. The effect of beef on the

⁴ <<http://www.worldstopexports.com/wheat-imports-by-country/>>, 25.05.2021.

Polish stock market is positive, and it is statistically meaningful at medium quantile levels. Poland is a major beef exporter country. This situation is positively priced in the stock market. However, the impact of beef on the stock market is more remarkable in Turkey. This may be due to the low demand for beef in Poland. According to the data for 2019, beef consumption per capita in Poland is 3.5 kg, and pork consumption is 38 kg⁵.

According to data presented in Table 3, the coefficient of determination (Pseudo R²) calculated for quantile regression models was obtained as higher for the model created for the Turkish stock market at all quantiles than for the model developed for the Polish stock market. In other words, quantile regression models designed for the Turkish stock market could better explain the relationship between the developments in the prices of five studied agricultural products and the changes in the stock market index. Nevertheless, models at different quantiles created for the Polish stock market yielded fewer error rates.

Wald test statistics shown in Table 4 for both countries are statistically significant at 1% and 5% levels; therefore, the null hypothesis is rejected that all slopes are equal (slope homogeneity) across quantiles. Table 4 presents the results of the symmetry test across quantiles. The null hypothesis of the Wald test is that the distribution is symmetrical. $H_0 = \beta_{1,r=\theta} + \beta_{1,r=(1-\theta)} = 2\beta_{1,r=0.5}$ According to the test statistics, both countries could not reject the null symmetry hypothesis between quantiles. In other words, this indicates that the coefficients are symmetrical to the coefficient of the median. Accordingly, it shows that the explanatory variables, international wheat, rice, sugar, and beef prices, have a homogeneous effect on the stock market indexes. In other words, in models with different quantile levels, the values of the explanatory variables at θ and $(1-\theta)$ levels converge to the median value.

Table: 4
Results of Quantile Slope Equality and Symmetric Quantiles Tests

Countries	Quantile Slope Equality Test		Symmetric Quantiles Test	
	test statistics	prob.	test statistics	prob.
Turkey	99.427	(0,000)***	24.720	0.212
Poland	53.247	(0,011)**	11.040	0.945

Notes: Significance: *** 1%, ** 5%. The model is estimated at the 0.5 quantile level. Test quantiles are 0.10, 0.20, ..., 0.90.

4.4. Cointegration Regressions Results

The primary method used in the study is quantile regression analysis. To confirm the results obtained from this analysis, analyses were made with FMOLS and DOLS CCR models, and robust empirical evidence was obtained regarding the direction and significance of the effect of independent variables on dependent variables.

⁵

<https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Poland%202019%20Livestock%20and%20Products_Warsaw_Poland_01-13-2020>, 25.05.2021.

According to Table 5. cointegration regression results, logwheat and logbeef variables statistically affect the Turkish stock market in all three models. While the logwheat variable has a negative impact on the models, the logbeef variable has a positive effect. The logsugar variable revealed a significant negative effect only in the DOLS model. The percentage of agricultural commodity prices explaining the stock market index for Turkey was found to be around 70% for all three models.

When we examine the effects of commodity prices on the Polish stock market, it is seen that there are different reactions to the Turkish stock market. While logrice significantly decreases the stock market index, logwheat is positive in all three models. logsugar, on the other hand, showed a significant positive impact on the stock market index in FMOLS and CCR models. Unlike the Turkish stock market, logbeef does not significantly affect any model for Poland. In addition, the percentage of disclosure of the relevant stock market by commodity prices was around 40%.

The applications of quantile regression and cointegration regressions on how the Turkish and Polish stock markets are affected by commodity prices support each other in terms of the signs of the variables. It has been determined that the stock markets of both countries are negatively affected by rice prices; on the other hand, wheat prices have a negative effect on the Turkish stock market but positively impact the Polish stock market. In addition, when the percentage of agricultural commodity prices explaining the stock market index is examined, it is seen that commodity prices explain the index at the level of 70% in Turkey and 40% in Poland. These results reveal that the economic dynamics of the two countries are different from each other.

Table: 5
Cointegration Regressions Estimation Results

	Turkey			Poland		
	FMOLS	DOLS	CCR	FMOLS	DOLS	CCR
c	2,853 (0,000)***	2,751 (0,000)***	2,864 (0,000)***	3,791 (0,000)***	3,691 (0,000)***	3,785 (0,000)***
logrice	-0,105 (0,676)	-0,056 (0,841)	-0,112 (0,648)	-0,545 (0,003)***	-0,508 (0,019)**	-0,542 (0,003)***
logwheat	-0,269 (0,057)*	-0,268 (0,084)*	-0,265 (0,054)*	0,443 (0,000)***	0,433 (0,000)***	0,441 (0,000)***
logsugar	-0,085 (0,136)	-0,103 (0,091)*	-0,083 (0,132)	0,079 (0,049)**	0,072 (0,119)	0,080 (0,043)**
logbeef	0,592 (0,000)***	0,558 (0,000)***	0,591 (0,000)***	0,044 (0,466)	0,056 (0,484)	0,046 (0,429)
Adj.R ²	0,705	0,732	0,705	0,430	0,434	0,431
S.E. of regress.	0,073	0,067	0,073	0,052	0,051	0,052

Notes: Significance: *** 1%, ** 5%, *10%. Figures in parentheses are p-values.

4.5. Discussions On Analysis Results

According to the results of the econometric analysis conducted within the scope of the study, it cannot be said that agricultural commodities do not affect stock market indices. The results were obtained by comparing the two countries such as Poland and Turkey. From this aspect, findings and results are specific to these two countries.

In Table A4, the validity of the hypotheses developed in line with the literature review and correlation analysis preliminary information as a result of the econometric analysis are presented within the scope of the research question. Accordingly, the effect of agricultural commodities on the Turkey stock exchange is more than on the Polish stock exchange. In other words, the potential of farming commodities to affect the stock market is higher in Turkey. This relationship shows oscillations in a certain and narrow area. The effect of the rice variable on the stock market index is heterogeneous. With a negative effect at low quantile levels, this effect gradually diminished and turned into a positive effect. Estimated coefficients for wheat and sugar variables show that these variables negatively impact the Turkish stock market. This effect is very clear and significant at all quantile levels. The two products need to underline that Turkey is a net importer in this context. Beef prices positively and significantly affect the stock market index at all quantile levels. At this point, it must be said that the high demand for beef in Turkey. This can be attributed to the increase in population (2008=70.4 Million, 2019=83.4 Million)⁶ and the increase in the number of foreign tourists (2008=26.3 Million, 2019=45 Million)⁷ in Turkey.

On the other hand, in Poland, rice prices have a negative effect on the stock market index at all quantile levels. Accordingly, the importance of rice for the Polish economy and consumers is gradually decreasing. The estimated coefficients of the wheat and beef variables positively affect the Polish stock market. This may be due to the fact that Poland is an important exporting country for these two products. However, the effect of the wheat variable on the stock market index is gradually decreasing. The effect, which increased to the median in beef, decreased afterwards.

On the other hand, while sugar prices positively affect the Polish stock market, this is only significant at the first quantile level. Therefore, the potential for changes in the international price of sugar to affect the Polish stock market is very limited. These findings can be said to be consistent with existing studies (Ouyang & Zhang, 2020; Misecka et al., 2019; Kaur & Dhiman, 2019; Bohl & Sulewski, 2019; Nicola et al., 2016; Chen, 2016; Girardi, 2015; Creti et al., 2013).

According to the results of cointegration regressions, it has been determined that wheat prices have a negative effect, and beef prices positively affect the Turkish stock market. On the other hand, rice and sugar prices did not significantly affect them. The rice price had a negative effect on the Polish stock market, and the wheat price had a positive effect. Unlike Turkey, beef price in Poland does not significantly affect the stock market index.

The factors that are thought to have an effect on the results obtained are discussed below. Accordingly, it can be said that the importer-exporter positions of the two countries for these products and the high domestic demand for these products are effective. Each

⁶ <<https://data.worldbank.org/indicator/SP.POP.TOTL?locations=TR>>, 25.05.2021.

⁷ <<https://www.tursab.org.tr/istatistikler/turist-sayisi-ve-turizm-geliri>>, 25.05.2021.

country's economic, political, sociological, and cultural dynamics can show similarities and significant differences in this context. For these reasons, it is considered that it would be more appropriate to analyse the reflections of the relevant agricultural products on the stock exchange index separately. The increase in the international price of wheat in Poland, an important exporter country of wheat, has a positive effect on the exchange of this country in Turkey, an important wheat importer country; this effect is the opposite. Again, due to cultural values, the demand for beef varies in both countries, so its effect (coefficient) on the stock market index is different in direct proportion to the demand. Therefore, the reflections of agricultural commodities on country economies and financial markets may show heterogeneity.

It can be thought that the industrialisation levels of countries are another determining factor for the effects of agricultural products on the stock market index. As a matter of fact, in Turkey, all agricultural products have the same or similar effects on the stock market index. Other agricultural products, excluding the sugar variable, are effective on the stock market index in Poland. In addition, the effect of farm products on the stock market index is more remarkable in Turkey than in Poland. This may be due to the fact that Poland's economic ecosystem is more industrialised. In the context of the mentioned above, it can be said that it would be more appropriate to make comparative analyses by grouping the countries according to their cultural differences and industrialisation levels while analysing the effects of agricultural commodities on the country's stock markets/ financial markets.

Another issue that needs to be addressed in the study is that the macroeconomic effects, other commodities (such as oil, gold), and other domestic and international factors that may impact the stock market index are not considered. The study focused on the effect of agricultural commodities on the stock market index, considering the effects of other factors as constant. In this context, agricultural commodities, which are regarded as important strategic commodities of the future, can affect countries, economies, and financial markets both today and in the future. It is crucial to research these issues regarding food safety, foreign trade, and employment and consider the potential to affect the financial markets.

It can be thought that this study gives significant results in finance theory, especially in risk management. The Turkey stock exchange is the stock market that offers the opportunity to gain higher gains (losses), especially between two stock market indices. In addition, the findings provide valuable information about possible portfolio diversification strategies that minimise investment risk while maximising profit. Gold and oil are already considered as part of portfolio investment strategies. This phenomenon can be applied to basic food types and included in portfolio diversification. In addition, a long position can be taken to invest in futures contracts based on agricultural products, and this strategy offers more gain (loss) opportunities on the Turkey stock exchange than on the Polish stock market. Especially considering that it is negatively correlated with the Turkish stock exchange, sugar can be included in portfolios for hedging purposes.

5. Conclusions

This article examines the connection between international agricultural commodity prices and stock market indices using quantile regression (Q.R.) and cointegration regression analysis. Using a Q.R. analysis can better analyse the relationship between variables than the OLS model. Quantile regression has proven to be more powerful when outliers are present and the error term is not normally distributed. The FMOLS, DOLS, and CCR methods are prevalent applications used in cases where classical regression assumptions cannot be met. The imbalance between the supply and demand for agricultural products creates national and international security problems. Due to these imbalances, commodity prices and increasing volatility can affect economies and financial markets. Therefore, close monitoring of global commodity prices is vital for both public authorities and portfolio management. This article contributes to filling a gap in the relevant literature by determining the effect of agricultural products on the stock market indices in Poland and Turkey. The data covers the period 2018M12-2020M11. Statistical and econometric analyses were performed within the basic statistical tests, correlation analysis, unit root tests, Johansen cointegration test, quantile regression, etc., and cointegration regressions analysis. The results obtained from the study can be listed as follows: (1) It cannot be said that agricultural commodities do not affect the stock market index. (2) BIST100 index offers the gains (losses) opportunity higher than the WIG20. (3) Among the agricultural products studied, sugar is the only variable that is not statistically significant on the Polish stock market in quantile regression. However, it has a meaningful positive effect on FMOLS and CCR models. Almost all agricultural products significantly affect the Turkish stock market in quantile regression. (4) Wheat, on the other hand, has different and significant effects on the stock markets of both countries. This effect is negative in Turkey, and it is positive in Poland. This situation stems from Turkey's importer, wheat, and Poland's exporter. (5) Beef, on the other hand, has a positive effect on the stock markets of both countries in quantile regression. This is because an exporter country of Poland stems from high domestic demand in Turkey. But it is found meaningful only for Turkey in cointegration regressions. (6) In general terms, it has been found empirical evidence suggests that the effect of agricultural commodities on the Turkish stock market is more remarkable than on the Polish stock market. This may be due to the fact that Poland's economic ecosystem is more industrialised than that of Turkey. The results obtained from the study are also in line with the studies of (Kotzya et al., 2021; Nguyen et al., 2020; Iyke & Ho, 2021; Boako et al., 2020; Bohl & Sulewski, 2019; Misecka et al., 2019; Chen, 2016; Girardi, 2015).

The results obtained in this study are significant because they hint at certain suggestions for decision-making and implementing authorities. In this context, public authorities must carefully monitor agricultural commodity prices to ensure food security, prevent social unrest, and control cross-border migration movements. Secondly, our results also provide helpful information on possible portfolio diversification strategies, particularly those that minimise investment risk while maximising profit. Gold and oil are already considered in existing portfolio investment strategies. Primary food sources can also be included in portfolio diversification. Furthermore, long positions can be taken by investing

in futures contracts based on agricultural products that are considered strategic products of the future, a strategy that offers more earning opportunities (loss risks) in the Turkish stock market than in the Polish stock market. Since sugar and wheat are negatively correlated with the Turkey stock exchange and rice with the Polish stock exchange, they can be included in portfolios for hedging purposes.

Our suggestions for future studies on the subject are as follows. The number of comparator countries can be increased. Analyses over homogeneous classifications created according to different industrialisation levels and cultural characteristics will provide a clearer picture. For future studies, products such as oil and oil seed-such as coconut oil, soybean oil, palm oil, and forest products such as log, and lumber, which are in different agricultural commodity groups, can also be used in the analysis.

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Appendix:

Table: A1
Theoretical Expectations and Hypotheses of The Study

Variables	Theoretical Expectations	Hypothesis
logindex\logrice	+/-	H ₁ : There is a meaningful relationship between the international rice price and stock market index.
logindex\logwheat	+/-	H ₂ : There is a meaningful relationship between the international wheat price and stock market index.
logindex\logsugar	+/-	H ₃ : There is a meaningful relationship between the international sugar price and stock market index.
logindex\logbeef	+/-	H ₄ : There is a meaningful relationship between the international beef price and stock market index.

Table: A2
Unit Root Test Results for Stationary Analysis

Traditional ADF unit root tests				Structural break ADF unit root tests			
Variab.	Level t-stat. (critical value)	First difference t-stat. (critical value)	Conc.	Level t-stat. (critical value) break date	First difference t-stat. (critical value) break date	Conc.	
logbist100	-3,025 (-3,476)	-11,217 (-3,476)***	I (1)	-4,101 (-4,949)	-11,954 (-4,949)*** 2010M01	I (1)	
logwin20	-2,210 (-3,476)	-11,342 (-3,476)***	I (1)	-3,230 (-4,949)	-11,930 (-4,949)*** 2020M03	I (1)	
logwheat	-1,580 (-3,476)	-10,354 (-3,476)***	I (1)	-2,769 (-4,949)	-11,099 (-4,949)*** 2012M07	I (1)	
logsugar	-2,079 (-3,476)	-0,335 (-3,476)***	I (1)	-3,839 (-4,949)	-10,513 (-4,949)*** 2010M03	I (1)	
logrice	-2,203 (-3,476)	-9,738 (-3,476)***	I (1)	-4,187 (-4,949)	-10,340 (-4,949)*** 2009M07	I (1)	
logbeef	-2,787 (-3,476)	-8,546 (-3,476)***	I (1)	-3,792 (-4,949)	-9,823 (-4,949)*** 2019M011	I (1)	

Note: Significance: *** 1%.

Table: A3
Johansen Cointegration Test Results

Panel A: Turkey					
Hypothesized No. of C.E. (s)	Max-Eigen Statistic	0,05 Critical Value	Trace Statistic	0,05 Critical Value	
None *	43,41519	33,87687	95,47509	69,81889	
At most 1 *	34,51885	27,58434	52,05990	47,85613	
At most 2	10,71202	21,13162	17,54105	29,79707	
Panel B: Poland					
Hypothesized No. of C.E. (s)	Max-Eigen Statistic	0,05 Critical Value	Trace Statistic	0,05 Critical Value	
None *	43,41143	33,87687	80,90150	69,81889	
At most 1	18,49933	27,58434	37,49007	47,85613	
At most 2	10,77330	21,13162	18,99074	29,79707	

Note: Significance: * 5%.

Table: A4
Comparison of Econometric Model Results

Quantiles	Turkey						Poland		
	Rice	Wheat	Sugar	Beef	Rice	Wheat	Sugar	Beef	
QR	0.10	✓		✓	✓	✓	✓	✓	
	0.20	✓	✓		✓	✓	✓		
	0.30		✓		✓	✓	✓		
	0.40		✓		✓	✓	✓		✓
	0.50		✓	✓	✓	✓	✓		✓
	0.60		✓	✓	✓	✓	✓		
	0.70		✓	✓	✓	✓	✓		
	0.80		✓	✓	✓	✓	✓		
	0.90		✓	✓	✓	✓	✓		
FMOLS		✓		✓	✓	✓		✓	
DOLS		✓	✓	✓	✓	✓		✓	
CCR		✓		✓	✓	✓		✓	

Notes: ✓; since the coefficient sign is statistically significant, the null hypothesis (H_0) is rejected; (empty cells) since the coefficient sign is statistically insignificant, the null hypothesis (H_0) is accepted.

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The Independent Advisory Board for Turkish Social Security Institution: A Policy Transfer Trail from the United Kingdom Case

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Türk Sosyal Güvenlik Kurumu için Bağımsız Danışma Kurulu: Birleşik Krallık Örneğine Dayalı Politika Transferi Denemesi

Abstract

Social security is a policy area requiring technical, bipartisan, and objective expertise and a high level of consultation and consensus with stakeholders for proper decision-making and implementation. For assuring these necessities in the context of social security challenges, the UK government system employs an impartial advisory body. Using this example, this study intends to examine the historical and political backdrop and the implementation of the advisory committee and provide an outline for possible Turkish application. Based on the case study analysis executed in this paper, an obvious need for an independent advisory body in the Turkish social security system has been identified. However, the implementation and boundaries of such a body's independence would directly determine its efficiency and requirement of existence.

Keywords : Social Security, Public Management, United Kingdom, Advisory Mechanisms.

JEL Classification Codes : H55, I38.

Öz

Sosyal Güvenlik sadece teknik, tarafsız ve objektif uzmanlık gerektiren bir alan değil, aynı zamanda düzgün bir karar alma ve uygulama için tüm paydaşların danışma ve uzlaşmasına ihtiyaç duyan bir politika alanıdır. İngiltere hükümet sistemi bu gereklilikleri yerine getirmek için bir bağımsız danışma kurulu kullanmaktadır. Bu makalenin amacı da bu danışma kurulunun siyasi ve tarihi arka planını incelemek ve bu dersten faydalanarak Türkiye için olası bir taslak oluşturmaktır. Makalede uygulanan vaka örneği incelemesine dayanarak, Türk sosyal güvenlik sisteminin bağımsız bir danışma organına ihtiyacı tespit edilmiştir. Bununla birlikte, bu organın bağımsızlığının nasıl uygulanacağı ve sınırlarının ne olacağı, sadece bu yapının verimliliğini değil, aynı zamanda varlığının devamına ihtiyaç duyulup duyulmayacağını da belirleyecektir.

Anahtar Sözcükler : Sosyal Güvenlik, Kamu Yönetimi, Birleşik Krallık, Danışma Mekanizmaları.

1. Introduction

According to the ILO's Social Security (Minimum Standards) Convention (Nr: 102), a social security system should not be managed solely by public administration or government bodies, but social partners and those who are protected should participate in the management of social security administrations or join consultation bodies in these institutions (ILO, 1952). Participation of social stakeholders is critical for refining policies and making systems more responsive to citizens' and clients' needs, not just in systems funded by worker and employer premiums but also in tax-based social security systems (ILO, 2001). On the other hand, independent management and consultation comprehension are critical in social security. To begin with, the systems contain numerous technical elements and intergenerational aspects that must be safeguarded from the influence of short-term political interests. Second, social security policies should address a wide range of needs from diverse interest groups. All parties should work together to develop an agreement that protects the interests of all parties and the government. In this regard, stakeholder autonomy and engagement are critical tools for the healthy and effective administration of social security systems (Alper, 2007).

The use of a non-departmental public body (NDPB) can be a response to meeting the needs mentioned above of the Turkish Social Security Institution by providing it with an autonomous, specialised, participatory, and accessible outside organisation. Because of the history and widespread existence of NDPBs in the UK, as well as the fierce discussions that have raged around them for the past 20 years, NDPBs in the British public government structure give precious lessons for analysing both the problematic and positive sides of these bodies. Making proper analyses is feasible with the guidance of these lessons. Previous the UK governments' efforts in the scope of government service reforms to reduce the number of NDPBs and similar organisations while trying to boost their efficiency, in particular, can be considered a reasonable basis for analysing these types of entities.

The Social Security Advisory Committee (SSAC) is an advisory NDPB tasked with providing social security-related advice to the Secretary of State for Work and Pensions and the Parliament. In addition to the mandatory assessment of proposed social security legislation, the committee aids political leaders and administration in their independent work program or on-demand.

During the public service reform, when hundreds of advisory NDPBs are abolished or merged, the SSAC could continue its existence for the following reasons. First, because of the large volume of legislation and the complexity of their applications, social security has been recognised as a technical field requiring outside expertise. Second, all evaluations on SSAC have emphasised that SSAC's efficiency stems from its complete political impartiality. Third, the SSAC function must be carried out independently of political figures to give credible reports (Department of Work and Pension, 2012).

The survival of SSAC during UK government service reform and its well-regarded operation for decades demonstrate its relevance as a best practice in this field for countries such as Turkey, where the lack of such an agency is criticised. In this context, this article aims to assess the SSAC model for the Turkish system and suggest an independent advisory mechanism for the Turkish Social Security Institution based on the SSAC model's positive and negative aspects. Rather than directly replicating the SSAC structure, emulation of the example and adaption to the Turkish system based on the receiver's needs is proposed. For this purpose, an interview was conducted with one of the SSAC members to better understand the committee's daily implementation. In addition, the UK's NDPB system has been analysed from a historical and institutional point of view in the first section of the paper. SSAC has also been evaluated in this section as a case study. In the second section, the properties of the Turkish social security system and its institutional structure have been investigated to determine what type of advisory body is helpful for the Turkish system. In conclusion, an institutional structure has been proposed for Social Security Institution.

2. The Independent Public Bodies in British System

2.1. Theoretical Framework and Definitions

Most nations' public sectors have been altered through changes under the banner of modern public administration over the last four decades (NPM). Since the late 1970s, conventional, hierarchical, legalistic "Weberian" public administrations have been partially supplanted by results-oriented public organisations and for-profit private enterprises or NGOs or marketised by the state itself. The NPM reforms have resulted in, among other things, the adoption of private-sector methods in the internal operations of public administrations and the exterior structure of public administrations as quasi-markets (Lapuente & Van de Walle, 2020). On the other hand, it is stated that the NPM has a two-tier approach: at one level, there is a theory/doctrine that defends improving the public sector by adopting concepts, techniques, and values from the private sector; at a higher level, there is a theory/doctrine that defends improving the public sector by adopting notions, techniques, and values from the private sector. Below that, we have more concrete concepts and real actions relating to performance, disaggregation, specialisation, the adoption of market processes and a "client" perspective, and the application of quality-of-service improvements (Pollitt, 2018).

In latest years, private-sector management principles have been brought into the public arena in ways never before seen and in all areas of public policy: from health care and education to transportation, security, and even central bureaucratic functions. The primary premise was that business-like techniques would improve public organisations' efficiency and effectiveness. This notion is especially important when reducing the deficit and public debt is a top priority for governments across the European Union, as it was the last three decades. Whether formally or tacitly, NPM reforms are still a powerful driver for change (Lapuente & Van de Walle, 2020).

Although public administrations have continuously innovated, whether unexpectedly, seldom, or continually, rigorous research of public sector innovation is relatively new; according to recent surveys, there are ten times more studies on innovation in the private sector than in the public sector. Indeed, public administrations are founded on bureaucratic traditions and practices, resulting in a rigid and pyramidal organisational logic. This conventional administrative approach is not conducive to novel ideas and procedures. As a result, encouraging innovation-oriented settings for its development is critical if the public invention is not a casuistic, isolated, and arbitrary process (Criado et al., 2020). With this innovation, six problematic issues in the workings of the public sector were addressed through reforms based on the NPM (Correia & Pereira, 2021).

- Productivity/efficiency, i.e., "how to do more with less".
- Strengthening the market as a cure for the bureaucratic legacy.
- Bringing government closer to citizens, improving the public service provided, and satisfying society's needs.
- Decentralized decision-making.
- Greater competence in the management of public policy by the government.
- Accountability of politicians.

The public sector's innovation has developed considerably and focuses on various factors. In specifically, four forms of innovation have been recognised in the public sector: (1) process innovation, whether administrative or technological; (2) product and service innovation, primarily through new products or services; (3) governance innovation, focusing on developing original ways of addressing social problems; and (4) conceptual innovation, focusing on the introduction of new concepts, frames of reference, or paradigms that aid in reformulating the nature of problems or feasible solutions to them (De Vries et al., 2016).

Based on this background, it can be said that unelected bodies that are free from direct government control, such as independent central banks, economic regulators, and autonomous executive or consultative organisations, have grown commonplace in public administration around the world in the scope of NPM. Governments use them to resolve conflicts of interest between the state and other sectors, allocate resources based on real or false impartiality, and transfer decision-making authority in delicate ethical or technical domains. (Vibert, 2007). According to the NPM, modern states should be task-specific rather than general-purpose, flexible rather than durable, and operate at multiple levels rather than a few. Instead of established hierarchical layers on a few levels, states behave in more complex configurations like marble cakes (Hooghe & Marks, 2003). This transition necessitated the creation of a large number of specialised and independent arms-length bodies centred on important departmental cores that governments directly control. As a result of this system, the public sector has become more complex and fragmented, but it has also reduced the direct control of elected politicians and bureaucrats/civil servants who are selected by politicians and operate under their direct control to some extent. (Dommett & Flinders, 2015).

These bodies have a long history in the United Kingdom, dating back to the 16th century. The number of bodies operating out of hierarchical structures grew as the state's duties grew, especially after the 1970s. In British political history, the widespread use of these bodies has been linked to a preference for flexibility over legal rigidity (Flinders et al., 2014). These bodies' size, effectiveness, accountability, and cost have become contentious political issues. Because of the lack of a clear definition, it has been particularly difficult to assess the success or failure of these bodies. (Cole, 1998). According to Dynes and Walker, governments' autonomous, non-governmental, arm-length, non-departmental (NDPB) administrative and advisory machines, or quangos, could be "*generically describe anything and everything that occupies the terrain between the public and the private sectors*" (Dynes & Walker, 1995: 130). According to a more precise definition, "*quangos are organisations which, as their main task, are charged with the implementation of one or more public policies and which are funded publicly but operate at arm's length of the central government, without an immediate hierarchical relationship existing with a minister or a parent department*" (Thiel, 2004: 176).

NDPB has entire authority over their production process. In this way, they control how their inputs, outputs, and procedures are managed. The focus of political responsibility changes away from management and operational difficulties and toward the establishment and oversight of the NDPB. As a result, politicians' accountability and control methods are restricted. Even if an NDPB is in the public domain, it is not a public organisation due to the mixed administration (Thiel, 2004).

In 1979, the new Conservative government decided to evaluate NDPBs and established a commission chaired by Sir Pliatzky. In his report, he underlined that even if these bodies take roles process of government, they are independent of government departments. He also identified three different types of NDPBs (Report, 1980). The more current definition made by Cabinet Office followed Pliatzky's definition and classification: NDPBs are the bodies that have "*roles in the process of the national government but [which] is not a government department or part of one, and which accordingly operate to a greater or lesser extent at arm's length from ministers*" (Cabinet Office, 2011: 10). In this scope, it is possible to mention three subtypes of NDPB.

- Executive NDPBs: The legal entities formed under the Companies Act have legal personality. They are responsible for various administrative, commercial, executive, technical, and regulatory tasks.
- Advisory NDPBs: They aim to assist political figures and their administrations with unbiased and objective counsel. They have a lower budget and fewer employees than executive NDPBs. An independent advisory body can mainly perform two functions. It operates as an expert organisation in a collection of high-profile specialists who can render high-quality judgments based on their knowledge and skills in a specific field. On the other hand, a consultative organisation creates an independent communication channel for stakeholders and transfers their ideas to the political arena. (Ogus, 1998).

- Tribunal NDPBs mainly deal with relations between individuals and public authorities. In some cases, they act as courts of appeal bodies (Cabinet Office, 2011).

After the Conservative-Liberal Coalition took power, a campaign against NDPBs was launched under the “Bonfire of the Quangos” banner. 901 NDPBs and similar organisations were assessed as part of Francis Maude’s study, and over 150 bodies were abolished, and over 160 bodies were amalgamated into less than 70 entities (Dommett, 2014). Three criteria have been identified based on this evaluation to determine how an NDPB can survive:

- The NDPB should undertake a precise technical operation.
- There should be a need for impartial decisions about the distribution of public money.
- There should be a need for facts to be transparently determined, independent of political interference.

After the “bonfires of the quangos”, according to Flinders and others (2014), the most important alteration has been observed in the relationship between NDPBs and their sponsor departments. The interconnections between them become much more substantial. Sponsor departments have established more stringent policy controls and tighter oversight of everyday operations.

Table: 1
Pros and Cons of NDPSs and Such Bodies

Advantages	Disadvantages
Depoliticising decision-making	High numbers and unpredictable costs
Building public trust in the objectivity	Accountability problems
Increasing managerial freedoms	Enjoying the freedom to produce opinions against governments
Focusing on a specialist function	Achieving the right balance between freedom and control
Accessing external skills and expertise.	Lack of clarity over roles and responsibilities
Justifying unpopular decisions	
Communication channel with stakeholders	

Source: Derived from Gash t. and others, *Read Before Burning*, Institute for Government, 2010.

2.2. Positive and Negative Sides of the NDPBs and Their Roles as Independent Advisory Public Bodies in the UK

Because of the historical and widespread existence of NDPBs in the UK and the intense discussions about them for over 20 years, their use in British public administration structures gives precious lessons for analysing these bodies’ problematic and positive aspects.

A variety of factors has sparked attempts to address the problem of NDPBs. NDPBs can enhance their durability, maintain their expenditure without oversight, and affect reform processes, according to a neoliberal perspective, because of their autonomy from political authority. This point of view suggested that they can act as an undesired and excessive extension of the state under the protection of the independence concept. Because of their large quantity and lack of information on most NDPBs, parliamentary oversight and public

awareness have become almost impossible. (Farrugia & O'Connell, 2008). Even though Francis Maude's review encompassed 901 bodies, he claims that the report cannot capture the full scope of the topic because of the of solid information regarding such bodies (Daily & Hansard, 2010). However, it is also suggested that counting NDBPs and similar organisations is futile due to the many organisations included in these categories. (Flinders & Skelcher 2012).

Since NDPBs and similar organisations' accountability is ambiguous, overlapping, and neglected, with confusing roles and boundaries, and political monitoring is weak and practically impossible for them, it is suggested that NDBPs are harming democracy's quality. From this viewpoint, NDBPs create an environment where elected politicians' powers decrease (Flinders & Skelcher, 2012; House of Common, 2014). Using Hirst's words, these bodies place "*public money and government functions in the hands of unelected persons whose links to the elected bodies that supervise government are tenuous at best*" (Hirst, 1995: 341). On the other hand, the opposite end of the continuum, tied to political control over these organisations, may also be problematic for democracy from a clientelist standpoint. NDBPs can rapidly devolve into domains where governments can exert influence. Relevant politicians usually appoint the main members of NDBPs. Again, many of these bodies, their specialised job requirements, and legislative issues make any form of appointment process oversight difficult. In that sense, it is argued that NDBPs are very suitable areas for nepotism and cronyism. NDBPs can also be utilised to win support from some social groups for policies, such as appointing members of particular groups to boards of bodies, inviting them to consultation mechanisms, or even forming an NDBP comprised solely of certain groups. (Theil, 2004; Farrugia & O'Connell, 2008). In parallel with this view, it emphasised that "*public appointments are not sufficiently transparent, representative, or accountable*" in an official report (House of Common, 2014: 37).

Practical cooperation and collaboration between NDPBs and their sponsoring departments will not be realised unless the roles and duties of the two organisations are clearly defined, and precise coordination mechanisms are established. In British public management, a lack of clarity about NDPBs' tasks and responsibilities and a work division between NDPBs and their sponsoring body cause chronic problems. According to reviews, some NDPBs are unsure about their roles. Furthermore, NDPBs may not have adequate opportunities to participate in policymaking processes, and as a result, they are unable to influence or respond to political agendas (Gash et al., 2010).

NDBPs, on the other hand, have their own set of advantages. When an NDBP is founded, politicians anticipate it to boost the efficiency and effectiveness of policy implementation in a particular area and bring the government closer to citizens by keeping policy implementation at arm's length or enabling social groups to participate in policy development. These bodies provide a more direct and precise channel for social partners' voices to reach the government than its alternatives (Ogus, 1998).

It is suggested that NDPBs are a critical component of modern states. Even if there are some disadvantages, as explained above, these entities are critical for politicians who want to avoid direct responsibility for particular implementations and quasi-judicial decisions. Choosing an NDBP to serve as an executive body entails transferring political obligations and decision-making responsibilities. However, politicians can be held responsible for their policy decisions about transferring power to a NDBP in the first place due to their supervision and regulatory roles (Thiel, 2004). The same situation applies to advisory NDBPs. Politicians can either employ NDBP advice to justify unpopular policy decisions or hide behind the excuse of adopting insufficient guidance to justify their poor policy judgments. Furthermore, because of their public accessibility, the relevant politicians can quickly embrace achievements resulting from an NDBP's advice.

On the other hand, NDBPs allow politicians to deflect blame and transfer responsibility for operational concerns that they cannot address. On the other hand, benefiting from these transfers requires robust and transparent NDBP oversight mechanisms (Flinders, 2004).

According to Shapiro (1997; 289), "creating such an 'apolitical' independent agency is constitutionally guaranteeing rights. It is the announcement by the demos that it does not trust itself and wishes to put certain policy questions beyond its reach". Indeed, by transferring policymaking or consultation mechanisms to NDBPs, topics such as highly value-based judgments relating to history or religion can be relocated from the political to a more objective field. Depoliticising decision-making in these domains can assist in developing public trust by boosting decision independence, credibility, and coherence in areas where political intervention is seen as undesirable or destabilising (Flinders, 2004; Gash et al., 2010).

Another important reason why NDPBs are so commonly employed is their flexibility. On the one hand, the types of relationships that an NDPB has with relevant government departments might range from utterly independent to tighter control without a direct authority link. On the other hand, the accountability process can be classified as either hierarchical or the market style. Again, NDPBs can bring in private or third-party services by providing a legal and financial basis or separating public services from government bureaucracy (Bartelli, 2006).

Last but not least, another advantage of NDPBs is managerial flexibility. It is advantageous in two ways. First and foremost, independence from civil service administrative norms, such as pay and hiring/firing procedures, is critical. Governments can benefit from advisory NDPBs to gain external experience and information at lower costs than a private consultancy or outsourcing the evaluation activities. In this sense, NDPBs are an excellent method to recruit high-profile individuals at a low or no cost and benefit from their experience. Second, NDPBs can provide outside mainstream policies because they are not part of the typical state hierarchical framework. Since these recommendations include objective expert opinions that can be followed throughout the policy-making process and

replies from social partners who can act as intermediaries between interest groups and the government, they can help avoid mistakes that lead to worse failures (Ogus, 1998; Gash et al., 2010; Flinders & Skelcher, 2012).

2.3. A Case Study From UK: Social Security Advisory Committee

Social Security Advisory Committee (SSAC) is an NDBP established and constituted under the Social Security Act dated 1980. It merged two predecessor bodies (the National Insurance Advisory Committee and the Supplementary Benefits Commission) and continued its duties under the Social Security Administration Act 1992. According to the Act, the primary task of SSAC is to give advice and assistance to the Secretary of State for Work and Pension in connection with the discharge of their functions under the relevant enactments (Social Security Administration Act, 1992). SSAC is an independent statutory body that provides impartial advice on social security and related matters. It scrutinises most of the complex secondary legislation that underpins the social security system. There are two main priorities of SSAC. While the first one is to run effective, timely, and impartial scrutiny on draft regulations in social security, the second one is to provide advice to the Secretary of State on social security and welfare (SSAC, 2015a).

SSAC is the UK's only statutory advisory body on social security and associated problems, such as its linkages to the labour market and more extensive social welfare concerns. SSAC does not have authority over industrial injury benefits, war pensions, occupational pensions, or child support. These exceptions, particularly occupational pensions, divide and limit the SSAC's coverage unnecessarily (Member of SSAC, 2016). Its position in mandatory secondary legislation examination is particularly unique. Its draft legislation reports must be responded to and published by the administration before or concurrently with the legislative process (Saunders, 2007). In this regard, legislative recommendations of SSAC are made not just for the Department of Work and Pensions and related ministers but also for the parliament and its members.

Fourteen members, including the chairperson, form the committee after consulting with the Prime Minister, the secretary of state-appointed the chairperson, and members. Every month, on average, all members spend two days on committee business, and they are only paid for their working days (based on a committee decision, the member does not claim travel time payments). Members' genuine working days, according to their opinions, are three days every month. The members are assisted by a secretariat consisting of five staff members and one non-paid advisor from HM Revenue and Customs. One of the secretariat staff works as an analyst and mainly assists in the independent work program of SSAC. The secretariat carries its duties understaffed and overworked (Member of SSAC, 2016)¹.

¹ *An interview was made with one of the SSAC members for understanding daily operations of SSAC and relations between DWP and SSAC in June 2016 in York. For respecting the member's request, the name of the member was not mentioned in the text. For using this footnote, I would like to express my gratitude to the distinguish member.*

The question of why SSAC is utilised for these scrutiny processes rather than DWP's internal mechanisms, such as the law department, needs to be answered. According to the last two Triennial Reviews, all stakeholders, internal and external, have agreed that independent advice and scrutiny are required. It is considered that political neutrality and independence from Ministers and the administration are essential for efficiently performing the duty of oversight. SSAC's legislative advice creates independent challenges that any other mechanism cannot provide, and it can highlight implications, interactions, and unintended consequences of any draft law in the field, thanks to its larger vision (on both DWP and HMRC legislation) and continuity (long term service of 4 to 6 years). Furthermore, these recommendations give the DWP a second chance at extra checks and vital insider information for parliamentarians.

On the other hand, its social partners regard SSAC as a trustworthy and approachable organisation because of its long-standing neutrality. They are more willing to participate in SSAC's consultation meetings. Its independence is SSAC's greatest asset, allowing it to communicate quickly and efficiently with a wide range of stakeholders in the realm of not only statutory scrutiny but also the other responsibilities listed below (Department of Work and Pension, 2012; Stoney, 2015). In this sense, the committee has been evaluated as an excellent intermediary tool between the Government and the customers of the social security system (Ogus, 1998).

Mandatory scrutiny has been a large part of SSAC's operation, and more than 50% of SSAC resources are also allocated for studies on mandatory scrutiny. For instance, during 2014-15, SSAC evaluated 42 packages of regulations and draft proposals that the committee provided feedback on. SSAC required additional scrutiny on five of these legislations and took them as a formal reference. In each case, the report produced by SSAC also contained results of wider public consultation (SSAC, 2015a; SSAC, 2015b). On the other hand, in the 2018-19 period, the Committee considered 15 packages of regulations and draft proposals covering a broad range of issues (SSAC, 2019).

The second part of SSAC's duty is to provide advice and assistance to the secretary of state, whether in response to a specific request or on SSAC's initiative. The secretary of state does not oblige to respond or publish this kind of advice. This advice and assistance can be (Stoney, 2015: 10):

- "Responding to specific requests for advice from Ministers and officials.
- Undertaking its detailed studies as part of SSAC's Independent Work Programme.
- Informally scrutinising regulations exempt from statutory scrutiny, e.g., where regulations are made within six months of a new provision.
- Providing non-statutory advice to HMRC.
- Providing comments on a range of draft guidance and communications.
- Responding to public consultation exercises conducted by Government and others where they believe they can add value".

Ministerial requests for advice may not be separate from the mandatory scrutiny exercises since providing independent advice and scrutiny on draft legislation improves SSAC's ability to produce broader advice on similar themes. Also, from a pragmatic standpoint, utilising the committee's knowledge for purposes other than mandated responsibilities seems logical (Department of Work and Pension, 2012).

Aside from its scrutiny efforts, the SSAC's Independent Work Program, which includes research and reporting activities, has played an important role in SSAC's advisory role. In 2019, two reports, namely "The effectiveness of the claimant commitment in Universal Credit" and "Separated parents and the social security system", have been published under this task (SSAC, 2019). Despite the lack of a more current study, older studies had noted a conflict between independent work programs and demand-driven advisory activities, particularly during welfare and social security reforms when government demand grew (Saunders, 2007). Naturally, the secretary of state and other associated ministers has tight ties to the SSAC chair and some members. As a result, such tensions can be reduced by informal or formal communication (Member of SSAC, 2016).

The success of SSAC is closely tied to its positive and productive relationship with its sponsoring department, DWP. Both sides had specific issues, according to the 2012 study. According to the DWP, some of SSAC's statements were inconsistent with and even adverse to government policies. Furthermore, it is said that SSAC was unable to demonstrate its differences and appeared to be just another stakeholder. SSAC, on the other hand, felt that DWP was overly defensive and did not devote enough time to describing the general contexts and aims of the laws under review (Department of Work and Pension, 2012). According to a 2016 evaluation, both sides have worked hard to improve their relationship. The key objective in doing so was to safeguard the committee's independence. The DWP has begun to share more information regarding draft regulations and their backgrounds with the committee, allowing the SSAC to provide more accurate and efficient advice. SSAC members and the secretariat have held a series of training for DWP and other associated authorities to increase understanding of the SSAC and its functions. Because of this training and improved staff contact between SSAC and DWP high-level managers and relevant ministers, there were no criticisms of relations in the 2012 review (Stoney, 2015; Member of SSAC, 2016). According to the 2019 review, the SSAC's interaction with the ministries has improved formally and through informal channels. The report states that "*We are particularly grateful to the Ministerial team for their willingness to engage with the Committee frequently, whether that be private keep in touch meetings with our Chair or informal private sessions with the full Committee. This serves to help gain an understanding of the respective roles played by both sides and establish the reputation of the Committee as a trusted adviser which strives to provide constructive and supportive advice*" (SSAC, 2019: 13).

3. Needs of Independent Advisory Body for Turkish Social Security Institution

3.1. Current Situation

Turkey enacted comprehensive institutional and parametric reforms in social security in 2006. Under the new Social Security Institution's umbrella, the former three social security organisations have been merged (SSI). In social security, citizens' rights and obligations have been consolidated simultaneously. SSI has grown into a comprehensive and unique institution that provides services to all Turkish nationals and foreign residents in Turkey from all social security branches described in ILO convention nr: 102, except for family benefits.

SSI was designated in its establishment act (nr: 5502) as an autonomous public organisation with its own legal identity and budget, even though it was created as an associated institution of the Ministry of Labour and Social Security. Since its establishment, there has been a controversy about its autonomy. Even though the SSI Management Board was recognised by law as the organisation's highest administrative body and some of its members were elected by stakeholders, there are concerns regarding SSI's administrative dependency, as the board's chair and the majority of its members are government appointees (Alper, 2007). The SSI General Assembly, on the other hand, was established as the institution's highest consultative body by law nr: 5502. The Assembly, which meets every three years, is chaired by the Minister. High-level delegates from associated parties are expected to participate in the Assembly. Even if SSI creates the agenda for each meeting, other stakeholders can add items to it. Although the assembly is an excellent example of social dialogue and a social partner forum, its ability to function as an autonomous consultative body is limited for the reasons given below (Turk-is, 2006; Demir, 2015);

- The efficacy and responsiveness of the Assembly are reduced significantly due to long gaps between meetings.
- The meetings are chaired by the ministers and one-third of the members appointed by the government. This group may act as a block during voting.
- The General Assemblies are not suitable for discussing operational issues and institutional reviews in detail due to high-level participation and deliberations and its specified functions in the law. The majority of the debates have centred on strategic policymaking.
- Instead of written analyses, participants express their views orally. Minutes are prepared by the administration and sent to the stakeholder.
- Even though the conclusions of the assembly should be considered policy priority by SSI, no analyses of the practical outcomes of the findings have been made public. In that sense, it can be said that there are no check mechanisms for real implementation of the assemblies' results.

3.2. The Reasons Behind the Need for an Advisory Committee for SSI

There are no official processes at SSI that can provide independent, regular, and high-level consultations and evaluations based on an integrated approach. On the other hand, these procedures are critical for ensuring the social security system's autonomy for various reasons.

To begin with, Turkey's fundamental social security legislation, the Act of Social Security and General Health Insurance, has been modified far too many times since its enactment in 2006. While the Act originally had 131 articles, 482 revisions have been made by 69 different laws and presidential orders as of 2021. In addition to the changes made to the primary law, numerous changes have been made to Act nr: 5510's bylaws and regulations. As monitored in Table 3, the significant frequency of revisions to a relatively new law harms the system's stability and homogeneity. Table 3 indicates that many amendments have been put into force with other laws and executive degrees. Observing alterations in already modified articles, in particular, results in a significant loss of credibility (Usan, 2016: SSI, 2016a).

Table: 3
Number of Alterations of Law Nr: 5510 since 2006 (Sub-Clause Level)

	Law Number	Number of Alterations		Law Number	Number of Alterations		Law Number	Number of Alterations		Law Number	Number of Alterations
1	5565	1	21	6353	11	41	KHK/681	13	61	7162	1
2	5655	2	22	6385	12	42	6770	2	62	7179	7
3	5754	109	23	6458	3	43	6824	9	63	7194	1
4	5763	4	24	6462	10	44	KHK/690	17	64	7196	1
5	5797	6	25	6486	7	45	7020	2	65	7226	4
6	5838	5	26	6494	1	46	KHK/694	2	66	7256	3
7	5917	3	27	6495	7	47	7061	1	67	7281	2
8	5921	1	28	6518	1	48	KHK/696	1	68	7316	2
9	5951	1	29	6552	23	49	7072	2	69	7318	1
10	5947	2	30	6645	16	50	7073	12		Total	482
11	5951	1	31	6655	1	51	7077	17			
12	5997	9	32	6661	1	52	7078	2			
13	6009	1	33	6663	9	53	7099	2			
14	6111	41	34	6676	4	54	7103	8			
15	6191	1	35	6704	1	55	7143	3			
16	KHK/665	3	36	6728	10	56	7144	1			
17	KHK/666	2	37	6745	4	57	KHK/703	16			
18	6270	12	38	6761	1	58	7146	3			
19	6283	6	39	6774	7	59	7151	1			
20	6322	2	40	KHK/680	2	60	7161	3			

Source: Prepared by the Author via Act of Social Security and General Health Insurance Nr: 5510.

The broad implementation area requires a wide range of use of secondary legislation (Table 4) that may not be scrutinised by the government, administration, or legislatures. It is evident that the current legal system has severe flaws and mandating independent third-party scrutiny of draft legislation could be the answer (Department of Work and Pension, 2012).

Table: 4
Number of Secondary Legislative Documents

Type	Number of Documents
Institutional Regulations	48
Institutional Circular	282
Basis and Procedures	35
Statement Documents	49
Directives	17

Source: <<https://kms.kaysis.gov.tr/Home/Kurum/22620739>>, 27.05.2021.

The second reason is social partners' access to decision-making processes. Even though SSI has stated that maintaining close relationships with all stakeholders is an institutional priority, there is no information about the outcomes of these relationships in the annual reports (SSI, 2016b; SSI, 2018). Although the institution has attempted to benefit from social partners' perspectives by requesting official written opinions or convening ad hoc meetings outside of general assemblies, individual departments usually collect social partners' views for their own specific needs and do not disseminate information internally. As a result, a coordinated system for vertical and horizontal transmission of common knowledge about stakeholder contributions cannot be established. An independent consultation mechanism can help coordinate and facilitate interactions between SSI and social partners.

According to its Strategic Plan for 2015-2019, one of SSI's strategic goals is to improve service quality and capacity. This strategic goal can be considered the third reason. The administration intends to strengthen its local offices while increasing client satisfaction rates to achieve this goal. SSI has outsourced its evaluation of developments to an external company in this field (SSI, 2016a). However, these external evaluations are limited to client surveys, with no mention of assessments leading to process improvements or human capital increases.

In most cases, individual departments attempt to develop separate policies in their respective areas and impose them on frontline offices. This situation adds complexity to the mix and hierarchical pressures on service providers. An independent body's evaluation and consultation process conducted in the country may result in more objective, coordinated, and targeted analyses. It may also provide a more open environment for local office opinions.

The last reason for the need for an independent advisory mechanism is to overcome difficulties caused by the external-internal evaluation dichotomy. As previously stated, SSI is evaluated both internally and externally. Both external and internal evaluation have advantages and disadvantages. In the case of SSI, assessments conducted by governmental external evaluation bodies carry some risks, such as being unaware of particular sensitivities of social policies and institutional structure, limited information about rapidly changing legislation, or insufficient knowledge about the social insurance system. Internal evaluations conducted by SSI departments, on the other hand, are based on historical and institutional facts and contain more accurate information about legislation. It is much easier to establish a link between internal evaluations and implementations. However, evaluators' expectations

about their careers, political interventions and redirections, departmental biases, being evaluators and other duties, and insufficient relation with stakeholders can impair the quality of the internal evaluation (Clarke, 2005). As a third method, SSI outsources its external evaluations to private companies. However, these external evaluations are limited to client satisfaction issues in most cases.

In this context, establishing a mechanism capable of employing a more integrated evaluation approach would benefit SSI. To begin, SSI requires both formative and summative evaluations to improve service quality. Second, the complexity of social security legislation necessitates internal knowledge. Third, its large number of employees, national service network, and complex institutional structure necessitates a high level of expertise in SSI. But at the same time, objectivity and independence become crucial for quality evaluation in this kind of institution with a wide variety of duties and large service networks (Le Menestrel et al., 2014). Furthermore, due to the complexity of social security legislation and conflicts of interest among various parties, any changes in social security legislation and implementations can result in unintended reflections on unexpected areas. Knowing multiple fields of social policy becomes critical in dealing with all the complications of changes in social security legislation (Department of Work and Pension, 2012).

4. Concluding Remarks: Recommendation on Establishment of Independent Advisory Body for SSI

Since the states' inception, policymakers have observed, borrowed, and adopted the policies and implementations of other nations to solve their problems. In particular, in areas such as social policies, policymakers at all levels around the world look to different places/institutions or history to learn from other experiences or find best practices or wrong lessons. The primary goal of this search is to adopt policies that have already been piloted and proven successful in various jurisdictions. According to Page (2000: 2), the policy transfer concept is "the transposition of policies and/or practices already in operation in one jurisdiction to another". On the other hand, Evans proposes that policy transfer tries to make sense of the cross-cultural transfer of knowledge about institutions, policies, or delivery systems from one sector or level of governance to another level of governance in a different country (Dussauge-Laguna, 2012). Knowledge, administrative arrangements, or institutions from other places can develop policies in other countries or areas (Dolowitz & Marsh, 1996). In that sense, the transposition of the SSAC example from the UK to Turkey to establish a new institutional structure and develop new policies can be accepted as a policy transfer based on emulation. However, only borrowing ideas from the outside world in their original form would not be enough for the successful emulation of a policy. The receiver country should adopt policy approaches, tools, and structures for its own conditions (Stone, 2001). As a result, Turkey should rearrange its approach to advisory NDPBs in general and the institutional structure and policies of the SSAC in particular based on its own needs. Within the scope of this understanding, the following would be the main principles of an institutional and administrative structure for an independent advisory body:

- As seen in the SSAC example, SSI's advisory body (as a theoretical abbreviation, SSIAB) should be responsible for providing high-quality and efficient advice to the Minister of Labour and Social Security, the SSI's president, and the parliament on social security issues when necessary. If SSI sponsors SSIAB, there may be more value for money. Because of its expert staff capacity, SSI can lend its experts to the SSIAB secretariat. According to the lessons learned from the SSAC secretariat, SSIAB secretariat staff may be appointed for a more extended period and comprise two personnel groups: analysts and support personnel.
- SSIAB members would represent the administration, social partners (clients of the SSI), and academia. The criteria and job descriptions for the members should be made public. The Minister should appoint the members and chair based on the recommendations of the related parties. Their term of office should be at least four years and should not be about the ministers. The member must be apolitical, but they may represent interest groups that nominate them. If SSIAB membership is an honorary position rather than a paid job, their accountability will be increased. In contrast to the SSAC example, committee members should be compensated for every day spent on committee work, including travel days. Again, all costs of SSIAB should be publicly announced.
- SSIAB's independence should be the first and foremost feature. It should be able to control its production process. As a result, the board must decide on its working methods, resource management, and outputs (Thiel, 2004). In the case of Turkey, political authority can easily influence, intervene in, and even change SSI's internal processes. In this sense, without legislative protection for the SSIAB's production process, the board could quickly lose its independence and become an area that political figures can patronise and direct as they see fit. The only independent advisory body can produce the undermentioned benefits:
 - Production of advice and evaluation based on long-term technical necessities instead of short-term political (populist) inducements.
 - Close and sustainable relations with all stakeholders.
 - Accountable scrutiny process on draft legislations.
 - Being a trustable consultation point for all external partners, including social partners and the parliament.
 - Production persuasive advice that political figures can use for justifying their positions and shifting their responsibility.
- In parallel with SSAC, primary responsibilities should be scrutiny of the draft legislation responded to by the administration mandatorily and providing self-initiative or demand-based advice. Considering that extremely high amendments have taken place in the Turkish system, most SSIAB resources would be used for mandatory scrutiny activities. However, as mentioned in the SSAC example, the advice activities and mandatory scrutiny are connected in most cases. High-level amendments require continuous evaluation of the wide-range effects of changes in the various fields and different interest groups. SSIAB would be the most suitable mechanism for conducting these evaluations by using an integrated

approach by merging the expertise of its members and inside information provided by analysts in its secretariat.

- Apart from these two primary duties, SSIAB should conduct staff training and local office visits. These two types of activities would help increase SSIAB's visibility inside the institution, and, at the same time, they would provide observation opportunities for further evaluations.
- In the UK case, accountability of NDBPs is one of the most controversial issues. Giving independence to SSIAB would lead to a shift in political accountability from managerial issues to supervision. This shift makes available shifting in responsibility. On the other hand, SSIAB's accountability should be guaranteed by internal and external evaluations. SSIAB should publish its working plans, including future targets and annual reports. External evaluation can be made annually or biannually by SSI or external evaluators. Similar to triannual evaluations of SSAC, it should contain different stakeholders' opinions about the board. The external evaluation should be summative and formative. In this way, procedural improvements can become possible, but the existence of the SSIAB can also be justified.
- As seen in the literature review part and external evaluation on SSAC, the relation between an advisory NDPB and its sponsor institution is very important. While the main claims come from sponsor institutions as too low quality or indelicate advice, NDPBs complain about unclear work definitions, lack of information sharing, and inclusion in the policymaking process. To avoid these problems initially, roles and responsibilities should be identified clearly. As observed in the SSAC example, informal communication channels improve the quality of relations between bodies. The exact structure may adapt for SSIAB, as well.
- Although this depends on SSIAB performance, it can be anticipated that SSIAB can pass the three tests that SSAC passed in theory. Firstly, due to the material and personal coverage of SSI being bigger than DWP's coverage, it can be expected that the need for external technical expertise is more significant. Especially when considering a high level of Turkish legislation amendments, the need for additional effort and expertise for scrutiny and evaluations for new implementation becomes much clearer. Secondly, Turkish legislatures and administrators need apolitical and impartial assessments and consultations in social security due to many legislative changes. Lastly, high-level independence is required for an advisory body operating in an environment where political interventions in daily operations are very high.

In conclusion, the benefits of establishing an arm's length advisory body for SSI are obvious. However, independence is the most crucial and essential power and the necessity for these kinds of bodies, as is underlined by one member of SSAC (Member of SSAC, 2016). Without absolute independence from political pressure, the recommended body cannot create a difference in the current structure of the Turkish social security system.

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The Effect of Augmented Reality Experience on Loyalty and Purchasing Intent: An Application on the Retail Sector

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Artırılmış Gerçeklik Deneyiminin Sadakat ve Satın Alma Niyetine Etkisi: Perakende Sektöründe Bir Uygulama

Abstract

Due to mobile applications have become popular in marketing activities, many retail businesses have begun to launch their Augmented Reality (AR) applications. The application of AR technology to marketing is a very new process. When businesses create interactive channels through which they can reach consumers, they can influence the purchasing decision processes of consumers. In addition, companies aim to provide consumers with an unforgettable shopping experience. The study's research question was, "How do consumers' innovativeness and AR experiences affect their loyalty and purchase intentions? Also, innovativeness has a significant effect on their AR application use intentions. This study investigates the impact of innovativeness and AR experience on consumer loyalty and purchase intention. Based on the assumption that the importance of AR applications in marketing activities will gradually increase, it can be said that examining the effects of AR applications on consumer attitudes and behaviours is gaining reputation. Studies investigating the impact of augmented reality applications are very limited in the consumer behaviour literature. This situation shows the original value of the study. In the application part of the study, a quantitative research design was used. In this context, the convenience sampling method was selected. Data were collected from 319 participants via an online questionnaire, and the responses obtained were analysed using a structural equation model. The results showed that the AR experience had been affected positively by the innovation dimension, while consumer loyalty was affected positively by the AR experience.

Keywords : Marketing, Augmented Reality, Structural Equation Model, Innovation, Loyalty, Purchase Intention.

JEL Classification Codes : M30, M31.

Öz

Pazarlama faaliyetlerinde mobil uygulamaların kullanımını popüler hale gelmesiyle birlikte günümüzde birçok perakende işletme, kendi AR uygulamasını piyasaya sürmeye başlamıştır. AR teknolojisinin pazarlama alanına uygulanması oldukça yeni bir sürecin başlangıcını ifade etmektedir. İşletmeler, tüketicilere ulaşabilecekleri interaktif kanallar yaratıklarında, tüketicilerin satın alma karar süreçlerini etkileyebilmektedir. Ayrıca, işletmeler, tüketicilere unutulmaz bir alışveriş deneyimi sağlamayı hedeflemektedir. Buradan yola çıkıldığında çalışmanın araştırma sorusu, "Tüketicilerin yenilikçilikleri ve AR deneyimleri, tüketici sadakatini ve satın alma niyetini nasıl etkileyecektir?" olarak belirlenmiştir. Tüketicilerin yenilikçilik merakı da AR uygulaması kullanım niyetleri üzerinde önemli bir etkiye sahiptir. Dolayısıyla çalışmanın amacı, yenilikçiliğin artırılmış gerçeklik deneyimine

ve AR deneyiminin de tüketici sadakatine ve satın alma niyetine etkisini incelenmek olarak belirlenmiştir. Pazarlama faaliyetlerinde AR uygulamalarının öneminin giderek artacağı varsayımından hareketle, AR uygulamalarının tüketici tutum ve davranışları üzerindeki etkilerinin incelenmesinin önem kazandığı söylenebilir. Tüketici davranışları literatüründe artırılmış gerçeklik uygulamalarının etkilerini araştıran çalışmalar oldukça sınırlıdır. Bu durum, çalışmanın özgün değerini göstermektedir. Çalışmada, nicel araştırma tasarımı kullanılmıştır. Bu kapsamda kolayda örneklem yöntemi ile 319 katılımcıdan online anket yoluyla veri toplanmış ve elde edilen yanıtlar çalışmanın amacı doğrultusunda faktör analizi ve yapısal eşitlik modeli kullanarak incelenmiştir. Sonuçlar yenilikçiliğin ve AR deneyiminin ürün ve eğlence boyutlarını pozitif yönlü etkilediğini, bununla birlikte AR deneyiminin ürün ve eğlence boyutlarının da tüketici sadakatini pozitif yönde etkilediğini göstermiştir.

Anahtar Sözcükler : Pazarlama, Artırılmış Gerçeklik, Yapısal Eşitlik Modeli, Yenilikçilik, Sadakat, Satın Alma Niyeti.

1. Introduction

Developments in communication technologies have brought many novel concepts and applications into our lives. The increase in the number and use of smart devices and mobile internet connections have caused new dimensions to emerge in businesses' outlook on marketing activities.

When the digital transformation in marketing activities is evaluated from the perspective of both businesses and customers, it reveals the following research opportunities for researchers and businesses (Rauschnabel et al., 2019).

- How can brands use existing technologies with new technologies such as AR, AI, chatbots, voice-activated assistants, and wearables?
- Can innovative behaviours be developed in individuals and the broader consumer community?
- Which digital marketing and social media technologies-related strategies, activities, or initiatives can improve the way customers engage in innovation-related behaviours?
- What are the interactions between customer characteristics such as innovation, brand engagement, technology readiness, and the features of technological platforms?
- What are business capabilities required to capture, manage, and gain a deeper understanding of customer innovation opportunities?

While seeking answers to these research questions, it is observed that businesses increasingly include mobile applications in their digital marketing activities.

With smartphones and mobile internet connections becoming an indispensable part of consumers' daily lives, businesses have needed to respond by incorporating several marketing applications in their marketing activities. As a result, mobile applications

developed by businesses have turned into essential tools for interacting with consumers. These mobile applications form an attachment between consumers and businesses and create brand awareness.

Using these mobile applications of businesses/brands may also enable consumers to experience the product they wish to purchase. Augmented Reality (AR) is one of the most recent mobile applications businesses have begun to employ. Businesses aim to draw consumers' attention through virtual showrooms, changing rooms, makeup applications, virtual tours developed using AR, and advertising campaigns integrating AR.

Businesses try to give consumers the best experience, especially in online shopping experiences. In addition, nowadays, it is extremely important to establish interactive communication with consumers to develop sustainable relationships with consumers. For consumers interested in and want to experience technological innovations, innovations such as AR applications can influence consumers' purchasing decisions.

Within the context of AR applications in marketing, which constitute a dimension of experiential marketing, the present study aimed to determine the effects of businesses' marketing campaigns employing AR applications on consumer loyalty and purchasing intention. This study is considered necessary because relatively few studies in the relevant literature. This subject has been predicted to be crucial for AR applications of businesses related to consumers' purchasing experiences (Gaudiosi, 2015).

2. Literature Review

People have begun to carry out many of their daily processes through smartphones, and people use mobile applications such as augmented reality more commonly. Developing more creative, innovative strategies than competitors has become essential for building strong and effective customer relationships. Such marketing strategies are assumed to give the consumers a more positive experience. Augmented reality marketing, which could be considered a dimension of experiential marketing, has taken the foremost rank in the most innovative marketing strategies practices.

2.1. Experiential Marketing

In terms of marketing, the experience can be defined as the whole range of pleasant feelings businesses create for consumers (Verhoef et al., 2009). On the other hand, experiential marketing gives consumers unforgettable experiences with a holistic marketing approach, with constituents supporting each other (Schmitt, 1999). Experiential marketing offers businesses a competitive edge, and a positive consumer experience is strategically important for a business (Schmitt, 1999; Maklan & Klaus, 2011; Luigi et al., 2012). In experiential marketing, consumers are provided with experiences before, during, or after the purchase (Schmitt, 1999). Experiential marketing is the set of values that give pleasure to consumers and appeal to their senses used to improve brand loyalty (Bati, 2013). Experiential marketing aims to influence customer satisfaction while at the same time

ensuring the continuation of customer loyalty (Brakus et al., 2009; Garg et al., 2010; Klaus & Maklan, 2013). Experiential marketing creates an emotional relationship between the brand and the consumer (Küçükşaraç & Sayımer, 2016). According to Nasermoadei et al. (2013), emotional and social experiences positively affect purchase intention.

The augmented reality experience can be described as an element of experiential marketing. Hence, businesses incorporate AR applications into their marketing activities as experiential marketing to increase interactions with consumers, create a different product/brand experience, and increase consumer satisfaction and loyalty.

2.2. Augmented Reality

There is an upper term - XR - which represents the concepts of AR and VR. There is no agreement as to whether "X" stands for "extended," "extended," or simply serves as a variable X for "anything" about new and innovative forms of reality. Accordingly, XR is a general term with two independent subcategories, AR and VR. AR is a general term for a continuum from Aided Reality to Mixed Reality (Dwivedi et al., 2021).

Augmented Reality (AR) is a kind of virtual media or virtual reality, as it is commonly called. The main difference between Augmented Reality and virtual reality is that the latter is detached from the real world, while the former combines virtual objects with the real world (Azuma, 1997).

Augmented Reality (AR) can be defined as "an environment in which digital information, which is both spatially and temporally registered with the physical world and interacts in time, is placed on the physical world" (Craig, 2013).

Augmented reality provides users with real-time visual experiences integrated into a place or object they are looking at in the real world without any delay (Gervautz & Schmalstieg, 2012). AR systems integrate virtual data into the physical environment of individuals, enabling them to perceive that data in their environments (Höllerer & Feiner, 2004). Virtual reality aims to bring the user into a different world by creating a digital experience in a simulated or imaginary world. However, augmented reality seeks to overlap data or content and the real world. Augmented reality aims to add to, rather than replace, what is happening (www.mdgadvertising.com, 2017). Applications such as video games, interactive marketing and advertising apps, medical apps, educational apps, and navigation apps can be given as examples of important AR applications (Gervautz & Schmalstieg, 2012).

The reason why AR applications are regarded as a dimension of experiential marketing may be that they enable individuals to experience products. Thanks to AR applications, users can have experiences such as examining, discovering, interacting with, and sharing their opinions on the products. Aside from using AR applications for entertainment purposes or games, businesses can create a brand, product, or marketing campaign by employing such applications in other ways. For instance, an eyewear company

lets its customers experience its products using a smartphone camera through its developed virtual mirror. Moreover, several brands have AR applications that help their consumers with interior design. With AR apps downloaded onto smart devices, consumers can instantly and easily see how an object or a wall paint they have chosen for their home might look in the room. Businesses also employ AR applications to create interactive advertisements and package designs, increase retail experiences, and develop exciting games. Such applications facilitate the spread of engrossing brand stories and make it possible for consumers to experience the products in novel ways (Scholz & Smith, 2016).

Considerable consumer interest in these applications has given rise to the idea that businesses could benefit from AR applications in their marketing activities to differentiate themselves from their competitors.

AR applications are making their way from laboratories into consumer markets. AR applications such as smart mirrors or virtual makeup apps have been treated as crucial potential marketing tools in the retail sector to create experiences for consumers, draw their attention, and influence their purchasing decisions (Pantano & Naccarato, 2010; Demirkan & Spohrer, 2014; Pantano, 2014; Daponte et al., 2014).

2.3. AR Marketing

The term "AR Marketing" was coined in response to the utilisation of AR applications in experiential marketing. Although an increasing number of companies are integrating Augmented reality into their marketing campaigns (Dacko, 2017), and previous academic research points to the potential for AR for marketing purposes, it is still in the process of developing a working definition of AR marketing (Yaoyuneyong et al., 2016).

Although there is no clear definition of AR marketing, when Augmented Reality is used in marketing, it is called "Augmented Reality Marketing" AR marketing is a strategically driven marketing act generally used with other media tools that combine digital information or objects with the perceived physical world in a way that could help businesses achieve their aims and to provide benefits to the consumer (Rauschnabel et al., 2019).

Marketing is becoming more and more digital day by day is an indicator of digital transformation in marketing activities. Marketing activities such as e-commerce, online brand communities, digital advertising tactics, live chat services, and mobile services can be given as examples (Lamberton & Stephen, 2016).

Studies have found that digital marketing and social media marketing have a positive effect on customer retention and purchase intention (Hanaysha, 2018; Alansari et al., 2018; Morra et al., 2018; Wong et al., 2018). Social media marketing also has a positive effect on brand-related issues such as brand equity and brand loyalty (Tarnovskaya & Biedenbach, 2018; Stojanovic, 2018; Mishra, 2019; Shanahan et al., 2019).

Businesses use various tools to analyse data on social media, extract data and manage multi-channel communication. However, many organisations seem to have low adoption and use of analytical tools such as AR or Machine Learning and do not know enough about emerging technologies such as Artificial Intelligence (AI) (Duan et al., 2019; Gil González et al., 2018; Miklosik et al., 2019).

But the technologies listed above are used by companies to improve brand-related social media images automatically, set more effective sales promotion targets, suggest personalised incentives for users, and identify relevant eWOM communications (Tous et al., 2018; Vermeer et al., 2019; Takahashi, 2019; Ballestar et al., 2019). Studies in the literature primarily provided information about AR's mechanisms (Huang & Hsu Liu, 2014).

Within the concept of experiential marketing, brands turn smart devices, packages, and printed media into interactive promotion tools through AR applications. Therefore, AR applications as part of marketing strategies can start making significant contributions to businesses wishing to interact with their consumers in producing innovative and creative campaigns that are different from their competitors. Using AR applications in marketing activities forms one part of the multi-channel marketing strategies for businesses (Bodhani, 2013). Augmented reality applications emerge as a new means of marketing communication, with relatively little research carried out on the aspects of marketing and consumer behaviour (Yadav & Pavlou, 2014).

AR marketing is a strategic company capability that can bring different perspectives to user behaviour. AR marketing is an open and flexible marketing activity that encompasses many AR techniques and technologies, emphasising the integration of different types of digital and physical content without specifying requirements for interaction or levels of realism. The goal of AR marketing is to achieve corporate goals. AR marketing can be used in commercial, profit-oriented, non-profit, or, more generally, ideas marketing. AR Marketing can also enhance and extend established marketing approaches ranging from advertising to content marketing to storytelling. In this sense, AR marketing can be applied to company-provided (e.g., virtual mirrors in stores) or user-provided technologies (e.g., mobile devices such as tablets and smart glasses) (Rauschnabel et al., 2019).

AR Marketing can address multiple goals throughout the customer journey, such as branding customers, triggering purchases, and improving after-sales service (BCG, 2018). While some existing branded AR apps are linked to pre-purchase activities (e.g., furniture purchase planning), others provide post-purchase value. Some everyday AR marketing activities use AR alone (for example, a virtual mirror), while others use it in combination with other media (Yaoyuneyong et al., 2016).

Marketing campaigns carried out through AR applications also bring new insights into consumers' purchasing behaviour. Stores have turned into exclusive places combining real and digital, thanks to developments in communication technologies. AR applications present information to consumers' senses at various levels. It could therefore be suggested

that augmented reality has reshaped commercial activities. Online content created through social networks has turned individuals from testers to buyers and buyers to advertisers, giving more excellent value to experiences and increasing sales (Cuomo et al., 2014).

Among the studies carried out on the subject is Bulerca et al.'s (2010) descriptive work, which showed three themes of AR applications that influence users: creating a brand attitude, perceived benefits of AR marketing, and perceived negativity. Regarding the benefits of AR marketing, the study participants above suggested that they found the application time-saving, practical, convenient, and entertaining. Regarding brand attitude, the participants stated that they found the brand honest and trustworthy as they could experience the products in the application when they used it. On the other hand, perceived negativity was that participants could experience the products only in the virtual environment. Eyüboğlu's (2011) study showed that participants found the AR application entertaining and exciting.

Studies on virtual trials used in marketing campaigns have shown the significant role of hedonic and pragmatic viewpoints on user experience (Cho et al., 2012; Merle et al., 2012). According to Schwartz (2011), traditionally, exposure to a product has been categorised as direct or indirect. Seeing the product in an advertisement is an indirect experience while trying the product in the store means a direct experience. However, experiencing the product virtually with AR applications is among my indirect and direct experiences in the spectrum of experience. Also, Schwartz (2011) stated that individuals have an indirect experience of the products when they see them in conventional advertisements and a direct experience of them in stores. AR applications allowed individuals to experience the effects of these two extremes. In other words, consumers can experience the product/brand without going to a store or being exposed to a conventional advertising message, thanks to AR applications. The study above found that incorporating AR applications in marketing activities influenced consumers' purchasing intention, with a direct and significant relationship between participants' attitudes and purchase intentions.

Krieger (2013) found that AR marketing positively changes consumer behaviour, brand value, and customer retention. In the study, users reported that they liked and found the AR application entertaining, and they would share the product they saw through the application with their friends and acquaintances. The study above found that participants had positive attitudes towards the product and the brand after they had experienced the AR application. It also revealed that AR marketing had a relatively significant effect on purchasing, loyalty, and customer satisfaction. The participants stated that the AR marketing application made it possible to interact with the business, and they liked this kind of marketing.

AR applications provide users with several cognitive and emotional benefits such as knowledge, awareness, satisfaction, and stimulating experiences. Two main characteristics of AR applications are that they provide additional information about the product/store and enable consumers to have pleasant experiences by stimulating them (Olsson et al., 2013).

Poncin and Mimoun (2014) conducted a retail field study and found that AR positively affects the store atmosphere. Spreer and Kallweit (2014) also examined shopping experiences associating AR Marketing with hedonic and utilitarian gratifications.

Chang et al. (2014) suggested that works of art enriched with AR applications increased memorability of information on the work of art and the appreciation of the paintings. Characteristic traits of early adopters, such as openness to new ideas, are among the factors influencing the perceived value of AR applications (Javornik, 2014).

Huang and Hsu Liu (2014) showed that allowing users to place furniture in their rooms through AR visualisation created a strong experiential value when integrated into consumers' shopping journeys. Chang et al. (2014) suggested that the entertainment factor rather than the application's functionality is more important in adapting users to such technologies.

Kourouthanassis et al. (2015) investigated the role of emotions in adapting mobile applications in personalised tourism advice. They found that functional properties of AR applications, such as impact and stimuli, have a profound effect on users' voluntary use of the application. In their study, Javornik et al. (2016) looked into the effects of a make-up application placed in a store that allows users to try makeup virtually on user experience. The study participants stated that they were greatly amused, excited, and surprised by their experience with the application. The study also suggested that AR apps allow low virtual try-on in cinemas, theatres, and museums. AR applications can provide an exhilarating experience when their uninterrupted integration is ensured due to their complex structure involving utility, reality, enjoyment, and amusement. The study's findings showed that participants responded positively to the AR application. Scholl and Smith (2016) developed an eight-factor model for businesses to efficiently utilise AR applications in their marketing activities, namely experience, nourishing engagements, target audience, integrating AR application into the marketing program, neutralising threats, defining marketing targets, benefiting from the brand name, and attracting consumers' attention. Rauschnabel et al. (2017) showed that flow, social image, and social norms drive consumers to buy through AR applications. Kös (2017) suggested that users found advertisements with AR applications exciting and entertaining and increased customer satisfaction. Participants stated that the AR application was interesting because it made shopping easier, helped users spend less time shopping, and facilitated better time management. Hilken et al. (2017) found that AR applications can affect hedonic and utilitarian gratification and purchasing and word-of-mouth behaviours by increasing decision comfort. Comparing conventional e-commerce and AR applications, Yim et al. (2017) and Yim and Park (2018) suggested that AR applications are more often associated with utility, pleasure, and innovativeness. Adam and Pecorelli (2018) found that online recommendations influenced customers' online purchasing intention and their choice of products. They also suggested that the effects of consumer recommendations in AR settings are similar to those on conventional online marketplaces. Customers' suggestions on AR applications decrease others' product uncertainty and positively influence purchasing intention and choice of products.

Holopainen et al. (2018) stated that enriched reality applications could present new opportunities for different emotional influences, enhanced social interactions, and long-term customer experiences between customers and between businesses and their customers. Their study also found that enriched reality applications positively impact word-of-mouth marketing communication activities. The interaction rate of an individual having experienced an enriched reality application with the store selling the product/service tends to increase.

Rauschnabel (2018) has shown that basic human needs (belonging, relationship, or social connection) can be addressed through AR technologies. Dieck and Jung (2018) reported similar findings in the context of tourism. According to the results of their research, information quality, system quality, usage costs, recommendations, personal innovativeness, risk, and facilitating conditions affect the perceived ease of use and usefulness of AR applications.

Rauschnabel et al. (2018) determined that Augmented Reality Smart Glasses provide hedonic, utilitarian, and symbolic benefits. Using a branded AR application positively affects the participant's attitudes towards the brand. Augmented Reality can also be used to expand core products and services ("products"). For example, companies can use AR components to expand their services or physical products.

Retailers can use Augmented Reality to enable their customers to virtually try out products from multiple vendors (Rauschnabel et al., 2019).

When investigating how and where Augmented Reality can affect the marketing mix, it can be said that Augmented reality can further improve and expand the supply chain channels. Augmented Reality can be used in B2B marketing activities as an effective tool to market products or services to other companies as an advertising or sales tool. Augmented Reality can create direct interactions between manufacturers and consumers in B2C marketing, thus opening up new opportunities for communication ("promotion") and selling ("place") Dwivedi et al. (2021).

2.4. Innovativeness

Innovation takes a vital role in the development of technologies nowadays. In terms of technology, innovation; is defined as people's willingness to try new technologies. Innovation plays an important role in the development of technology. Functions such as innovation, attitudes, needs, and experiences ensure home shopping methods. Therefore, consumers who embrace innovation may be more likely to perceive AR apps as practical, easy, and fun. Consumers who are open to innovations and consumers who are eager and curious to try innovations attach importance to the functional features of AR applications (Midgley & Grahame, 1978; Shim & Drake, 1990; Flynn & Goldsmith, 1993; Agarwal & Prasad, 1998; Robinson et al., 2004; Huang & Liao, 2015).

Attitudes towards technology also explain the adoption of technology. Therefore, it can be said that an individual's use of new technology is a function of an individual's attitude towards technology use. TAM (Technology Acceptance Model) is based on the reasoned action theory. The model states that having a positive attitude to perform a behaviour increases the probability of performing that action. Therefore, it can be said that consumers who have positive attitudes about AR applications will be more likely to use AR applications in online shopping (Ajzen & Fishbein, 1980; Moore & Benbasat, 1991; LaRose & Atkin, 1992; Kim & Forsythe, 2010).

2.5. Purchase Intention

Purchasing intention is closely related to consumers' interest in and the possibility of buying a given product and future purchasing act (Peter & Olson, 2010; Hung et al., 2011; Kim & Ko, 2012).

There have been many studies highlighting the predictor role of positive mental state regarding the working mechanisms of experiential retailing factors (Baker et al., 1992; Donovan & Rossiter, 1994; Menon & Kahn, 2000; Eroğlu et al., 2001; Chang et al., 2011; Huang, 2012). The relevant literature suggests that positive mental states such as stimulation, pleasure, and satisfaction can increase purchasing intention and behaviour. It has been recommended that consumers with positive emotional experiences have stronger purchasing intentions.

Baier et al. (2015) stated that retailers could incorporate AR applications in their marketing activities, particularly to enhance customer experience and interact with customers by enabling them to experience the products in virtual settings and gain knowledge of the product. Also, according to Beck and Crie (2016), augmented reality applications have a significant effect on purchasing intention as it enables the consumer to experiment and visualise the product.

Similarly, Abrar (2018) showed that augmented reality applications in the retail sector influenced the brand's interaction with the consumers and consumers' purchasing intention. The study above also stressed that AR applications and devices could be creative tools for drawing consumers and promoting brand awareness.

2.6. Loyalty

Loyalty can be defined as a behavioural expression of a person's attitudes towards a brand (Cha et al., 2016). Loyal consumers love a particular brand, repurchase a product or service, make suggestions to others, and recommend the brand they buy. Loyal consumers are not affected by the marketing activities of rival brands (Kim et al., 2015).

Loyalty refers to the level of interest and product/service user experience for a particular brand (Liu et al., 2012). Loyal Consumers tend to make repetitive purchases from the same brand compared to those who are not loyal. They are less sensitive to price.

Therefore, loyalty is extremely important in businesses' relationships with consumers (Murray, 2015).

The more loyal consumers businesses have, the longer their sustainable profitability will be (Reichheld & Sasser, 1990). In some studies in the literature, a direct relationship has been found between innovation and loyalty (Eisingerich & Rubera).

3. Research Methodology

3.1. Hypotheses Development

Consumers with high cognitive innovativeness adopt innovations more easily. Furthermore, having an innovation perspective will not have an impact on the consumer, even if the use of products is complex (Venkatraman & Price, 1990). With AR applications, the products can be experienced virtually, evokes innovation in consumers, and affects businesses' relationships with customers (Prahalad & Ramaswamy, 2000). While building beliefs about new technology such as AR, consumers with higher levels of innovation use multiple sources of information and are more open to new experiences (Kim & Forsythe, 2010). Therefore, the first hypothesis of the research was determined as follows:

H1: "Consumers with a high level of innovativeness would positively affect AR Entertainment experience".

With the developments and innovations in communication technologies and the latest version of the internet, consumers have the opportunity to examine products in 3D, thanks to AR applications. Consumers also can examine some product features as if the product was in front of them, thanks to AR applications (Kim, & Forsythe, 2010). Therefore, the second hypothesis of the research was determined as follows:

H2: "Consumers with a high level of innovativeness would positively affect AR product information".

Entertainment is one of the main links between experiential marketing outputs and customer satisfaction (Chou, 2009; Yuan & Wu, 2008). When consumers have more enjoyable experiences through technology, their willingness to try new technologies increases. Therefore, consumers who experience online shopping with AR applications find shopping enjoyable affects their purchase intentions (Igbaria et al., 1996). It is stated in the studies above that AR applications create a pleasant experience. The visual appeal and entertainment value of the AR experience are important factors that further encourage the sustainable use of AR apps. Visual appeal in the AR experience affects the purchasing decisions of consumers (Huang & Liao, 2015). Hence the third hypothesis of the study is:

H3a: "AR Entertainment affects consumer loyalty".

H3b: "AR Entertainment affects purchase intention".

Retailers are turning to AR applications to help consumers learn more about the product and enjoy the shopping experience. Consumers have a high level of control over products while having a direct product experience with AR applications, deciding what to touch and in what order. This situation eliminates the limited interaction in traditional marketing activities (Klein, 2003). According to Li et al. (2008), the AR experience enables consumers to experience more and more interesting than the indirect experience. According to the results they obtained from their studies, consumers gained more information with their virtual experience than when they were directly exposed to the product. The product knowledge they acquired through virtual expertise, on the other hand, had a positive effect on their purchase intentions. Also, Lu and Smith (2007) stated that the AR experience provides informational value more than traditional e-commerce does. Hence, the fourth hypothesis of the study is that:

H4a: "AR product information affects consumer loyalty".

H4b: "AR product information affects purchase intention".

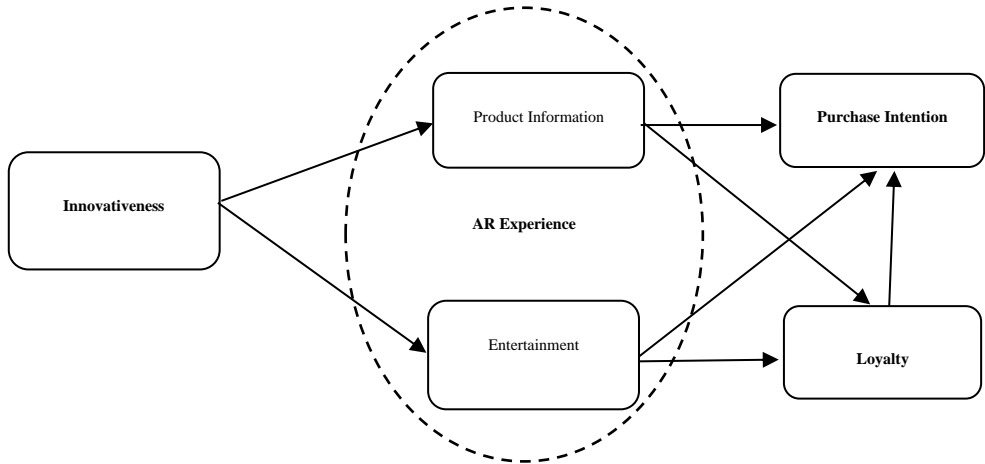
Loyalty can be defined as the tendency of consumers to buy one brand's products constantly. When consumers develop a relationship of trust with the brands they are loyal to, they continue to buy the same branded products (Noorlitaria et al., 2020). Hence, the fifth hypothesis of the study is that:

H5: "Loyalty positively affects purchase intention".

3.2. The Reasons Behind the Need for an Advisory Committee for SSI

Based on previous studies in the literature and hypotheses, this study proposes an integrated research model (see Figure 1).

Figure: 1
Research Model



3.3. Data Collection

The limited amount of research on AR marketing in the relevant literature and the prediction that the AR market will remain important indicates this study's importance. Data were collected through an online survey from 319 convenience-sampled participants for the present study. The survey form drew on the scales of Goldsmith and Holfacker (1991), Bulearca and Tamarjan (2010), Schwartz (2011), and Krieger (2013) and was composed of 37 items, including the demographics of participants. Following questions on participants' demographics, a 31-second-long video from the retailing sector (furniture and accessories products) that included an AR application was shown to participants to let them have the AR experience. They were asked to respond to questions prepared in a five-item Likert scale about innovativeness, AR experience, loyalty, and purchasing intention. The survey form was pilot tested for conformity on 30 subjects, and the final form of the survey was loaded online. The items were measured using a 5-point Likert scale, ranging from "completely disagree" to "completely agree".

Table 1 shows the demographical profile of respondents who participated in this study.

Table: 1
The Demographical Distributions of Participants

Gender	Frequency	%	Age	Frequency	%
Female	182	57,1	18-25	179	56,1
Male	129	40,4	26-35	90	28,2
Total	311	97,5	36-45	31	9,7
Missing	8	2,5	46-55	9	2,8
Total	319	100	Over 56	3	,9
Literate	5	1,6	Total	312	97,8
Primary School	15	4,7	Missing	7	2,2
Middle School	5	1,6	Total	319	100
High School	30	9,4	Income (Month/TL)	Frequency	%
College	22	6,9	<1600	154	48,3
Graduate	175	54,9	1601-2600	51	16,0
Postgraduate	61	19,1	2601-3600	31	9,7
Total	313	98,1	3601-4600	18	5,6
Missing	6	1,9	>4601	55	17,2
Total	319	100	Total	309	96,9
			Missing	10	3,1
			Total	319	100

It can be seen in Table 1 that 57.1% of the participants were female, and 40.4% were male, with eight participants (2.5%) choosing not to respond to this question. 54.9% of the participants had a Graduate degree, 19.1% had a postgraduate degree, 9.4% were high school graduates, 6.9% had a college degree, 1.6% were primary school graduates, and 1.6% stated that they were only literate. There were only six participants that did not answer this question. 56.1% of the study participants were between 18-25, 28.2% were aged 26-35, 9.7% were 36-45 years old, and 2.8% were aged 46-55. In addition, nearly 1% of the participants were aged 56 or older, with 2.2% not responding to this question. 48.3% of participants earned below TL 1,600, and 17.2% had incomes above TL 4,600 monthly. In addition, the monthly income of 16% of participants was between TL 1,601-2,600, 9.7% of participants earned between TL 2,601-3,600, and those with monthly incomes between TL 3,601-4,600 comprised 5.6% of the study sample.

3.4. Findings

The data obtained were analysed through exploratory and confirmatory factor analysis and path analysis methodology on SPSS and STATA package software. This was followed by the findings of exploratory factor analysis, reliability analysis, and confirmatory factor analysis on the study variables. Finally, the path analysis results will be concisely explained based on the study model's structural equation model.

3.5. Exploratory Factor Analysis

Exploratory factor analysis was employed to purify the items. Before establishing the factor structure, the correlation matrix was initially checked to find its suitability for factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy determined the sample size adequacy. The value of the KMO measure of sampling adequacy for factor analysis was min. 0.700, which was deemed to be appropriate. Also, Bartlett's test of sphericity was found significant to big be enough (see Table 2).

The factor loads derived from the exploratory factor analysis of the latent variables, total variance, and the reliability coefficients are given in Table 2.

Table: 2
Results of the Exploratory Factor Analysis

Factors (Cronbach's alpha) and Items	Standardised Factor Loadings	Total Variance %	Kaiser-Meyer -Olkin Measure of Sampling Adequacy	Barlett Test (sig.)
Innovativeness $\alpha=0.817$	-	73,277	.700	328.3(.000)
I1: I tend to be the first to try new technologies among my peers.	.889	-	-	-
I2: When I hear about new technology, I look forward to being able to use it.	.853	-	-	-
I3: I learn about new technologies before others.	.825	-	-	-
AR Experience $\alpha=0.889$	-	70,687	0,881	1263.4(.000)
AR Product Information (1)	-	-	-	-
ARP1: I have gained enough information on the product(s) advertised in the Augmented Reality application.	.841	-	-	-
ARP2: I liked the product(s) in the video in the Augmented Reality Application very much.	.812	-	-	-
ARP3: I felt emotionally drawn to the product(s) advertised in the Augmented Reality application.	.737	-	-	-
ARP4: I felt detached from the real world while viewing the product(s) Advertised in the Augmented Reality application.	.734	-	-	-
ARP5: I lost track of time while viewing the product(s) advertised in the Augmented Reality application.	.714	-	-	-
AR Entertainment (2)	-	-	-	-
ARE1: I found the use of augmented reality in the video enjoyable.	.883	-	-	-
ARE2: I think that, compared to other advertisements, the use of augmented reality applications in the video provides more information on the product(s).	.850	-	-	-
ARE3: I liked the video prepared by the Augmented Reality application very much.	.765	-	-	-
Loyalty $\alpha=.888$	-	75,009	.837	685.2(.000)
L1: I recommend the product (s) in the video prepared with the Augmented Reality application to my friends and relatives.	.896	-	-	-
L2: After watching this video about Augmented Reality, I will use this and similar augmented reality applications in the future.	.877	-	-	-
L3: The products in the video prepared with the Augmented Reality application had a positive effect on me.	.846	-	-	-
L4: The video I watched about the Augmented Reality application had a positive effect on the brand.	.843	-	-	-
Purchase Intention $\alpha=.868$	-	71,709	.830	563.1(.000)
PI1: I would like to buy this product (s) promoted by Augmented Reality application.	.875	-	-	-
PI2: I would like to try this product (s) introduced with Augmented Reality application.	.851	-	-	-
PI3: I would like to try this product (s) introduced with Augmented Reality application.	.840	-	-	-
PI4: Augmented Reality application facilitates my purchasing decision.	.820	-	-	-

As a result of the exploratory factor analysis of innovativeness, three statements showed that they were collected under a single factor, with a total explained variance of 73%. The reliability coefficient (Cronbach Alpha) of innovativeness was 0.888.

The factor loads derived from the exploratory factor analysis of the variable of AR consisting of a total of 8 statements, and the reliability coefficients of its sub-factors are given in Table 4. Cronbach's alpha score for the latent variables of experiential marketing experience was 0,889. The eight statements were collected under two factors, with a total explained variance of 70,689%. The two factors were called "AR product information" and "AR entertainment", respectively, according to the contents of the statements.

The reliability coefficient (Cronbach Alpha) and total explained variance of the latent variable of loyalty were calculated at 0.888 and 75%.

3.6. Measurement Model (CFA) and Validity

A measurement model specifies how latent variables or hypothetical constructs are assessed in terms of observed variables and represents the validity and reliability of the observed variables' responses for the latent variables (Bagozzi & Yi, 1988; Hair et al., 2010). Following the exploratory factor analyses, the "innovativeness" factor consisted of three statements, the "AR product information" factor of five statements, the "AR entertainment", the factor of three, loyalty", and "purchasing intention" factors each made up of four statements were analysed through confirmatory factor analysis on STATA package software to determine their validity, the findings of which are summarised in Table 3.

Table: 3
Results of the Measurement Model

Factors (Cronbach's alpha) and Items	Standardised Factor Loadings	AVE	CR	Mean	sd
Innovativeness ($\alpha=,817$)	-	0,60	0,817	-	-
I1:	0.83***	-	-	3,07	1,11
I2:	0.78***	-	-	3,32	1,12
I3:	0.71***	-	-	3,24	1,09
AR Product Information($\alpha=,869$)	-	0,59	0,879	-	-
ARP1:	0.76***	-	-	3,28	1,15
ARP2:	0.72***	-	-	3,32	1,17
ARP3:	0.78***	-	-	3,39	1,07
ARP4:	0.82***	-	-	3,38	1,14
ARP5:	0.77***	-	-	3,18	1,17
AR Entertainment($\alpha=,858$)	-	0,61	0,826	-	-
ARE1:	0.75***	-	-	3,80	1,18
ARE2:	0.68***	-	-	3,73	1,10
ARE3:	0.91***	-	-	3,68	1,14
Loyalty($\alpha=,888$)	-	-	-	-	-
L1:	0.82***	-	-	3,27	1,09
L2:	0.77***	-	-	3,59	1,12
L3:	0.86***	-	-	3,49	1,05
L4:	0.82***	-	-	3,39	1,09
Purchase Intention($\alpha=,868$)	-	0,62	0,867	-	-
PI1:	0.83***	-	-	3,30	1,12
PI2:	0.83***	-	-	3,51	1,05
PI3:	0.75***	-	-	3,53	1,10
PI4:	0.74***	-	-	3,62	1,06

*** $p < 0,001$.

The reliability coefficient (Cronbach Alpha) and total explained variance of the latent variable of purchasing intention, which consisted of four statements collected under a single factor, were 0.71 and 71%, respectively.

The reliability coefficient (Cronbach Alpha) and total explained variance of the latent variable of purchasing intention, which consisted of four statements collected under a single factor, were 0.71 and 71%, respectively.

Table 3 shows the standardised factor loadings (p-values) for each item, average variance extracted (AVE), composite reliability (CR), mean, and standard deviation for the latent variables. The average variance extracted (AVE) and composite reliability (CR) was

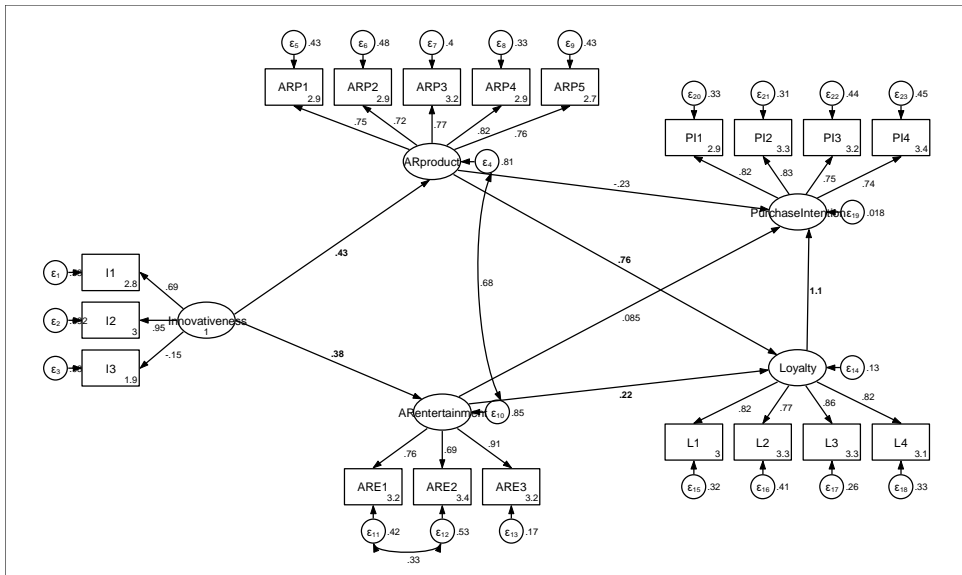
calculated manually to measure convergent validity and construct reliability. The composite reliability values exceeded 0.8, thus demonstrating a high internal consistency of latent variables (Hair et al., 2010). Furthermore, all factor loadings exceeded 0.70 and were significant ($p < 0.05$), evidence of convergent validity. Cronbach alphas ranged from 0.817 to 0.888, exceeding the 0.70 thresholds. Convergent and discriminant validity was evaluated using the AVE. The test criterion was that the AVE should exceed 0.5 (Fornell & Larcker, 1981). In this study, all of the AVEs for the Innovativeness, AR Product Information, AR Entertainment, loyalty, and purchase intention exceeded the threshold of 0.6, indicating that this study had adequate convergent and discriminant validity.

As a result of the confirmatory factor analysis, the goodness-of-fit values were found to be $\chi^2(141)=315.397$ (0.000), RMSEA 0.066, CFI=0.953, TLI=0.943, and SRMR=0.041. Since the goodness-of-fit values were within acceptable limits (Carmines & McIver, 1981; Browne & Cudeck, 1993), a model was created that formed linear relationships between the factors of innovativeness and AR product information and AR entertainment, and the variables of loyalty and purchasing intention. Figure 2 shows the path diagram for these causal relationships

3.7. Structural Model (Hypotheses Testing)

The findings of the path analyses conducted are shown in Figure 2.

Figure: 2
Structural Equation Model (SEM) Path Analysis



The goodness-of-fit values of the model were found to be Chi2(143)=346.939 (0.000), RMSEA 0.070, CFI=0.943, TLI=0.932 and SRMR=0.046. All indicate an acceptable model fitness for the structural model.

To test hypotheses in the research model using SEM, the results are given in Table 3.

Table: 3
Hypothesis Test Results

Hypothesised path	Standardised estimates	t-value	Hypothesis supported
H1: Innovativeness → AR entertainment	0,38***	6,16	Yes
H2: Innovativeness → AR product	0,43***	6,35	Yes
H3a: AR entertainment → Loyalty	0,22***	3,38	Yes
H3b: AR entertainment → Purchase intention	0,08	1,15	No
H4a: AR product → Loyalty	0,76***	13,29	Yes
H4b: AR product → Purchase intention	-0,23	-1,34	No
H5: Loyalty → Purchase intention	1,13***	6,44	Yes

*** $p < 0,001$.

The findings suggest that the innovativeness dimension has significant positive effects on both the AR entertainment dimension ($\beta=0.38$; $p<0.05$) and the AR product information dimension ($\beta=0.43$; $p<0.05$); thus, H1 and H2 were supported. In addition, the AR entertainment ($\beta=0.22$; $p<0.05$) and AR product information has significant positive effects on loyalty ($\beta=0.76$; $p<0.05$), the same being true between loyalty ($\beta=1,13$; $p<0.05$) and purchasing intention; thus, H3a, H4a, and H5 were supported.

4. Conclusion

In recent years, technological developments have increased the use of smartphones, and mobile applications associated with these smart devices are becoming increasingly popular tools in online retailing activities. The latest trend in such applications is the integration of AR. Many retail businesses have launched their AR-integrated mobile applications. This study was conducted because AR applications will maintain their importance by becoming more complex and integrated into commercial activities. The present study investigated the effects of innovativeness on AR experience and how AR experience influenced consumer loyalty and purchasing intention. To this end, data were gathered through an online survey from 319 participants and were examined through reliability analysis, exploratory and confirmatory factor analyses, and path analysis.

The findings revealed that innovativeness had positive correlations with AR entertainment and AR product information, positively influencing consumer loyalty. Increased consumer loyalty was associated with increased purchasing intention. Therefore, based on the study sample and limitations, it could be suggested that AR applications increase consumer loyalty.

Consumers tend to adapt to and use technological innovations in the retail sector (Pantano, 2014). Bonetti et al. (2018) showed that consumers' cognitive innovativeness levels played a vital role in their acceptance and use of AR applications, which is in line with

the findings of the present study suggesting that level of innovativeness positively correlated with the dimensions of product knowledge and entertainment of AR applications, and that innovativeness influenced purchasing intention.

Marketing-oriented AR applications fill a gap consumers cannot have in online shopping. Thanks to the AR experience, consumers can experience information they cannot obtain from the online store. There is no direct interaction and experience with the online store's website products. Therefore, when sufficient information about the product is not available, consumers give up purchasing the product. Thanks to AR applications, they can access more information about the products. For example, thanks to the AR application, they can experience how a seat they intend to purchase will look in their living room, which colour seat will be more appropriate, or which model of sunglasses will look better on their faces.

Thanks to its simulation effect, AR applications provide a virtual experience. With this experience, consumers can experience the functional aspects of the products. With AR experience, the risk perceived by consumers is also reduced. In this way, consumers have a more enjoyable shopping experience. From this point of view, it can be said that the web traffic of the businesses that will use AR applications in their marketing campaigns will increase, their basket abandonment rates will decrease, and therefore their sales, profit, and competitive advantage will increase. The most important limitation of the study is that the AR application was not supervised individually by the participants. Participants saw the application in the video showing them and answered the questions according to this video. Another limitation of the research is that the data used in the study are determined by the convenience sampling method. Based on this constraint, research results cannot be generalised to the main population. The time constraint could be the other crucial limitation of the present study, preventing it from carrying out a larger sample. Another limitation of the study was that it was confined to investigating an AR application in the retailing sector.

AR applications add a new dimension to consumers' product experience. This aids businesses and marketing managers in gaining flexibility in reaching their consumers. Customer satisfaction has been shown to constitute one of the most crucial factors encouraging consumers to revisit the same websites in their online purchases. It is also among the most important factors in creating loyalty to mobile services. Customer satisfaction increases profitability and consumers' visit rates (Wang & Chen, 2011; Luarn & Lin, 2003; Vranakis et al., 2012).

Digital marketing activities enriched with AR applications can, therefore, bring businesses a competitive advantage by increasing consumer satisfaction and contributing to loyalty and the success of businesses. Jung et al. (2015) found that the content and quality of AR applications influence customer satisfaction. The same study also showed that participants satisfied with using innovative mobile applications tended to use AR applications designed to promote tourism destinations. Participants satisfied with the AR application were also inclined to word-of-mouth marketing. Similarly, Hilken et al. (2017)

showed that AR applications influence word-of-mouth marketing and purchasing. Hence, it can be suggested that businesses could benefit from mobile applications such as AR apps to reach innovative consumers and get them to talk about the product/brand.

When consumers are satisfied with their experiences, they tend to be more loyal to businesses and pay higher prices, meaning that integrating AR applications into marketing activities may bring several benefits to businesses (Krieger, 2013). Irshad et al. (2018) suggested that AR applications could be employed as effective tools for promoting and marketing almost every product. Businesses need to pay attention to several factors to benefit from AR applications. Firstly, they need to define their target audience and ways to reach them, such as determining the campaign's targets. Next, they need to determine how the AR application can be used and what contents it could have. Later, they need to integrate the AR applications into the social and physical environment (Scholz & Smith, 2016). Early adopters of new technologies may be a suitable target audience for businesses wishing to use AR applications; as such, consumers tend to try new applications (Yim & Chu, 2013). Hence, companies can gain a significant competitive edge from using AR applications as part of marketing activities to create effective interaction with consumers with tech-intensive lifestyles and turn it into consumer loyalty.

Businesses can organise customised campaigns specific to the target audience by taking advantage of the interactive feature of AR applications.

Future studies could concentrate on other variations of AR applications in different sectors. Other suggestions for future studies can be listed as follows:

In this study, an AR application was used to show the participants how their furniture and accessories would look in the home environment. Researchers may start from a different application type in future studies, like wearable technologies.

The research model can be designed using random sampling methods in future studies. In addition, different age groups, different personality traits, or different cultural groups can be determined as a sample.

AR applications increase consumers' product knowledge and provide a more enjoyable shopping experience. So, businesses can take advantage of AR apps, especially when they want to interact more with consumers.

In addition, businesses should classify consumers according to their adoption of innovations and direct the right message to the right consumers to benefit from AR applications effectively.

In future research, the relationships of AR applications with variables such as customer satisfaction, post-purchase behaviour, and customer satisfaction can be examined.

It could be suggested that, with the right content and target audience, businesses wishing to integrate AR applications into their marketing activities can succeed. It is hoped that the present study's findings could serve as examples for such enterprises and contribute to the literature on the subject.

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The Causality Relationship between Military Expenditure and GDP in 12 NATO Member Countries based on Per Capita Values

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12 NATO Üyesi Ülkede Kişi Başı Değerlere Dayalı Askeri Harcamalar ve GSYH Nedensellik İlişkisi

Abstract

This study deals with the relationship between per capita real GDP, per capita real military expenditure, and per capita real capital in 12 NATO member countries from 1995-2020. The country group is chosen from Central and Eastern European countries depending on their common properties. Bai and Ng (2004) PANIC, Westerlund and Edgerton (2008) structural break co-integration, and Konya (2006) bootstrap panel causality tests were applied to consider cross-sectional dependence, respectively. Meanwhile, the convergence of the 12 countries' military expenditure in Russia is discussed. It is seen that there is weak evidence for this convergence. According to bootstrap panel causality findings, there is strong evidence in 5 countries based on the non-existence of causality. Therefore, Neutrality Hypothesis is valid in Croatia, Estonia, Latvia, Lithuania, and Turkey.

Keywords : Military Expenditure, GDP, Capital, Cross-Sectional Dependence, Bootstrap Causality.

JEL Classification Codes : C33, E13, H56.

Öz

Bu çalışma 12 NATO üyesi ülkede kişi başına reel GSYH, kişi başına reel askeri harcama ve kişi başına reel sermaye arasındaki ilişkiyi 1995-2020 dönemi için ele almaktadır. Yatay kesit bağımlılığını dikkate almak için sırasıyla Bai ve Ng (2004) PANIC, Westerlund ve Edgerton (2008) yapısal kırılma eşbütünleşme ve Konya (2006) bootstrap paneli nedensellik testleri uygulanmıştır. Aynı zamanda, 12 ülkenin kişi başına reel askeri harcamasının Rusya'ya yakınsaması tartışılmaktadır. Bu yakınsama için zayıf bulguların mevcut olduğu görülmektedir. Bootstrap panel nedensellik bulgularına göre 5 ülkede nedenselliğin olmadığına dair kuvvetli kanıtlar mevcuttur. Bu nedenle, Hırvatistan, Estonya, Letonya, Litvanya ve Türkiye'de Yansızlık Hipotezi geçerlidir.

Anahtar Sözcükler : Askeri Harcama, GSYH, Sermaye, Yatay Kesit Bağımlılığı, Bootstrap Nedensellik.

1. Introduction

Economists have long discussed the relationship between military spending and economic growth in the literature. There are different investigations on the impact of military expenditure on economic growth and the direction of this relationship. Benoit (1978: 271) is one of the leading economists who deal with this issue based on the weight of the defence budget. He asserted that developing countries with high military budgets had a high level of economic growth, whereas those with low military budgets had low growth.

Benoit (1978: 271) separates the impact of military spending on economic growth for developed and developing countries. Mainstream economics has accepted that military spending decreases available resources for investment and reduces the growth rate in developed countries. On the other hand, Benoit (1978: 276-277) states that only a limited amount of income does not spend on the military goes to productive ways in less developed countries. Meanwhile, the military programs of these countries can create a contribution to their economies from various directions. First, military spending can increase nutritional and dressing facilities in less developed countries. Secondly, technical training, repair, and maintenance can create civilian benefits to society.

Moreover, works and maintenance in public affairs like roads and barrages can provide civilian externalities. Vocational activities in the military can also reduce unemployment with R&D spill-overs to civil society. The internet was one of the military's most important R&D spill-over impacts on civil society. The internet was born by the US Defence Department Advanced Research Projects Agency (DARPA) to avoid collapsing a communication network in the USA in the 1960s (Castells, 2008: 7). So, it can be claimed that there can be a positive causality impact operating from military expenditure to economic growth due to those kinds of utilities.

The direction of interaction is from military to growth, providing that aggregate demand is initially less than aggregate supply. The additional demand created by the army sector increases utilisation of capital accumulation, decreases resource cost, and generates other labour employment if resources exist at capacity utilisation. The increment in demand leads to more efficient resource utilisation, which stimulates investment and rises growth at the end (Değer, 1986: 182). Dunne et al. (2005: 450) express this positive direction of impact as a Keynesian multiplier effect based on demand-side analysis. An increment in military spending increases demands if there is insufficient capacity in the economy. So, resources are utilised more efficiently while employment levels start to increase.

The negative impact of military spending on growth is related to the reallocation of the resources, which is also the idea of mainstream economics leaning on the crowding-out effect. The increment in military spending can divert resources from productive ways as an opportunity cost of investment by enlarging the saving-investment gap. It also creates a balance of payment problem for the economy if the imports of arms products have a heavy burden on the budget. So, it causes shrinkage in the growth capacity (Değer, 1986: 183).

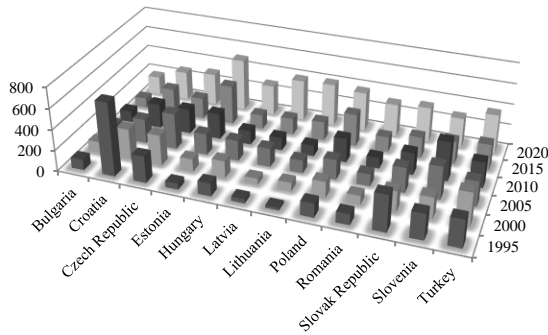
Moreover, Lim (1983: 379) states that a higher economic growth rate can be achieved due to the elevation of capital productivity. Değer (1986) discusses the impact of military expenditure through capital accumulation. If the increment in defence burden reduces the capital formation for the new investments, then economic growth is hindered by capital stock in quality and quantity.

Rosh (1988: 672-673) introduces the concept of the security web, which is the mutual security perception of a regional group of countries against an external threat. Higher militarisation of other countries in the regional groups can lead to more military expenditure for an individual country. According to Kohler (1979: 120), determining the reason behind military spending takes importance for its increment, decrement, or stagnation. The cycle of military expenditures can be due to modernisation of armament, increment in quality of forces, innovations for internal and external trade benefits, etc. This is in line with Dunne and Perlo-Freeman (2003: 25); the overall economic environment can determine the military burden in time.

On the other hand, military expenditures are a component of government spending. So, the increment in the military can be positively caused by Gross Domestic Product if tax revenue is income elastic based on Wagner's Law (Rosh, 1988: 675); if not, it is expected to affect it negatively. A high level of economic growth can bring a higher defence budget by rapidly rising tax revenue depending on the power of the defence lobby. Moreover, highly income rising or rich countries can expand more on defence easily relative to others (Benoit, 1978: 275).

CEE (Central and Eastern European) countries have exercised radical changes from planned to market economies and experienced a political shift built upon democracy after the 1990s. Besides, 11 CEE countries (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia) become members of the European Union and the NATO (North Atlantic Treaty Organization) on different dates. So, it can be interpreted that these 11 countries have experienced a radical transformation of economics, politics, and social order. As a result, their institutional orders and living arrangements become subject to investigation. The new conditions can also be dealt with from social and ideological synthesis. But one of the stubborn facts is the social consequences of this transilience. It brought a new solution to social and political problems, given democratic institutions and people's freedom in this region. So, these countries are one of the most rapid Westernization examples related to their developments. Turkey can be seen as the border of the CEE region and has some standard features with these countries. Turkey is added to this country sample due to its geographical position. Turkey is also a member of NATO since 1952 and has been in accession negotiation with the EU (European Union) since the 1963 Ankara Treaty.

Figure: 1
Per Capita Real Military Expenditure of 12 Countries (Millions of US\$)



Source: Author's calculation.

Per capita, real military expenditure values of 12 countries are indicated in Figure 1. Military expenditure data of countries are attained from Stockholm International Peace Research Institute (SIPRI, 2021), which is expressed at 2019 constant prices. This data is transformed into 2010 prices and then divided by the midyear population data of countries attained from World Development Indicators (WDI, 2021). First of all, the 1995 high value of Croatia is related to the Bosnia War, realised between 1992-1995. However, it is seen that there is an increment in the per capita real values in time. The average weight of 12 countries was 200 in 1995, whereas this value reached approximately 336 in 2020. Beswick (2019) states that one of the fundamental rise reasons of military expenditure is related to the expansion of Russia into the territory. Crane (1987) examined the military spending composition of the region during the era of the Soviet Union. So, the military convergence of these 12 countries to Russia becomes a subject of interrogation to reveal the tension level of these countries.

This study asks the question of whether a general pattern is possible for these 12 countries from the aspect of nexus among per capita real military expenditure, per capita real capital, and per capita real GDP (Gross Domestic Product). First of all, unit root structure has been investigated considering cross-sectional dependence. Then, the co-integration relationship has been put forward depending on cross-sectional dependence and structural break. In the last step, bivariate and trivariate bootstrap panel Granger causality findings have been explored among variables by considering per capita capital structure and time trend methodologically in the light of Konya's (2006) study.

2. Literature Review

Joerding (1986) examines the relationship between military expenditure and economic growth with the Granger causality method in 57 less developed countries. Military spending is diversified with two different measurements as ACDA (Arms Control and

Disarmament Agency) and SIPRI. It is obtained that the significant Granger causality findings are from growth to military in two measures. Biswas and Ram (1986) evaluate the relationship with the augmented growth model based on the Feder approach in low- and middle-income countries. It is seen that the effect of the military on growth is negative from 1960 to 1970 in low-income countries, whereas it transformed into positive from 1970 to 1977. Kusi (1994) takes the same issue with the Granger causality method in 77 developing countries from 1971-1989. Findings demonstrate no causal linkage in 62 countries, but the remaining countries do not reflect a common pattern. Smith (1980) dealt with subjects in terms of investment and reached a negative association in 14 OECD countries. Cappelen et al. (1984) investigate the impact of the military on growth in 72 common sample countries, which consist of large, Mediterranean, and small country groups. Findings reflect that the effect of the military on growth is positive and significant in Mediterranean countries. In addition, Frederiksen and Looney (1983) express that the military's influence on growth is negative and significant in resource constraint countries, while it is significant and positive in resource-abundant countries. Classification of resource abundancy is determined with cluster analysis of 9 variables based on savings, import level, investment productivity, and foreign exchange availability.

Karagol and Palaz (2004: 290) specify that the direction and measure of causality nexus between military expenditure and economic growth can bring some policy implications. If military spending foregoes growth, government intervention can be anticipated. A positive relationship signals aggregate demand expansion, whereas an adverse effect is related to the crowding-out effect. Kollias et al. (2004) investigate the causality relationship between military spending and growth for 15 EU countries. Kollias et al. (2004: 557) state that causality from military to growth reflects aggregate demand and employment effect originating from R&D activities and military production. But causality from growth to military indicates security impact that countries are trying to protect their welfare and citizens from external threats. So, unidirectional causality from military to growth is based on economic reasons, while the reverse relies on geopolitical and security motives. However, Kollias et al. (2004) signify that causality from growth to military can also be a defence policy response for the state of the economy. The economy's strength is stated as the best warranty for security (Treddenick, 1996: 645).

On the contrary, Marxist thought declares the positive impact of military expenditure on growth as a security effect. A rise in military spending can increase economic growth via the safety of capital and citizens in favour of disposing of domestic and foreign threats (Hatemi-J et al., 2017: 1194). Moreover, bidirectional causality between military and growth reflects the existence of Keynesian aggregate demand effects due to reciprocal dependence (Kollias et al., 2004: 561), which is expressed as a "feedback effect" (Chowdhury, 1991: 87). Military expenditure is represented as a ratio of GDP, whereas the rate of change in GDP represents growth. Consequently, seven countries have unidirectional causality from growth to military, three countries (Austria, Denmark, and Luxemburg) have reciprocal causality, and the other three (France, Finland, and Portugal) have no causality. Besides,

three countries (Belgium, Greece, and Ireland) do not have a co-integration relationship (Kollias et al., 2004).

Chang et al. (2014) examine the bootstrap causal relationship between military spending and growth for G7 countries and China in a common sample for 1988-2010. Chang et al. (2014) express that military spending can guide higher growth by uprising aggregate demand. On the other hand, if the military expenditure is financed by taxes or borrowing, then a detrimental effect (Military-Growth Detriment Hypothesis) of the military on growth can arise due to crowding out the impact on private investment (guns or butter). If the military expenditure is financed with funds from non-military investment programs, then a detrimental effect on growth can arise (Lim, 1983: 383). Competition among sectors is expected for funding if the defence budget is set more for fiscal reasons than threat reasons (Treddenick, 1996: 645).

Meanwhile, Değer (1986: 189) declares that economic growth can negatively affect the military burden due to the need to spend more on defence, possibly through more imported armaments. So, it is important to reveal the relationship between military expenditure and growth to enlighten policymakers on a better military strategy. Chang et al. (2014) apply the bootstrap panel causality method due to cross-sectional dependency and heterogeneity in the panel. The Neutrality Hypothesis is valid for France, Germany, and Italy in causality findings. In contrast, Military-Growth Detriment Hypothesis is valid for Canada, Japan, the UK, and the USA due to significant negative causality from military to growth. Besides, there is significant positive causality from the growth of the military in China, Japan, and the USA.

Pan et al. (2015) search the relationship between per capita real GDP and per capita real military expenditure with a bootstrap panel causality approach in 10 Middle Eastern countries from 1988-2010. There is unidirectional causality from military to growth in Turkey and growth in the military in Egypt, Kuwait, Lebanon, and Syria. Meanwhile, there is bidirectional causality in Israel, and Neutrality Hypothesis is supported in Bahrain, Jordan, Oman, and Saudi Arabia. Destek and Okumus (2016) also refer to the bootstrap panel causality method for BRICS and MIST countries in a typical sample from 1990-2013. While there is a one-way negative causality from military to growth in Turkey, there is one-way positive causality from military to growth in China. Two-way causality is valid in Russia; the remaining countries reflect the Neutrality Hypothesis. Aye et al. (2014) employ a bootstrap causality approach in South Africa from 1951 to 2010. Findings indicate the Neutrality Hypothesis for the whole period.

Topçu and Aras (2017) seek the relationship between military expenditures and growth in CEE countries based on co-integration and causality methods for 1993-2013. According to Westerlund's (2007) co-integration findings, series are not co-integrated, and the significant causality is from growth to military. Yıldırım et al. (2005) investigate the relationship leaning on the Feder model in the Middle East countries from 1989 to 1999. In terms of panel GMM findings, the increment at the rate of change in military expenditure

has a significant positive impact on the growth. Besides, Öcal and Yıldırım (2009) investigated the arms race between Greece and Turkey based on the nonlinear co-integration specification for the period 1956-2003. According to TAR and m-TAR models, Turkey has an asymmetric adjustment at the long-run equilibrium. Tütüncü and Şahingöz (2020) deal with an arms race between Greece and Turkey with bootstrap causality and asymmetric causality. While there is one-way causality from Greece to Turkey depending on bootstrap causality, there is bidirectional causality leaning on asymmetric causality. Topçu et al. (2013) assess the nexus between the old and new members of the EU separately from 1988 to 2012. Concerning Pedroni's co-integration findings, all series are co-integrated. In the Granger Causality finding, causality is from growth to military in both old and new member countries. Karadam et al. (2017) search the non-linear relationship in Middle East countries and Turkey from 1988 to 2012. According to PSTR model findings, the impact of the military on growth is positive at the low regime, whereas it transforms into negative at the high regime. However, Koçbulut and Altıntaş (2021) interrogate the same relationship with the panel threshold model in 17 OECD countries from 1995-2018. The impact of the military on growth is positive above a certain threshold level.

Özşahin and Üçler (2021) examine the relationship between military spending and employment based on Konya's (2006) bootstrap panel causality test in 18 NATO member countries for the post-cold war period of 1991-2018. In terms of findings, both variables suffer from cross-sectional dependence, and the SUR model is one of the solutions for contemporaneous correlation. There is a unidirectional causality running from military to employment in Denmark, France, and Germany, whereas causality is from employment to military in Italy. While there is bidirectional causality in Luxemburg and Poland, the remaining countries reflect the Neutrality Hypothesis. So, it is not possible to claim a common conclusion for these 18 NATO member countries. Hatemi-J et al. (2017) investigate bivariate asymmetric causality in 6 defence spender countries at the top level for 1980-2013. There is unidirectional positive causality running from military to growth in China and Japan, called Military Spending-Led Hypothesis. Kollias et al. (2004: 557) denominate this as a "spin-off effect" due to the high impact of the military on aggregate demand, employment, and military R&D. There is unidirectional positive causality running from growth to military in France, Russia, Saudi Arabia, and the USA, which is claimed as Growth-Led Hypothesis by Hatemi-J et al. (2017). Destek (2015) applies asymmetric causality in G-6 countries from 1960 to 2013. There exist one-way negative causality operating from military to growth in France, Germany, and the UK; Neutrality Hypothesis is valid in Canada and Italy. Gül and Torusdağ (2020) examine the relationship between inflation and military expenditure with a bootstrap panel approach in 25 NATO member countries from 1990-2018. There is a unidirectional causality running from inflation to military in England, Croatia, the Czech Republic, Estonia, Latvia, and the United States.

Saba and Ngepah (2019) evaluate the relationship in 35 African countries based on Dumitrescu and Hurlin's (2012) panel causality method for 1990-2015. From the findings, there is no common pattern for all African countries. Despite these 12 countries reflecting bidirectional causality, both policies related to military spending or growth affect each other

mutually. Çolak and Özkaya (2020) deal with the issue of external debt in Transition Economies for the period 1997-2016. Two significant thresholds exist in the model based on panel threshold regression findings, and military expenditure does not create a significant burden on external debt up to the first threshold point. After this point burden of debt starts to increase, indicating the arms race and security motives in the region. Esener and Ipek (2015) state that the impact of military spending on external debt is positive and significant in 36 developing countries, depending on GMM findings.

Moreover, Altınok and Arslan (2020) investigated the relationship between public expenditure and real growth based on the bootstrap panel causality method for 2002-2017 in South-eastern European countries. There is one-way causality from growth to public spending in all countries, except Bulgaria and Turkey. There is one-way causality from public spending to growth in all countries except North Macedonia.

Zhong et al. (2015) deal with unemployment in a common sample of G7 countries leaning on bootstrap panel causality from 1988 to 2012. First of all, cross-sectional dependency and heterogeneity of the panel are evaluated, and it is seen that both dependence and heterogeneity are present in the model. There is bidirectional causality in Italy and the United Kingdom, notwithstanding that Italy's estimated coefficient is negative for the causality running from military to unemployment. While there is one-way positive causality operating from military to unemployment in Canada and Japan, there is negative causality from unemployment to the military in France and Germany. Yildirim and Sezgin (2003) discuss the relationship from employment depending on the ARDL model in Turkey from 1950 to 1997. Findings reflect that the effect of the military on employment is negative and significant both in the short and the long run.

Zhong et al. (2016) focus on the nexus between military expenditure and growth for BRICS and USA in a common sample for 1988-2012. According to bootstrap panel causality findings, there is negative causality running from military to per capita real GDP in Russia and USA. In contrast, positive causality runs in the reverse direction in Brazil, India, and Russia. Ceyhan and Köstekçi (2021) searched the relationship between military growth and unemployment in Turkey from 1988 to 2019. According to FMOLS (Fully Modified OLS) findings, military spending has a cumulative effect on growth and unemployment in the long run.

On the other hand, Topal (2018) investigates the relationship between military and growth with the time-varying causality method in Turkey from 1960 to 2016. Due to economic and political reasons, the causal link weakened after the mid of 1970s. Finally, Alptekin and Levine (2012) resort to the Meta approach leaning on estimates of 32 empirical studies. Findings reflect that Military Spending-Led Hypothesis is valid in developed countries, and there is evidence for the non-linear relationship.

3. Theoretical Model

Heo (1999: 700) states that military expenditure is a component of government expenditure, and additional spending can be financed by income taxes, budget deficit, or issuing new money. So, the increment in military expenditure brings either a tax burden, more budget deficit, or both. Değer and Smith (1983: 337) declare that military spending deflects resources at the expense of foregone investment and consumption. Besides, a balance of payment cost arises if a high amount of military equipment is imported abroad. That is to say, the government increases the debt burden to compensate for defence spending, and interest rates start to increase, decreasing investment and/or raising the balance of payment gap. So, military expenditure is taken into aggregate production function to reflect the crowding-out effect frankly (Heo, 1999: 700; Chang et al., 2014: 180).

$$GDP_{it} = A \cdot f(K_{it}, L_{it}, ME_{it}) \quad (1)$$

Following Chang et al.'s (2014) theoretical discussion, the aggregate production function is presumed as Cobb-Douglas type and has constant return to scale at Equation 1.

$$GDP_{it} = A \cdot f(K_{it}^{\alpha}, L_{it}^{1-\alpha-\beta}, ME_{it}^{\beta}) \quad (2)$$

A represents technological progress, α measures capital elasticity of output, β measures military elasticity of output, and $1 - \alpha - \beta$ measures labour elasticity of output. Even this, values are divided to the population at Equation 2, then logarithm is taken to express elasticities of values at the analysis.

$$lgdp_{it} = \alpha_{it} + \beta 1. lk_{it} + \beta 2. lme_{it} + \theta. T_{it} + \varepsilon_{it} \quad (3)$$

Equation 3 represents the final version of the theoretical model, where ε_{it} represents the random error term, and T is added to the proxy time trend. Since per capita values ensure variables in the same units for large and small countries and are less sensitive to regional fluctuations, it is preferred to labour to avoid the scale effect by following Chang et al. (2014). $lgdp$ is the per capita real GDP, lk is the per capita real capital and lme is the per capita real military expenditure.

4. Dataset and Methodology

Annual data covers the period of 1995-2020 for 12 countries for the relationship between per capita real GDP, per capita real military expenditure, and per capita real capital. Military expenditure data is attained from SIPRI (2021), which publishes it at 2019 constant prices. It is first transformed into 2010 prices and then divided by the mid-year population of countries, respectively. The data of gross capital formation (2010 constant) and per capita GDP (2010 constant) are obtained from WDI (2021). Gross capital formation is expressed as gross domestic investment consisting of expenditures and the fixed assets of the economy and net changes in the level of inventories, which is also divided by the mid-year population of each country. All variables are transformed to logarithmic values at the final step.

Further, correlation analysis was realised among variables. The correlation coefficient between \lgdp and lme is 0.34, and the coefficient between lme and lk is 0.42, indicating moderate positive correlations. Nevertheless, the correlation coefficient between \lgdp and lk is 0.94, which points strong positive correlation relationship (Ratner, 2009: 140). This knowledge is taken into consideration in the co-integration analysis. It is observed that all variables have an increment trend in time. So that time trend is added to models.

4.1. Empirical Methodology

The scientific view interrogates the reality of nature as a fundamental objective, so it examines beliefs, values, and conceptual and experimental tool communities as a whole. The main task of scientists is to reveal the truth by eliminating all illusions of prejudice and dogmatic inferences in the light of experiments and laboratories. Like this, objective reality is reached owing to clear vision and impartiality (Kuhn, 1963: 347). Social scientists tempt to put forward possible nexus among variables based on their gaugeable values. Whether a case that occurred in one part of the world can cause an event in a different part of the world in a forward time becomes an inquiry (Granger, 1980: 331). This inquiry can be answered with observable values and an appropriate analysis of the dataset's properties.

If past values of Y_t serves to estimate containing information of X_t , and if this information does not exist in any other predictor series, then Y_t is asserted to cause X_t (Granger, 1969: 430). The flow of time has a central role in this definition depending on entropy. The past value of one variable gives information to forecast the present and future values, but not reversible. Meanwhile, this definition brings a stationarity pre-requirement for the series (Granger, 1980: 338-349). If the economic series are non-stationary, it makes an economic shock continuous for a random walk process. For instance, ρ takes the value of 1 in $y_t = \rho y_{t-1} + \varepsilon_t$ AR(1) autoregressive process, if there is the unit root at the series (Wooldridge, 2013: 639). So, the unit root makes the estimator biased and inconsistent at OLS (Ordinary Least Square) estimations. Another issue is related to dependency on cross-section units in the panel. Cross-sectional dependence entails biased and size distorted estimation if neglected (Pesaran, 2006: 992).

Zellner (1962: 349-351) claims that simultaneous equation by equation estimation of SUR (Seemingly Unrelated Regression) yields more consistent findings than OLS single equation estimations. Konya (2006: 982) enlarges this issue by applying the SUR estimator to the panel causality model with the bootstrap procedure. This method produces solutions to difficulties related to panel causality estimations. SUR estimator considers the cross-sectional dependency situation of units at estimation. By the way, cross-correlations of errors can be modelled with the SUR estimator (Pesaran, 2021: 13). It allows simultaneous correlation among panel units, which rescues the necessity of joint homogeneity for all panel members. Besides, it unencumbers the pretesting requirements of unit root and co-integration by adding maximum integration into estimation with bootstrap error terms. Wald test determines the direction of causality with country-specific bootstrap critical values

(Konya, 2006: 979). So, the bootstrap methodology does not affect panel unit root and co-integration structures.

This study establishes a causality relationship among $lgdp$, lme , and lk . For this purpose, the cross-sectional dependency situation of variables is investigated in the empirical part. Unit root situation of variables is assessed with ADF and PP tests by ignoring cross-section dependency. Then PANIC test procedure is applied by considering cross-sectional dependence. In the second part of the unit root interrogation, the lme value of each country relative to Russia is analysed with a PANIC test to reveal the military convergence situation of these countries towards Russia. In the third step, the co-integration situation of variables is assayed with Westerlund and Edgerton's (2008) structural break test. The final step is to examine bivariate and trivariate causality among variables using Konya's (2006) methodology with time trend impact.

4.1.1. Cross-Sectional Dependence

Cross-sectional dependence is the correlation in panel units. Breusch and Pagan (1980: 247) set forth Lagrange Multiplier (LM) to identify cross-sectional dependence in the panel.

$$LM = T \sum_{i=1}^N \sum_{j=1}^{N-1} \rho_{ij}^2 \quad (4)$$

LM test is displayed at Equation 4, where ρ_{ij}^2 reflects estimated coefficient of correlation from OLS single equation model and has (χ^2) distribution with $\left(\frac{Nx(N-1)}{2}\right)$ degrees of freedom. Cross sectional dependence is identified with the null hypothesis of $H_0: Cov(\varepsilon_{it}, \varepsilon_{jt}) = 0$ for $i = j$, against the alternative hypothesis of $H_A: Cov(\varepsilon_{it}, \varepsilon_{jt}) \neq 0$ for at least one pairwise of $i \neq j$ (Menyah et al., 2014: 390).

Pesaran (2021: 13) claims that the LM test is more appropriate when the time (T) dimension is larger than the cross-section (N) dimension. So, Pesaran (2021: 22) introduces the CD test for large N and small T dimensions.

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \rho_{ij} \quad (5)$$

Pesaran (2021: 18) emphasises the size distortion problem in the LM test and propounds the CD_{LM} test for large N and T dimensions, which have a standard normal distribution (Kar et al., 2011: 691).

$$CD_{LM} = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N (T \rho_{ij}^2 - 1) \quad (6)$$

Pesaran et al. (2008: 106) introduce the bias-adjusted LM test as an alternative to the LM test, which heads the exact average and variance of the test statistic with strictly exogenous regressors and normal residuals.

$$LM_{adj} = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \frac{(T-k)\rho_{ij}^2 \mu_{Tij}}{v_{Tij}} \quad (7)$$

This test is also consistent with near-zero values of the cross-sectional average of factor loadings. The bias-adjusted LM test is more appropriate for large N and T dimensions.

$$\tilde{\Delta} = \sqrt{N} \left(\frac{N^{-1}\bar{s}-k}{\sqrt{2k}} \right) \text{ and } \tilde{\Delta}_{adj} = \sqrt{N} \left(\frac{N^{-1}\bar{s}-E(Z_{it})}{\sqrt{\text{var}(Z_{it})}} \right) \quad (8)$$

Pesaran and Yamagata (2008: 57) introduce delta and adjusted-delta tests to check homogeneity in the panel. The null hypothesis of homogeneity ($H_0: \beta_i = \beta_j$) is tested against the ($H_A: \beta_i \neq \beta_j$) alternative hypothesis. The Delta test is more convenient than the adjusted-delta for large samples.

4.1.2. Unit Root and Co-integration along with Cross-Sectional Dependence

Bai and Ng (2004: 1127-1128) propose a Panel Analysis of Non-stationarity in Idiosyncratic and Common (PANIC) test in the detection of unit root depending on common factor component in case of cross-sectional dependency at second-generation panels.

$$X_{it} = D_{it} + \lambda_i' F_t + e_{it} \quad (9)$$

The model of the PANIC test is demonstrated at Equation 9, where D_{it} is the polynomial trend function, F_t is the $rx1$ common factor vector, λ_i is the factor loadings vector, X_{it} is the deterministic component, and e_{it} is the idiosyncratic error term. Idiosyncratic error term consists of two components; one is more of an idiosyncratic and the other a small number of common factors. The number of common factors is discretionarily determined but must lean on a theoretical background for the soundness of the analysis. If the F_t is found stationary at the model, then e_{it} becomes the source of the unit root. In addition, the principal component is applied to the first difference equation model, and loadings and common factors of each model are estimated with ADF regressions. Stationarity is examined leaning on the homogeneity situation of the panel under the null hypothesis of the presence of unit root.

Westerlund and Edgerton (2008: 668-670) put forward a co-integration test that takes both structural break and cross-sectional dependence into consideration.

$$y_{it} = \alpha_i + \eta_i t + \delta_i D_{it} + x_{it}' \beta_i + (D_{it} x_{it})' \gamma_i + z_{it} \quad (10)$$

$$x_{it} = x_{it-1} + w_{it} \quad (11)$$

Scalar models are expressed at Equations 10 and 11, where D_{it} is the scalar dummy, α_i is the intercept, and β_i is the slope. δ_i and γ_i are parameters at the time of the structural break. This test is extended with unobserved common factor component by inspiring from Bai and Ng (2004), and z_{it} consists of both idiosyncratic and common factors ($F_t + v_{it}$) as a solution to cross-sectional dependence.

$$LM_{\tau}(i) = \frac{\hat{\phi}_i}{SE(\hat{\phi}_i)} \text{ and } LM_{\phi}(i) = T\hat{\phi}_i \left(\frac{\hat{w}_i}{\hat{\sigma}_i} \right) \quad (12)$$

Breaks are enlarged towards three-shift situations without shift, level shift, and regime shift. By this way, three different shift situations can be investigated on the brink of no break, break at the intercept, and break at the slope. Co-integration is examined with the LM test by diversifying with Tau (τ) and Phi (ϕ) statistics under the null hypothesis of no co-integration. $\hat{\phi}$ is the estimated standard error of ϕ , and also it is the parameter of restricted maximum likelihood estimate of α at the first difference error model. While $SE(\hat{\phi}_i)$ is the standard error of $\hat{\phi}_i$, \hat{w}_i is the estimated standard deviation of Δv_{it} (Westerlund & Edgerton, 2008: 671-673).

4.1.3. Bootstrap Panel Causality

Konya (2006: 979) introduces the SUR equation by equation method into Granger Causality with critical bootstrap values. The bootstrap method induces to remove the pre-requirement of unit root and co-integration investigation, whereas the SUR method resolves the cross-sectional dependence problem by modelling cross-correlations of errors. Meanwhile, the SUR method does not require homogeneity in panel estimation due to contemporaneous correlation among panel units.

$$\begin{aligned} lgd p_{1,t} &= \alpha_{1,1} + \sum_{l=1}^{llgd p1} \beta_{1,1,l} lgd p_{1,t-l} + \sum_{l=1}^{llme1} \theta_{1,1,l} lme_{1,t-l} + \varepsilon_{1,1,t} \\ lgd p_{2,t} &= \alpha_{1,2} + \sum_{l=1}^{llgd p1} \beta_{1,2,l} lgd p_{2,t-l} + \sum_{l=1}^{llme1} \theta_{1,2,l} lme_{2,t-l} + \varepsilon_{1,2,t} \\ &\vdots \end{aligned} \quad (13)$$

$$\begin{aligned} lgd p_{N,t} &= \alpha_{1,N} + \sum_{l=1}^{llgd p1} \beta_{1,N,l} lgd p_{N,t-l} + \sum_{l=1}^{llme1} \theta_{1,N,l} lme_{N,t-l} + \varepsilon_{1,N,t} \\ &\text{and} \\ lme_{1,t} &= \alpha_{2,1} + \sum_{l=1}^{llgd p2} \beta_{2,1,l} lgd p_{1,t-l} + \sum_{l=1}^{llme2} \theta_{2,1,l} lme_{1,t-l} + \varepsilon_{2,1,t} \\ lme_{2,t} &= \alpha_{2,2} + \sum_{l=1}^{llgd p2} \beta_{2,2,l} lgd p_{2,t-l} + \sum_{l=1}^{llme2} \theta_{2,2,l} lme_{2,t-l} + \varepsilon_{2,2,t} \\ &\vdots \end{aligned} \quad (14)$$

Bivariate SUR model simultaneous systems are demonstrated at Equations 13 and 14. l is the lag length of the system, $\varepsilon_{1,1,t}$ and $\varepsilon_{2,1,t}$ are white noises and correlated for each cross-section, but not among units. Unidirectional Granger Causality operates from lme to

lgdp if in Equation 13 not all $\theta_{1,i}$'s are zero, but all $\beta_{2,i}$'s are zero in Equation 14. Besides, unidirectional causality operates from lgdp to lme if all $\theta_{1,i}$'s are zero in Equation 13, but not all $\beta_{2,i}$'s are zero in Equation 14. Finally, there is bidirectional causality between lme and lgdp if neither all $\beta_{2,i}$'s nor all $\theta_{1,i}$'s are zero, there is no Granger causality between lme and lgdp, if all $\beta_{2,i}$'s and $\theta_{1,i}$'s are zero.

$$\begin{aligned}
 lgdp_{1,t} &= \alpha_{1,1} + \sum_{l=1}^{llgdp1} \beta_{1,1,l} lgdp_{1,t-1} + \sum_{l=1}^{llme1} \theta_{1,1,l} lme_{1,t-1} + \sum_{l=1}^{llk1} \gamma_{1,1,l} lk_{1,t-1} + \varepsilon_{1,1,t} \\
 lgdp_{2,t} &= \alpha_{1,2} + \sum_{l=1}^{llgdp1} \beta_{1,2,l} lgdp_{2,t-1} + \sum_{l=1}^{llme1} \theta_{1,2,l} lme_{2,t-1} + \sum_{l=1}^{llk1} \gamma_{1,2,l} lk_{2,t-1} + \varepsilon_{1,2,t} \quad (15) \\
 &\vdots
 \end{aligned}$$

$$lgdp_{N,t} = \alpha_{1,N} + \sum_{l=1}^{llgdp1} \beta_{1,N,l} lgdp_{N,t-1} + \sum_{l=1}^{llme1} \theta_{1,N,l} lme_{N,t-1} + \sum_{l=1}^{llk1} \gamma_{1,N,l} lk_{N,t-1} + \varepsilon_{1,N,t}$$

and

$$\begin{aligned}
 lme_{1,t} &= \alpha_{2,1} + \sum_{l=1}^{llgdp2} \beta_{2,1,l} lgdp_{1,t-1} + \sum_{l=1}^{llme2} \theta_{2,1,l} lme_{1,t-1} + \sum_{l=1}^{llk2} \gamma_{2,1,l} lk_{1,t-1} + \varepsilon_{2,1,t} \\
 lme_{2,t} &= \alpha_{2,2} + \sum_{l=1}^{llgdp2} \beta_{2,2,l} lgdp_{2,t-1} + \sum_{l=1}^{llme2} \theta_{2,2,l} lme_{2,t-1} + \sum_{l=1}^{llk2} \gamma_{2,2,l} lk_{2,t-1} + \varepsilon_{2,2,t} \quad (16) \\
 &\vdots
 \end{aligned}$$

$$lme_{N,t} = \alpha_{2,N} + \sum_{l=1}^{llgdp2} \beta_{2,N,l} lgdp_{N,t-1} + \sum_{l=1}^{llme2} \theta_{2,N,l} lme_{N,t-1} + \sum_{l=1}^{llk2} \gamma_{2,N,l} lk_{N,t-1} + \varepsilon_{2,N,t}$$

Konya (2006: 981-982) diversifies the causality model with the trivariate SUR system. So, lk is added to the system as a promotive variable. But lk does not directly affect Granger Causality as a joint cause; it is treated as an auxiliary variable at Equations 15 and 16.

4.2. Empirical Findings

First of all, the cross-sectional dependence situation of variables is evaluated to determine further estimations. Then, the unit root properties of variables are queried by considering the impact of cross-sectional dependence.

Table: 1
Findings of Cross-Sectional Dependence

Constant			
Tests	lgdp	lme	lk
LM1	210,145***	123,623***	106,924***
LM2	12,546***	5,015***	3,562***
CD	-1,810**	-2,709***	-2,351***
LM _{adj}	104,471***	1,856**	97,312***
Constant and Trend			
LM1	212,904***	114,631***	127,930***
LM2	12,786***	4,233***	5,390***
CD	-1,875**	-2,056**	-2,596***
LM _{adj}	98,836***	44,123***	91,854***

Note: ***, ** indicate significance at the 1, and 5 per cent, respectively.

Cross-sectional dependence creates size distorted and biased estimations. The cross-sectional dependence situation of variables takes importance in determining co-integration and causality models in particular to avoid inconsistent findings. Cross-sectional dependence features of variables are expressed in Table 1. It is seen that all variables suffer from cross-sectional dependence both in constant and constant and trend models. Besides, it is diagnosed that all variables have a trend in time. Therefore, constant and trend models are prioritised in interpreting findings in the further part of the analysis.

Table: 2
Findings of Unit Root

Variables	Constant		Constant and Trend	
	ADF	PP	ADF	PP
lgdp	19,324	23,073	14,102	9,429
D(lgdp)	88,638***	76,920***	73,012***	56,306***
lme	37,759**	22,447	17,497	8,013
D(lme)	97,714***	118,668***	76,414***	139,370***
lk	52,215***	32,933	39,169**	24,612
D(lk)	151,890***	140,197***	295,103***	159,706***

Note: ***, ** indicate significance at the 1, and 5 per cent, respectively.

Unit root findings of variables are reported in Table 2 by ignoring cross-sectional dependence. Schwartz information criterion is used for lag levels of ADF (Augmented Dickey-Fuller). ADF and PP (Phillips Perron) tests are reported depending on Fisher statistics. According to PP test findings, all variables have unit root at the level and become stationary at the first difference in both models. The PANIC test is used to consider cross-sectional dependence at unit root interrogation.

Table: 3
Findings of Unit Root under Cross-Sectional Dependency

Variables	Constant		Constant and Trend	
	Choi	Mw	Choi	Mw
lgdp	-2,526	6,502	0,701	28,853
D(lgdp)	3,912***	51,106***	1,636*	33,334*
lme	0,189	25,308	-0,873	17,953
D(lme)	2,619***	42,144**	2,783***	43,281***
lk	-1,172	15,879	0,534	27,699
D(lk)	4,994***	58,600***	2,495***	41,288**
military expenditure relative to Russia's	0,992	30,871	1,301*	33,012

Note: ***, **, * denote significance at 1, 5, and 10 per cent, respectively.

The findings of the PANIC test are demonstrated in Table 3. In terms of findings, all variables have unit root at the level and lead into stationary at the first difference in constant and constant and trend models leaning on Choi and Mw tests. All calculations are done with Gauss 21, and the maximum lag is pre-determined as 4. While the Schwartz information criterion is used for lag levels, many factors are appointed as 2. Thus, the existence of unit root refers continuous impact of economic shocks over these series.

Nonetheless, per capita real military expenditure (2010 constant) of 12 countries is relatively calculated to Russia's per capita real military expenditure (2010 constant) and added to the unit root investigation in Table 3. Liu et al. (2019) state that stationarity at the

relative value of a country reflects the convergence situation of this country to another one. According to findings, per capita real military expenditure of 12 countries has weak evidence towards convergence to Russia based on Choi test finding. Weak evidence of convergence can correspond to low levels, but tension and armament competition exist in the region.

Table: 4
Co-integration, Cross-Sectional Dependence and Homogeneity

Tests	No Shift	Level Shift
Tau (τ) Statistics	-2,342 (0,001)***	-2,684 (0,003)***
Phi (Φ) Statistics	-1,114 (0,133)	-1,485 (0,068)*
Cross-Sectional Dependence in Model		
LM		265,703***
CD _{LM}		17,382***
CD		12,374***
LM _{adj}		14,912***
Homogeneity		
Delta		16,172***
Adjusted Delta		17,522***

Note: ***, * denote significance at 1 and 10 per cent, respectively.

Westerlund and Edgerton's (2008) LM test co-integration findings are displayed in Table 4 depending on the theoretical model at Equation 3. Cross-sectional dependence in the model reflects the correlation among epsilons. Values in parenthesis reflect the probabilities of test statistics. In terms of findings, there is cross-sectional dependency among epsilons in the model. Meanwhile, co-integration depends on the Tau test in level shift and no shift models, which reject the null hypothesis at the 1% level. So, it means that series move together in the long run. Both delta and adjusted-delta tests reject homogeneity in the panel. It implies that countries can implement their policies separately from each other.

Table: 5
Findings of Regime Shift Co-integration and Break Dates

Countries	Break Date
Bulgaria	1998
Croatia	1998
Czech R.	2008
Estonia	2008
Hungary	2008
Latvia	2008
Lithuania	2008
Poland	2006
Romania	2008
Slovakia	2006
Slovenia	2008
Turkey	2000
Tau (τ) Statistics	-2,002 (0,023)**
Phi (Φ) Statistics	-1,401 (0,081)*

Note: **, * denote significance at 5 and 10 per cent, respectively.

The co-integration finding of the regime shift model takes place in Table 5. The trimming rate is 10%, and 4 is identified as the maximum lag length. The maximum factor is 2, and all calculations are done with Gauss 21. The null hypothesis of no co-integration is rejected in both Tau and Phi statistics. The break date is determined endogenously, and 2008

is assigned as a break for 7 countries: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, and Slovenia.

They are remaining analysis based on bootstrap panel causality to clarify the magnitude and direction of causality nexus between per capita real military expenditure and per capita real GDP and policy implications of countries. Causality models are scrutinised with trend structure. So, 8 different bootstrap causality situations arise from adding a third variable and time trend into models.

Table: 6
Bivariate Bootstrap Panel Causality I

Countries	Ho: lme does not cause lgdp				
	Coefficient	Wald	Critical Values		
			% 10	% 5	% 1
Bulgaria	0.011	0.504	12.744	21.502	81.613
Croatia	-0.084	14.958	19.041	27.412	57.168
Czech R.	-0.007	0.201	14.486	20.893	39.033
Estonia	0.047	4.200	19.308	29.139	54.982
Hungary	-0.015	0.710	9.822	14.697	28.683
Latvia	-0.0005	0.002	15.420	22.292	41.194
Lithuania	-0.013	1.453	15.037	21.338	39.645
Poland	0.0002	0.001	10.568	16.024	33.206
Romania	-0.023	1.292	9.763	14.514	29.174
Slovakia	-0.013	0.556	14.009	20.663	40.274
Slovenia	-0.011	1.250	16.732	24.692	46.102
Turkey	-0.084	4.556	10.031	15.305	31.898

Bivariate bootstrap causality is displayed in Table 6 from lme to lgdp. Bootstrap critical values are attained with the simulation of 10 thousand replications, and 1-4 is treated as lag length for all causality models. All causality calculations are done with TSP 5.0. There exist no significant findings for bootstrap causality running from lme to lgdp in any country. This finding signals a common pattern in which countries can determine their growth policy without caring about the impact of military policy. So, there is evidence to claim that these 12 countries can be categorised with the Neutrality Hypothesis. On the other hand, the trend's impact on causality is asked to clarify the issue due to its tendency in time.

Table: 7
Bivariate Bootstrap Panel Causality with Trend II

Countries	Ho: lme does not cause lgdp				
	Coefficient	Wald	Critical Values		
			% 10	% 5	% 1
Bulgaria	0.005	0.167	15.974	25.654	69.663
Croatia	-0.087	16.882	28.378	39.936	75.523
Czech R.	-0.018	0.356	13.518	19.826	35.935
Estonia	0.002	0.057	22.496	31.722	59.850
Hungary	0.091	19.214**	10.380	14.856	27.945
Latvia	-0.002	0.601	15.851	23.629	43.174
Lithuania	-0.022	11.048	18.579	26.730	45.676
Poland	0.007	0.000	14.735	22.859	49.706
Romania	-0.019	2.489	15.095	22.365	43.850
Slovakia	-0.033	5.015	14.866	21.446	39.726
Slovenia	0.002	0.192	20.490	29.544	59.920
Turkey	-0.086	13.225	18.923	27.798	59.187

Note: ** denotes significance at 5%.

Bivariate bootstrap panel causality with the trend is expressed in Table 7 from lme to lgdp. Time trend is a proxy variable and is assumed to be substituted for the missing variable from the model (Konya, 2006: 986). According to findings, there is bootstrap positive causality running from lme to lgdp just in Hungary; the remaining countries support Neutrality Hypothesis. The spin-off effect is pertinent for Hungary based on findings that promote Military Spending-Led Hypothesis. This result supports the existence of the Neutrality Hypothesis for the remaining 11 countries, but the impact of lk is added to the causality model to bring new evidence both with the trend and without trend applications.

Table: 8
Bivariate Bootstrap Panel Causality III

Countries	Ho: lgdp does not cause lme				
	Coefficient	Wald	Critical Values		
			% 10	% 5	% 1
Bulgaria	0,205	1,495	6,177	8,940	16,685
Croatia	0,102	0,626	7,341	10,652	20,517
Czech R.	-0,074	0,517	15,306	23,058	42,340
Estonia	0,539	9,512	15,316	21,981	40,497
Hungary	0,073	0,316	19,298	28,288	51,574
Latvia	0,028	0,025	12,134	18,145	33,295
Lithuania	0,276	4,579	21,685	30,138	53,188
Poland	0,558	10,739*	8,156	12,008	22,126
Romania	0,108	1,521	6,319	9,204	16,269
Slovakia	0,143	2,489	10,164	15,119	28,732
Slovenia	0,013	0,007	9,204	13,478	26,144
Turkey	0,180	9,332	12,093	17,230	33,980

Note: * denotes significance at 10%.

Bivariate bootstrap causality takes part in Table 8 from lgdp to lme. There is significant positive causality operating from lgdp to lme just in Poland, which denotes the Growth-Led Hypothesis. The remaining countries support Neutrality Hypothesis. The trend's impact is taken into interrogation to make the issue clearer.

Table: 9
Bivariate Bootstrap Panel Causality with Trend IV

Countries	Ho: lgdp does not cause lme				
	Coefficient	Wald	Critical Values		
			% 10	% 5	% 1
Bulgaria	-0,331	0,300	12,517	17,998	32,873
Croatia	0,015	0,003	12,068	17,772	35,241
Czech R.	-1,088	14,225*	13,444	19,851	37,852
Estonia	0,413	3,217	12,199	18,154	35,614
Hungary	-1,860	22,735*	16,608	24,669	49,415
Latvia	-0,502	1,723	15,320	22,543	41,534
Lithuania	-0,389	1,393	13,985	20,334	38,522
Poland	-0,725	3,989	9,330	13,747	27,562
Romania	-0,577	7,884*	6,747	10,290	20,641
Slovakia	-0,623	4,050	17,643	25,778	47,763
Slovenia	2,139	23,791**	14,889	21,771	41,071
Turkey	0,598	10,095	13,614	20,782	46,038

Note: **, * denote significance at 5 and 10 per cent, respectively.

Bivariate bootstrap causality with time trend is demonstrated in Table 9 from lgdp to lme. There is bootstrap negative causality operating from lgdp to lme in the Czech Republic, Hungary, and Romania, which is the Growth-Military Detriment Hypothesis. Besides, there

is positive bootstrap causality operating from lgdp to lme just in Slovenia. Even if the findings do not support Table 8, Slovenia promotes the Growth-Led Hypothesis.

Table: 10
Trivariate Bootstrap Panel Causality V

Countries	Ho: lme does not cause lgdp				
	Coefficient	Wald	Critical Values		
			% 10	% 5	% 1
Bulgaria	-0,012	15,100*	9,923	16,437	77,850
Croatia	-0,090	9,696	14,562	20,878	39,364
Czech R.	0,037	13,943*	13,197	19,510	37,044
Estonia	0,038	9,352	17,186	25,308	48,772
Hungary	0,041	11,136*	11,131	16,628	32,387
Latvia	0,009	5,780	13,034	19,131	36,911
Lithuania	-0,008	12,686	13,076	19,815	38,815
Poland	0,003	0,033	9,405	14,786	31,598
Romania	-0,015	2,501	9,157	13,643	26,428
Slovakia	0,003	4,331	12,127	17,845	36,616
Slovenia	-0,010	0,371	13,372	19,289	36,612
Turkey	-0,198	0,231	8,945	13,933	28,442

Note: * denotes significance at 10%.

The trivariate system is evaluated to consider the theoretical model more closely by adding per capita real capital as an auxiliary variable. But lk is treated as an auxiliary variable in the model, not spark off a joint causality impact. Trivariate bootstrap causality is in Table 10 from lme to lgdp. There is positive bootstrap causality running from lme to lgdp in Czech Republic and Hungary, which endorse Military Spending-Led Hypothesis. There is negative bootstrap causality from lme to lgdp in Bulgaria, corresponding to the Military-Growth Detriment Hypothesis.

Table: 11
Trivariate Bootstrap Panel Causality with Trend VI

Countries	Ho: lme does not cause lgdp				
	Coefficient	Wald	Critical Values		
			% 10	% 5	% 1
Bulgaria	-0,039	96,032***	20,797	30,239	60,850
Croatia	-0,116	9,798	24,843	34,370	60,460
Czech R.	0,010	2,762	14,454	21,332	40,297
Estonia	0,050	2,712	16,826	25,257	47,874
Hungary	0,089	0,791	12,005	17,500	34,008
Latvia	-0,024	2,351	16,142	23,923	45,178
Lithuania	-0,029	0,068	20,659	29,687	59,763
Poland	-0,034	0,961	12,089	18,502	35,739
Romania	0,113	23,593*	22,625	32,190	62,884
Slovakia	-0,025	1,076	14,088	20,843	40,647
Slovenia	0,035	4,880	14,854	21,740	40,079
Turkey	-0,153	0,001	16,245	24,128	46,013

Note: ***, * denotes significance at 1 and 10 per cent.

Trivariate bootstrap causality with the trend is demonstrated in Table 11 from lme to lgdp. There is bootstrap positive causality operating from lme to lgdp just in Romania, which points to Military Spending-Led Hypothesis. There is bootstrap negative causality operating lme to lgdp just in Bulgaria, which implies Military-Growth Detriment Hypothesis.

Table: 12
Trivariate Bootstrap Panel Causality VII

Countries	Ho: lgdp does not cause lme				
	Coefficient	Wald	Critical Values		
			% 10	% 5	% 1
Bulgaria	0,245	0,869	9,785	14,260	26,705
Croatia	-0,011	0,032	11,205	16,855	31,878
Czech R.	-0,252	0,846	15,370	22,530	43,448
Estonia	0,786	5,648	17,134	25,365	46,875
Hungary	-0,074	2,369	32,648	43,765	73,485
Latvia	-0,130	0,255	18,111	26,692	50,445
Lithuania	0,267	0,733	25,097	34,268	62,962
Poland	0,637	12,099**	8,115	11,959	22,923
Romania	0,458	3,657	10,480	15,874	31,494
Slovakia	-0,087	2,632	12,564	18,866	35,615
Slovenia	-0,014	7,263	13,065	18,615	35,491
Turkey	0,205	0,905	12,935	18,856	35,015

Note: ** denotes significance at 5%.

Findings of trivariate bootstrap causality take place in Table 12 from lgdp to lme. There is positive bootstrap causality running from lgp to lme just in Poland, which signs to Military Spending-Led Hypothesis.

Table: 13
Trivariate Bootstrap Panel Causality with Trend VIII

Countries	Ho: lgdp does not cause lme				
	Coefficient	Wald	Critical Values		
			% 10	% 5	% 1
Bulgaria	0,274	0,181	14,110	24,351	62,072
Croatia	0,331	0,216	13,064	19,516	37,906
Czech R.	-3,382	37,162**	15,152	22,007	44,695
Estonia	0,078	0,319	14,571	21,329	40,813
Hungary	-3,258	106,444***	22,473	31,457	55,124
Latvia	-2,103	11,705	15,869	22,987	48,080
Lithuania	-1,247	5,363	14,188	21,310	43,594
Poland	-1,093	2,606	8,560	12,548	24,325
Romania	-0,947	2,254	10,595	16,032	32,218
Slovakia	-1,424	20,500*	19,450	27,818	50,638
Slovenia	0,038	0,056	14,869	21,659	41,135
Turkey	1,334	9,117	16,426	23,357	43,845

Note: ***, **, * denote significance at 1, 5 and 10 per cent, respectively.

The trivariate bootstrap causality with the trend is in Table 13 from lgdp to lme. There is negative bootstrap causality operating from lgdp to lme in the Czech Republic, Hungary, and Slovakia, implying the Growth-Military Detriment Hypothesis.

5. Conclusion

This study investigates the relationship between per capita real GDP, per capita real military expenditure, and per capita real capital in 12 NATO member countries spanning from 1995 to 2020. Cross-sectional dependence of variables is examined since ignoring it leads to biased estimations. It is detected that all variables are suffering from cross-sectional dependence, and all panel units are heterogeneous. It implies that all group members can apply their policies. Unit root, co-integration, and causality tests were determined, building

upon cross-sectional dependence. It is seen that all variables have unit root at the level and transform to stationary at the first difference.

Moreover, the per capita real military expenditure of 12 countries relative to Russia's per capita real military expenditure is analysed with the PANIC test to clarify convergence. It is identified that there is weak evidence of convergence towards Russia's per capita real military expenditure. So, it can be claimed that armament competition is not so high in the region but exists. Co-integration is inquired with Westerlund and Edgerton's (2008) structural break test. Series are moving together, in the long run, owing to co-integration. Besides, break dates are detected endogenously, and 2008, reminds of the destructive impact of the global economic crisis, is assigned as a structural break in the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, and Slovenia.

Bivariate and trivariate bootstrap causalities are examined, leaning on Konya's (2006) methodology with the trend and without trend versions. This approach has brought forth 8 different causality situations in both directions and induced various policy recommendations for countries. The main idea behind the trivariate causality is to include per capita real capital as an auxiliary to the model in this study. In terms of whole bootstrap causality findings, there is strong evidence for 5 countries due to a lack of significant causality. Croatia, Estonia, Latvia, Lithuania, and Turkey have no significant bootstrap causality, implying Neutrality Hypothesis. These countries can determine their military and growth policies separately from each other.

On the other hand, these countries can consider designing military R&D for market structure needs to create random positive stimuli in the future. Even if the values of simultaneous equation coefficients are not so high in both trend and without trend trivariate models, there is some evidence in Bulgaria corresponding to Military-Growth Detriment Hypothesis. This can be interpreted as the funding competition between military and non-military sectors, reducing the capital formation of new investments. So, Bulgaria needs to care about the investment effect of military spending on the economy due to the crowding-out effect.

There is evidence in the Czech Republic, Hungary, and Romania for bidirectional causality, reflecting the Keynesian aggregate demand effect due to reciprocal dependence. But the causality from military to growth is positive, whereas growth in the military is negative. The positive magnitude of causal linkage from military to growth matches the Military Spending-Led Hypothesis due to the spin-off effect. These countries can increase their growth by leaning on positive aggregate demand, employment, and R&D externalities of military spending. However, the values of simultaneous equation coefficients are high and negative for the causal linkage from growth to military, which supports the Growth-Military Detriment Hypothesis. Negative findings can result from the need to enhance defence spending via more imported equipment that points to the effort to increase armament.

If a country compensates for its military expenditure heavily with taxes or borrowing, a negative impact of growth on the military can be expected. There is also evidence for Slovakia corresponding to Growth-Military Detriment Hypothesis. These countries should care more about the income elasticity of tax revenue and its impact on the military before changing their growth policy. At the same time, there is some evidence in Poland and Slovenia matching the Growth-Led Hypothesis. Poland and Slovenia can afford additional spending on the military with further increment in per capita income level. The nexus among variables brings different policy implications for other countries and cases, excluding 5 of them.

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Socio-Economic Determinants of Happiness: The Case of Afghanistan¹

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Mutluluğun Sosyoekonomik Belirleyicileri: Afganistan Örneği²

Abstract

The study empirically investigates the determinant factors of happiness in Afghanistan using ordered logistic and probit regression models. In the study, cross-sectional data collected from 74,351 people in the 2019 survey of the Asia Foundation in 34 provinces of Afghanistan was employed. Our findings confirm that age, marital status, employment, education level, income, foreign language ability, perception of the country's future direction, and change in the household economic situation are the key variables affecting the happiness of individuals in the country. The positive impact of the family size variable on happiness has been the study's key finding.

Keywords : Happiness, Socio-Economic Status, Life Satisfaction.

JEL Classification Codes : Z10, Z00, Z13.

Öz

Bu çalışmanın amacı Afganistan'da mutluluğu belirleyen faktörleri sıralı lojistik ve probit regresyon modelleri kullanarak deneysel olarak araştırmaktır. Çalışmada, Asya Vakfı tarafından Afganistan'ın 34 ilinde 2019 yılında 74.351 kişiden toplanan yatay kesit verileri kullanılmıştır. Araştırmada yaş, medeni durum, istihdam, eğitim düzeyi, gelir, yabancı dil yeteneği, coğrafi farklılıklar, bireylerin uzlaşmaya ve ülkenin gelecekteki yönüne ilişkin algısı ve hane ekonomik durumundaki değişimin ülkedeki bireylerin mutluluğunu etkileyen temel değişkenler olduğu tespit edilmiştir. Aile büyüklüğünün mutluluk üzerindeki olumlu etkisi bu çalışmanın ana bulgusu olmuştur.

Anahtar Sözcükler : Mutluluk, Sosyoekonomik Durum, Yaşam Memnuniyeti.

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1. Introduction

Happiness is one of the most important human psychological needs due to its significant effects on the formation of human personality, and life has occupied the human mind for ages. One of the most important points is achieving happiness, strengthening it, and knowing the variables affecting its achievement. The final aim of every individual is the "*pursuit of happiness*". It is affected by a large number of economic and non-economic factors. Therefore, one of the critical duties of happiness research is to figure out what circumstances and factors affect individual happiness and to what degree. Recently economists have started identifying determinants of happiness. This has been possible due to the greater accessibility of micro-level data from different surveys. Information on socio-demographic characteristics and other activities and indicators has been linked with answers about happiness.

From ancient times the positive emotions of human beings, such as happiness, have been paid attention to and are one of the most talked-about and heated topics of discussion for researchers in different fields, including economics and psychobiology. Despite the conceptual difference that happiness, life satisfaction and well-being have, in most of the relevant literature, these terms are used interchangeably (Seligman, 2004; Diener, 2009). Therefore, we use the term happiness in this research. Happiness, also termed subjective well-being in the relevant literature, is an emotional concept, and in most definitions of happiness, positive emotions are concentrated. According to Aristotle, there are four happiness levels; At the lowest level is the happiness received from material objects, which is short-lived. At the second level, happiness is obtained from comparisons like promotions and winning titles. The third level is the happiness of helping others and bringing about positive societal changes. The highest level is happiness from spirituality and a sense of perfection (Eysenck & Eysenck, 1994). Even though psychologists have begun to pay attention to positive emotions as the definition of happiness these days, Tatarikiewicz defined life satisfaction as contentment with past, present, and future events in life, meaning satisfaction with what life was, what it is, and what it will be. Also, the philosophical definition of well-being is given as the "*notion of how well a person's life is going for that person*" (Crisp, 2001). Life satisfaction is a cognitive concept. It contains individuals' assessments of their lives compared to living standards. This means that individuals pass judgment regarding their life and what it should be in life satisfaction.

According to Argyle (2001), research on happiness started in 1960, and various organisations have surveyed happiness. In most happiness-related studies, three basic dimensions and orientations have been spotted and analysed: i) measuring the level of happiness and providing tools for measuring happiness; ii) the primary determinants and elements affecting happiness; iii) the ways of increasing happiness. Research about happiness is important because the eventual goal of most human beings is to be happy. Also, study about personal happiness contributes to different aspects of life. Still, it is mainly important for understanding the determinants and conditions that increase individual happiness since there is a wide range of factors affecting this phenomenon. Happiness

research helps us understand the relative importance of different factors contributing to personal happiness. Additionally, it's important to recognise human behaviour, analyse the consequences of happiness on behaviour, and investigate whether happiness is a cause or an effect. Lastly, happiness research is significant for economic policies because different policies have different impacts on society and all economic policies have trade-offs.

Every year different organisations publish reports regarding the World's happiest people. According to the World Happiness Report in 2020, the people of Afghanistan are among the saddest in the World. This study aims to identify the main socio-economic and demographic factors affecting happiness in the country. We believe that in the context of Afghanistan, just as in the rest of the world, there are several socio-economic and demographic determinants affecting the happiness of individuals. To the best of our knowledge, there is not an analytical or empirical study regarding the determinants of happiness in the context of Afghanistan. The other purpose of the study is to deliver identification about the effect of people of Afghanistan's socio-economic conditions on their happiness. Compared to other advanced and developing countries, it is characterised by meagre participation rates in the labour market, deficient levels of education, rampant poverty and corruption in government institutions, insecurity and substantial regional differences in terms of per capita income and other economic indicators. It is worth mentioning that we tried to find similar studies in countries that face conflict situations like Afghanistan. Still, unfortunately, no studies were found in the said category of countries. This study will help lay out the foundation for further studies in countries facing conflict situations like Afghanistan.

To study the effect of different determinants on happiness in Afghanistan, we use individual-level survey data from the Asian Foundation. The survey of the Asia Foundation provides rich data on political interests, trust in government, participation in elections, socio-political orientations, poverty, unemployment, and other issues. As a result of this study, we will know the comparative importance and impact of different literature-based variables on happiness in the context of Afghanistan. This study will also help policymakers consider these factors in decision making.

This study consists of five sections. Section one looks at the introduction. Section two reviews and looks at the main literature contributions of the impact of different determinants and variables on happiness. Section three explains variables, data set and methodology. Section four contains empirical analysis and results of the study. Section five contains the conclusion of the study.

2. Literature Review

Happiness is a key concept in mental health affecting different aspects of human life. There are various definitions of happiness, but most have focused on positive emotions. In a general definition, happiness can be defined as a general cognitive evaluation of the quality of one's own life (Diener, 2000). For centuries happiness has been a key theme in psychology

and political science, and recently, it has attracted the attention of economists too (Diener et al., 1999). The interest of economists was drawn to the topic of happiness, its determinants and measurement after the 1993 symposium in London, the proceedings of which were later published in the *Economic Journal* and elsewhere. In the 1990s, economists began conducting a large-scale empirical analysis of the determinants and factors of happiness in various contexts. Scholars from different disciplines have focused on one aspect or dimension more than another (Frey, 2010). Below, we look at the further research that has touched upon different angles and determinants of happiness in other contexts.

Some studies have found that the factors affecting happiness in different cultures and societies are different. Happiness is defined by personal achievement and self-esteem in North American cultural contexts. Individuals in these countries try to increase happiness by experiencing positive effects. Contrary to this, in East Asian Culture, happiness is defined by interpersonal connectedness. Individuals in this area are trying to balance positive and negative effects.

Moreover, in East Asian countries, happiness is predicted by the perceived embeddedness of the self in society and social relationships (Uchida et al., 2004). According to Diener, cultural and societal determinants affect happiness and life satisfaction differently. First, some countries can meet people's basic needs, like food, drinking water, and health care; such people report relatively higher rates of happiness. Another impact of culture is to change the associates of happiness by affecting individuals' goals and values. Lastly, variations in confidence and positivity, social support, coping habits and the degree of control of individual desires seem to lead to variations in cultural influences on mean happiness levels.

Researching subjective well-being, economists generally assume that it follows a U-shaped pattern with age. Data sourced from a broad Norwegian survey project proves that this is valid in cognitive well-being or life satisfaction, but not emotional well-being (happiness) that decreases with age. Paul and Tony cited a study by Blanchflower and Oswald in their analysis of the relevant literature as "*the most comprehensive to date*", with "*approximately 800,000 respondents from 60 countries who all reported a U-shaped relation in terms of happiness and age*" (Paul & Tony, 2012). Not all economists agree on this subject; according to Paul and Toney, some economists have defined the relationship between age and happiness as flat, gradually declining, or even contrariwise U shape. Also, Servet (2017), using data collected by a questionnaire from the Turkish Statistical Institute (TÜİK), has studied the relationship between age and happiness in the context of Turkey and has found that happiness has a positive relationship with age, a similar result is reached by (Sönmez & Sönmez, 2018) in the mentioned context. Graham has investigated the impact of age on happiness. He has found turning points in people's happiness according to age. He has found a U-shaped relationship between age and happiness in 44 of the 46 countries (Graham, 2017). To know the relationship between age and happiness, we also add a categorical variable for the period in the context of Afghanistan.

Another critical factor that affects happiness, according to some studies, is marital status. According to studies, happiness in adults has a lot to do with marital status. In the view of Lykken (1999), the process of married life and its relationship with the level of happiness has a U shape. According to him, when a person decides to get married, his happiness increases; when the marriage takes place, the happiness created decreases once again, and this decrease continues until the children reach youth. After this period, happiness rises again to reach its initial level. Servet (2017) has found that married people report lower happiness over time. According to Diener et al. (1999), married people are happier than those who have never been married or separated or have lost their spouse. Stack (1998), controlling for other sociodemographic variables and using data collected by the World Values Study Group on seventeen industrialised nations, have reached similar results regarding the impact of marital status on happiness. He has found that in 16 out of 17 countries, married individuals reported a significantly high level of happiness than single ones. Similar result is found in other researches (Akin & Şentürk, 2012; Sönmez & Sönmez, 2018). To see if this relationship is also valid in Afghanistan, we include marital status as a categorical variable with three categories: single, married, and widowed, to the list of explanatory variables in this study.

Some studies have looked at the effect of income on happiness and how income affects happiness. In research, Tella, MacCulloch, and Oswald (2003) discovered that macroeconomic movements significantly affect people's happiness. From the 1970s to the 1990s, they found strong microeconomic trends in the psychological well-being levels of a quarter of a million randomly sampled Europeans and Americans. According to the research, happiness equations increase monotonously with income and have a similar structure in different countries. They also discovered that increases in happiness are linked to macroeconomic variables such as gross domestic product. However, some studies contradict and are dubious about the importance of increasing real income on happiness. It is difficult for standard economics to explain the various empirical puzzles. In this regard, an important paradox is that while real per capita income has increased significantly in some countries since World War II, the happiness of individuals has remained constant or even slightly decreased. For example, real per capita income in the United States increased by 2.5 from 1946 to 1991, but happiness has not changed and remained constant during the same period. This paradox in happiness research has been called the "*Easterlin Paradox*". According to Helliwell, Layard, and Sachs (2012), the reason for this paradox is that people compare themselves to others. However, this paradox in happiness was blamed by other economists, including Clark, Frijters, and Shields (2008). They used micro-level data and found that individual-level happiness had increased in the same period, and there was a connection between personal happiness and income. Çirkin and Göksel (2015) examined the impact of income on happiness. They found that satisfaction with income leads to increased happiness, not the payment itself. Similar results that income affects happiness have been reached by other researchers (Erdogan et al., 2012; Köksal & Şahin, 2015). In this study, we also assume that other factors affecting the happiness of individuals in the context of Afghanistan are

income and changes in the household economic situation. Therefore, we consider them as explanatory variables in the context of Afghanistan.

Most research findings on the subject topic show that employment status plays a key role in happiness. When people lose their job and get unemployed, they experience a sharp decrease in happiness until they are reemployed (Blanchflower & Oswald, 2004; Clark & Oswald, 1994; Winkelmann & Winkelmann, 1998). Studies also found that high unemployment has negative spillovers not only on the unemployed but also employed because due to a higher level of unemployment, the employed also feel insecure (Green, 2011). Tait, Padgett, and Baldwin (1989) have found a strong relationship between employment and happiness. Cheng, Wang, and Smyth (2014), in the context of China, have found that the first generation of local migrants who are employed and satisfied with their jobs are happier than the new generation of local migrants, citing the reason that the aspiration of the new generation of migration change rises fast. In the context of Afghanistan, we assume that those employed or have money-generating activities report higher happiness than those who do not. Therefore, we include employment status or money generating activity as an explanatory variable in this study.

In happiness related literature, family size is also found to be a key factor affecting happiness. Scoppa and Ponzio (2008) have found that family size negatively affects happiness in the context of Italy. Other studies have also found that children and family size are negatively affecting happiness (Köksal & Şahin, 2015; Sönmez & Sönmez, 2018). Therefore, we also add family size as an explanatory variable in Afghanistan.

A lot of research has investigated the effect of education on happiness. Cuñado and de Gracia (2012), in Spain, using individual-level data sourced from the European Social Survey, have found that higher education affects income and employment opportunity, thus affecting happiness. They have found that the education level is not directly affecting happiness. Scoppa and Ponzio (2008) have found that education affects happiness in Italy's context; they have discovered that teaching increases happiness. Also, using data from TÜİK in 2008, Bülbül and Giray (2011) in the context of Turkey have found that education is positively affecting happiness. A similar result is reached by (Köksal & Şahin, 2015) in the mentioned context. Therefore, we add education level as a categorical explanatory variable in this study. We look at the relationship between different categories of education and happiness in the context of Afghanistan.

According to different studies, residence and origin of living are yet other factors affecting individuals' happiness. Scoppa and Ponzio (2008) have found that individuals in the South of Italy and big cities are less happy. Brereton, Clinch, and Ferreira (2008) using geographical information systems and data at the disaggregated individual and local level, have explored the impact of geography on happiness in the context of Ireland. They have found that climate and environmental and local conditions play a key role and affect the happiness of individuals. Due to the diverse nature of climate and differences in environmental factors in Afghanistan, we use two separate variables, geographic code

containing rural and urban areas and geographic region, in this study to explore the relationship and impact of geography and environmental factors on the happiness of individuals in the country. Additionally, due to the difference in security and local conditions in different country regions, we use victimisation of torture, individual perception of reconciliation and the country's future direction as explanatory variables in this study.

Also, in the study, it is pretended that the ability to speak a foreign language is yet another factor affecting the happiness of individuals because those who can communicate in a foreign language can have access to different information.

3. Data and Methodology

3.1. Data

To analyse the determinants of happiness in the context of Afghanistan, we use a nationally representative survey of the Asia Foundation, which was conducted in 34 provinces of Afghanistan. The mentioned survey was run from 2004 to 2019 in the country. The data used in this study is cross-sectional and belongs to 2019. Different individuals were asked in the survey. The survey is nationally representative since it covers all provinces of Afghanistan and other categories of society. As shown in Table 1, from the 74,351 persons who have been asked about their state of happiness in the data set, the per cent of females is nearly 49, and the percentage of males is almost 51. The Asia Foundation Survey of the people of Afghanistan contains data on different topics, including happiness. For this purpose, we use a wide range of explanatory variables of various natures, including discrete, binary and categorical variables. Our dependent variable in the study is happiness. Explanatory variables include education level, age, income, foreign language ability, geographic code and region, employment status, marital status, income, family size, the perspective of individuals on the possibility of reconciliation between the government and Taliban and the future direction of the country, the experience of torture and change in household economic situation. Tabulation of the 74,351 Afghan people who were asked in 2019 about their state of happiness in the survey is displayed in Table 1.

Table: 1
Tabulation of Data by Gender

Gender	Freq.	Per cent	Cum.
Female	36,561	49.17	49.17
Male	37,790	50.83	100.00
Total	74,351	100.00	

Table 2 below displays a complete list of the variables and their descriptions used in the analysis.

Table: 2
Description of the Variables

Variable	Description
Happiness	Categorical variable. Answer to the question "In general in your life, would you say you are very happy, somewhat happy, not very happy, or not at all happy?". It takes: 1 (not at all happy), 2 (not very happy), 3 (somewhat happy), 4 (very happy).
Employment	The dummy variable takes 0 if the respondent does not have any money generating activity and 1 if the respondent has money generating activity.
Income	It is a continuous variable that takes values between zero and infinite.
Reconciliation	Dummy variable taking 1 if the respondent thinks the reconciliation is possible and 2 if the respondent thinks reconciliation is impossible.
Marital status	Marital status is a categorical variable taking one if the respondent is a widower, 2 if the respondent is single, and 3 if the respondent is married.
Family Size	A discrete variable that shows the number of family members. It takes values between 1 and infinite.
Age	Age category in this study is a discrete variable taking values: 1 if the respondent's age is (18-25), 2 if the respondent's age is (26-35), 3 if the respondent's age is (36-45), 4 if the respondent age is (46-55), and 5 if the respondent's age is above 55.
Geographic region	It is a categorical variable taking 1 if the respondent comes from Central/Kabul, 2 if the respondent comes from Central/Highland, 3 if the respondent comes from Est, 4 if the respondent comes from Northeast, 5 if the respondent comes from Northwest, 6 if the respondent comes from Southeast, 7 if the respondent comes from Southwest and 8 if the respondent comes from the West of the country.
Education level	Categorical variable taking the following values: 1 (No formal), 2 (Primary), 3 (Secondary), 4 (High school), 5 (University), 6 (Informal).
Geographic code	Binary variable taking 0 if the respondent lives in a rural area 1 if lives in an urban area.
Country direction	Dummy variable taking values of 1 if the respondent thinks that the country is going in the right direction and 2 if the respondent thinks the country is going in the wrong direction.
Change in the household economic situation	Categorical variable showing the change in household economic situation. It takes one of them there is no change in the household economic situation, 2 if it has improved and 3 if it has worsened.
Victimisation of violence	Dummy variable taking 1 if the respondent is not a victim of violence and 2 if the respondent is a victim of violence.
Foreign language ability	Dummy variable taking 0 if the respondent cannot speak a foreign language and 1 if the respondent can speak a foreign language.

Source: The data is obtained from the Survey conducted by the Asia Foundation in 2019 on 74,351 Afghan people.

3.2. Method

In terms of the econometric method, just as in the rest of the studies on happiness and its determinants, in this study, we consider responses of individuals to the question "in general in your life, would you say you are very happy, somewhat happy, not very happy, or not at all happy?". Answers to the question are based on a scale from 1 to 4, where 1 represents not at all happy, and 4 means very happy. Since our dependent variable is ordinal, ordered logistic and probit regression models are used in this study. Also, it is worth mentioning that the data used in this study is cross-sectional. Different individuals are asked in the survey. The model used in the study is as follows;

$$h_i = \alpha + \sum \beta_i x_i + \epsilon_i \quad (1)$$

Equation (1) h shows the answer of the respondent to the question "How happy you are?", i stands for the respondent, α is constant of the model showing the effect of all the variables affecting happiness which are held constant in this model, β is regression coefficient, x represents a set of variables affecting happiness and ϵ shows error term in the model. Since our dependent variable is ordinal, we apply ordered logistic and probit regression models.

4. Empirical Results

Because our dependent variable (happiness) is ordinal, we used ordered logistic and probit analyses in this study. We have placed all of the explanatory variables (based on literature) in the same model, meaning we do not control for any variable extracted from relevant literature. A base category is considered for each explanatory variable (except discrete variables). Levels of happiness are interpreted as an ordinal measure. This means that higher levels show higher utility, but it does not assert that the change in happiness is proportionally equal to the level change. In the model, the signs of coefficients show the direction of the relationship between explanatory and dependent variables, whereas the absolute value of coefficients shows the strength of the relation. STATA statistical package is used in the analyses.

The results of the ordered logistic analysis are presented in Table 3 below, and the results of the probit regression analysis are given in appendix 1. As shown in the Tables of ordered logistic and probit regression, they both show similar results. As shown in the ordered logistic regression in Table 3, nearly all variables included in the model are statistically significant. While some of the explanatory variables, including *employment*, *geographic code*, *income*, *marital status*, *education level* and *family size*, have a statistically significant and positive impact on happiness, other variables, namely, *victimisation of torture*, *negative perspective on reconciliation between government and Taliban* and *the country's future direction* have a statistically significant and negative impact on happiness.

As shown in Table 3, since the coefficient of employment in the model is positive and statistically significant ($p\text{-value} < 0.05$), we conclude that employment is an important factor leading to a higher level of happiness for individuals. In the case of Afghanistan, those who are employed are happier than those who are not. Our finding in this regard supports those of (Blanchflower & Oswald, 2004; Clark & Oswald, 1994; Winkelmann & Winkelmann, 1998), who found that unemployment leads to a decline in the happiness of individuals in different contexts.

In terms of the impact of *income* on the happiness of individuals, we found that income is positively affecting happiness (coefficient is positive and statistically significant, $p\text{-value} < 0.01$). It is worth mentioning that the impact of income on happiness is very low (the coefficient's absolute value is low) in Afghanistan. Its reason could be attributed to the fact that individuals whose incomes are high may lead relatively comfortable life (controlling for other factors) compared to those whose income is low. Our finding is in line with those of (Clark et al., 2008), who reached similar results regarding the mentioned relation. We recommend a separate study of the high-income earners who are more satisfied with their income than low-income earners to compare our result with that of Çirkin and Göksel (2015). They found satisfaction with income to be a key factor in increasing happiness.

Regarding the impact of *geographic cod* on the happiness of the people of Afghanistan, as Table 3 shows, its coefficient is positive and statically significant (p-value < 0.01). This means that individuals who live in urban areas of Afghanistan are happier than those who live in rural areas. In this regard, our finding is not in line with that of (Scoppa & Ponzio, 2008), who found that people who live in big cities are less happy in the context of South Africa. The higher levels of happiness in urban areas of Afghanistan could be attributed to the relatively reasonable access to public services.

Table: 3
Ordered Logistic Regression Results

Happiness	Coef.	St.Err.	t-value	p-value
Employment				
Employed	0.054**	0.021	2.57	0.010
Income	7.77e-06***	8.51e-07	9.14	0.000
Geographic code				
Urban	0.027***	0.026	7.79	0.000
Victimisation of Violence				
Victim	-0.260***	0.026	-10.40	0.000
Reconciliation				
Positive View	-0.324***	0.020	-15.82	0.000
Country direction				
Wrong direction	-0.439***	0.021	-20.55	0.000
Family Size	0.007***	0.003	2.66	0.008
Marital Status				
Single	0.387***	0.077	4.99	0.000
Married	0.419***	0.070	6.01	0.000
Age Category				
26-35	-0.054*	0.029	-1.83	0.067
36-45	-0.115***	0.032	-3.61	0.000
46-55	-0.142***	0.038	-3.71	0.000
55+	-0.068	0.045	-1.50	0.135
Region				
Central/Highland	0.068	0.049	1.37	0.171
East	-0.103***	0.037	-2.79	0.005
Northeast	0.062*	0.035	1.76	0.079
Northwest	-0.205***	0.035	-5.83	0.000
Southeast	-0.431***	0.042	-10.21	0.000
Southwest	-0.489***	0.036	-13.40	0.000
West	-0.574***	0.038	-15.11	0.000
Education level				
Primary	0.086***	0.028	3.10	0.002
Secondary	0.009	0.039	0.25	0.806
High school	0.287***	0.027	10.33	0.000
University	0.591***	0.061	9.66	0.000
Change in Economic Situation				
Better	0.508***	0.026	19.30	0.000
Worse	-0.427***	0.023	-18.86	0.000
Foreign Language Ability				
Able to Speak	0.215***	0.521	4.13	0.000
Pseudo r-squared	0.043			
Chi-square	3721.996			

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

As shown in the logistic regression result in Table 3, personal or family members' *experience of torture*, individuals' negative perception of the possibility of *reconciliation* between government and Taliban as well as pessimistic perception of the country's *future direction* are all negatively affecting happiness in Afghanistan (all coefficients are negative and statistically significant, p-value < 0.01). In this regard, our finding is in line with (Brereton et al., 2008). This means those who are not victims of torture, who are optimistic

regarding reconciliation and the country's future direction, are happier than those who are victims of torture and have a negative perception regarding reconciliation and the country's future direction.

The interesting point in this study is that we expected *family size* to negatively affect happiness, just as in the rest of the studies. Still, in contrast to our expectation, we found that family size in the context of Afghanistan has a positive and statistically significant impact on happiness (p -value < 0.01). This means that members of large families are happier than those of small ones. Its reason could be the high level of interdependency between members of families and the difference in lifestyle in the country from the rest of the countries. In this regard findings of our study are not in line with those of (Köksal & Şahin, 2015; Scoppa & Ponzo, 2008).

Also, we found that *marital status* is also a key factor affecting the happiness of Afghanistan's people. Just as Table 3 shows, those who are single and married have reported a higher level of happiness (both coefficients are positive and statistically significant, p -value < 0.01) compared to the base category. Comparing coefficients of married and single individuals, it can be seen that the coefficient of married individuals is more significant than that of single ones ($0.419 > 0.387$). Therefore, we can conclude that married people are happier in Afghanistan. The findings of our study support those of (Diener et al., 1999; Akın & Şentürk, 2012; Sönmez & Sönmez, 2018), who found that married individuals are happier compared to those who have never been married, widowed or divorced.

In terms of the impact of *age* on happiness, as shown in Table 3, age reduces happiness (coefficients are negative and statistically significant). The lowest level of happiness occurs between 46-55 (its coefficient is negative and takes the most considerable absolute value among all of the age-relevant categories). In Afghanistan, youth between 18-25 are happier than the rest of the age groups.

In terms of *region*, it also significantly affects individuals' happiness (all coefficients are statistically significant, except central/highland). As shown in Table 3, the highest positive coefficient among all geographical regions belongs to the central highlands. But its coefficient is statistically not significant. Residents of the Northeast are happier since its coefficient is positive and statistically significant. Also, regionally residents of Western regions of Afghanistan have the lowest coefficient and are statistically significant at one per cent. To explore its reason, we recommend separate research in this regard too. The finding of our study in the mentioned context supports that of (Brereton et al., 2008), who also found that regional differences are a key factor in happiness.

Education completion level also has a positive and statistically significant impact on the happiness of individuals in Afghanistan (coefficients are positive and p -value < 0.01 , except for secondary education). As shown in Table 3, a gradual increase in coefficients of education category from primary to university, except for secondary education, is seen. The highest coefficient value among all education relevant categories belongs to university

graduates. If education is taken into account, university graduates are happier (controlling for other variables) in Afghanistan. Since the owners of secondary education are less happy than those of primary education (the coefficient of secondary education is smaller than that of primary education), we recommend separate research to explore its reasons. A similar result was reached by (Cuñado & de Gracia, 2012; Scoppa & Ponzio, 2008; Bülbül & Giray, 2011), who found in Spain and Italy that the education level is one of the determining factors of the level of happiness of individuals.

In Afghanistan, *change in a household economic situation* also significantly affects happiness (coefficients are statistically significant, p -value < 0.01). Those whose household economic situation has improved are happier. Controlling for other variables, those whose household economic situation has worsened are less happy (coefficient is negative and p -value < 0.01). It could be true because as a result of the improvement in the household economic situation, individuals can have access to better and more goods and services and lead a relatively comfortable life.

The ability to *speak a foreign language* is another important factor affecting the happiness of individuals in the context of Afghanistan (coefficient is positive and statistically significant). In Afghanistan, those who can communicate in a foreign language are happier than the base category. It could be due to the information they receive.

5. Conclusion

Different reasons can explain the increasing interest and literature about happiness and its determinants in various contexts, including developing and developed countries. According to most studies, including our own, happiness is affected by many socioeconomic factors. Monetary indicators alone are not sufficient measures of the happiness of people. Happiness survey data are a reliable and valuable way for economic analysis in this regard. Determinants of happiness have been debated and studied in various countries recently. These studies give more information about how different factors affect people's happiness. One of the main challenges in happiness-related studies is the subjectivity of assessments; just as in the rest of the studies, this issue has not been addressed.

This study aims at examining and empirically analysing determinants of happiness in Afghanistan. Using ordered logistic and probit regression analyses and the 2019 Asia Foundation Survey data to assess the micro-econometric happiness equation for the country, we found that just as in the rest of the World, happiness is affected by a large number of socio-economic factors, including age, marital status, employment, family size, education level, income, regional differences, perception of individuals regarding reconciliation and direction of the country and change in household economic situation. The positive impact of family size on the happiness of individuals is the key finding of the study. Our results confirm no remarkable difference in terms of the determinants of happiness in Afghanistan from the rest of the World. Briefly, our findings show that married and single individuals compared to widowed and those who have not experienced torture and have a positive

perception regarding reconciliation and the country's future direction are happier. Similarly, according to the regression estimation, youth between 18-25, members of big families, residents of urban areas, university graduates, those who can communicate in a foreign language and those who have money-generating activity and whose household economic situation has improved are happier and report a higher level of happiness in Afghanistan.

Consequently, our findings show how important economic and non-economic factors, including the perception of stability and the country's future direction, are for happiness. Important policy implications can be extracted from this analysis. For example, since unemployment, education and perception of stability have huge psychological impacts, and its perceived negative impact is much stronger than the loss of income, responsible authorities should provide individuals with employment opportunities and pay special attention to the factors affecting the happiness of individuals. Also, the Covid-19 pandemic and its related deaths and economic effects are a great source of concern and continue to be an important threat worldwide. Just as in the rest of the world, the Covid-19 pandemic has led to further unemployment and psychological effects due to exacerbation of the shaking economic situation in the country. Therefore, special attention is needed to be paid to avoid its economic and psychological effects.

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Appendix: 1 Ordered Probit Regression Results

Happiness	Coef.	St.Err.	t-value	p-value
Employment				
Employed	0.032***	0.012	2.63	0.009
Income	4.16e-06***	4.34e-07	9.60	0.000
Geographic code				
Urban	0.122***	0.016	7.89	0.000
Victimization of Violence				
Victim	-0.156***	0.015	-10.72	0.000
Reconciliation				
Positive View	-0.188***	0.012	-15.80	0.000
Country direction				
Wrong direction	-0.260***	0.013	-20.73	0.000
Family Size	0.004**	0.001	2.35	0.019
Marital Status				
Single	0.224***	0.044	5.08	0.000
Married	0.249***	0.040	6.23	0.000
Age Category				
26-35	-0.035**	0.017	-2.03	0.043
36-45	-0.066***	0.019	-3.57	0.000
46-55	-0.080***	0.022	-3.62	0.000
55+	-0.043	0.026	-1.62	0.104
Region				
Central/Highland	0.030	0.029	1.05	0.294
East	-0.041*	0.022	-1.89	0.059
Northeast	0.048**	0.020	2.35	0.019
Northwest	-0.106***	0.020	-5.16	0.000
Southeast	-0.237***	0.025	-9.64	0.000
Southwest	-0.275***	0.021	-13.07	0.000
West	-0.316***	0.022	-14.32	0.000
Education level				
Primary	0.050***	0.016	3.06	0.002
Secondary	0.006	0.023	0.26	0.791
High school	0.173***	0.016	10.63	0.000
University	0.343***	0.036	9.62	0.000
Change in Household Economic Situation				
Better	0.293***	0.016	18.87	0.000
Worse	-0.259***	0.013	-19.78	0.000
Foreign Language Ability				
Able to Speak	0.127***	0.306	4.16	0.000
Pseudo r-squared	0.044			
Chi-square	3808.984			

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

The Dynamic Effect of Biomass Energy Consumption on Economic Growth and Environmental Quality in Turkey

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Türkiye’de Biokütle Enerji Tüketiminin Ekonomik Büyüme ve Çevre Kalitesi Üzerindeki Dinamik Etkisi

Abstract

This study investigates the impact of biomass energy consumption on Turkey's economic growth and environmental quality. The research used annual time series data from 2004 to 2019. The ADF and Phillips-Perron unit root tests were utilised to test the stationarity of the series. In this study, the ARDL model is employed as an estimation technique. The results indicate that biomass energy consumption helps to reduce pollution and improve environmental quality in the long-run and short-run in Turkey, while economic growth and technological innovation increase the environmental deterioration. Therefore, this paper recommends that economic policymakers, specifically in Turkey, consider strategies that support sustainable economic growth using reusable energy sources.

Keywords : Economic Growth, EKC, Technological Innovation, Environmental Pollution, Time Series, Ecological Footprint.

JEL Classification Codes : Q53, Q56, Q57, R11.

Öz

Bu çalışma, Türkiye’de biokütle enerjisi tüketiminin ekonomik büyüme ve çevre kalitesi üzerindeki etkisini araştırmaktadır. Araştırmada 2004-2019 yılları arasındaki yıllık zaman serisi verileri kullanılmıştır. Serilerin durağanlığını test etmek için ADF ve Phillips-Perron birim kök testleri kullanılmıştır. Bu çalışmada bir tahmin tekniği olarak ARDL modeli kullanılmıştır. Sonuçlar, biokütle enerji tüketiminin Türkiye’de uzun ve kısa vadede kirliliği azaltmada ve çevre kalitesini iyileştirmede yardımcı olduğunu, ekonomik büyüme ve teknolojik yeniliklerin ise çevresel bozulmayı artırdığını göstermektedir. Bu nedenle, bu makale, özellikle Türkiye’deki ekonomi politikası yapıcılarının, temiz ve yeniden kullanılabilir enerji kaynakları kullanarak sürdürülebilir ekonomik büyümeyi destekleyen stratejileri dikkate almalarını tavsiye etmektedir.

Anahtar Sözcükler : Ekonomik Büyüme, EKC, Teknolojik Yenilik, Çevre Kirliliği, Zaman Serisi, Ekolojik Ayak İzi.

1. Introduction

The primary goal of economic activities is to increase human welfare, and rapid economic growth is seen as a way to reach this goal. However, when production increases the use of resources while the relative cost of production factors diminishes, wastes generated by the production and consumption process increase the environmental cost. As long as economic growth occurs, the use of natural resources will exceed production capacity, leading to an increase in the amount of waste and greenhouse gas emissions (Pata, 2018).

Therefore, human beings are presently confronted by two significant challenges; economic growth and preserving the environment (Uddin et al., 2017). When the economy starts moving along the development trajectory, then at the earliest stage of the economic growth environment deteriorates due to air pollution, deforestation, and many other pollutants. With an increase in per capita income economy starts to develop, and environmental deterioration declines (Sinha & Shahbaz, 2018). As environmental degradation has become more severe, the relationship between environmental degradation and economic growth has become an increasingly important issue (Tutulmaz, 2015).

One may claim that researchers in the 21st century are aware of air pollution's growing severe threat to human health and welfare. Therefore, the source of environmental deterioration has become today's most serious concern in the scientific literature on the environment, climate change, and global warming. The interest in the possible relationships between energy consumption, environmental quality, and economic growth dates back to the early 1970s, when policymakers and researchers started to be aware of the potential connection between energy consumption, environmental quality, and economic growth. Discussion concerning the relationship between economic growth, energy consumption, and environmental quality has received considerable attention over the last few years, but researchers have no consensus.

The unprecedented level of carbon dioxide in the earth's atmosphere poses challenges to humans' and other life forms' health. CO₂ emissions have reached their highest level in recorded history; they increased from 19,809 million tons to 33,431 million tons. It is considered the leading cause of global warming and climate change since it contributes to more than 60% of greenhouse gas (GHG) emissions (Danish & Ulucak, 2020).

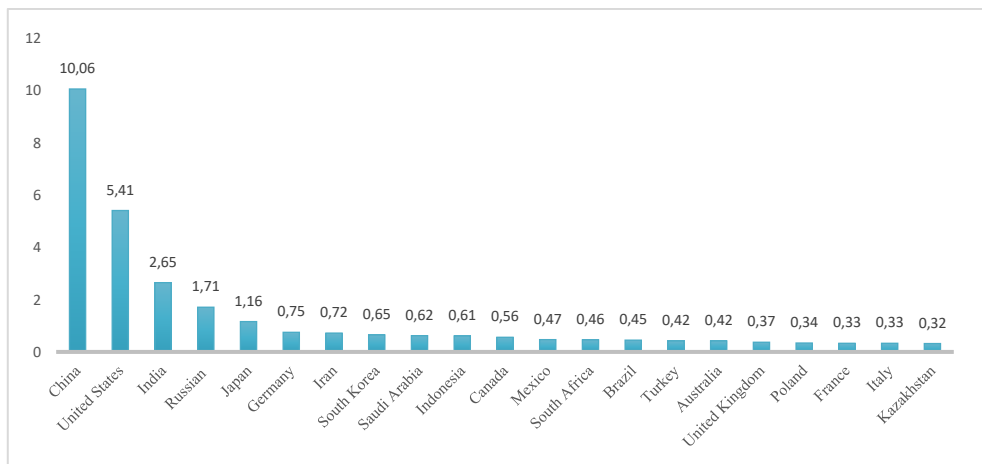
As a result of increasing environmental degradation, demand for clean and reusable energy has increased. The generation and consumption of clean energy sources like biomass and other reusables are the most effective tools for addressing rising environmental concerns (Owusu & Asumadu-Sarkodie, 2016). Biomass energy consumption and development may be the foundation of a sustainable energy system by changing the pattern of energy production and consumption, which can efficiently contribute to economic growth and strengthen environmental protections (Mao et al., 2018).

Biomass is expected to contribute half the 20% renewable target. Kaygusuz (2012) foresees that fossil fuels meet 80% of global energy demand in 2008 and will be corresponding to 78% of global demand in 2030. Do renewable energy sources reduce environmental damage? Or, more specifically, can biomass energy use improve environmental quality? And what is its impact on economic growth? Or in other words, how is economic growth affected by an increase in renewable energy consumption?

Turkey has experienced a significant increase in energy consumption and carbon emissions alongside economic growth. According to the International Energy Agency (IEA), Turkey is among the 20 countries that emitted the most carbon dioxide in 2018; as in figure 1, Turkey's share in carbon emissions is 1% of the entire world's emissions.

In its eleventh development plan (2019-2023), Turkey aims to protect the environment and natural resources, improve quality, ensure effective, integrated, and sustainable management, implement environment and climate-friendly practices in all areas, and increase environmental awareness and sensitivity of all segments of the society. In addition, and within the scope of national conditions, climate change will be tackled in sectors causing greenhouse gas emissions, and the resilience of the economy and society to climate risks will be increased by capacity building for adaptation to climate change (see, Eleventh Development Plan, 2019-2023).

Figure: 1
The 20 Countries That Emitted the Most Carbon Dioxide in 2018



Source: International Energy Agency (IEA).

For these reasons, investigating the impact of renewable energy consumption on economic growth and environmental degradation in Turkey is very important. It will significantly contribute to designing environmental management policies and their implementation. In this regard and within the framework of the Kuznets Curve Hypothesis,

many studies have investigated the link between economic growth and environmental quality in Turkey (see, for instance, Altınay et al., 2004; Erdal et al., 2008; Halicioğlu, 2009; Jobert & Karanfil, 2007; Lise & Van Montfort, 2007; Lise, 2006; Canbay, 2019; Say & Yücel, 2006; Soytas, 2001; Soytas & Sari, 2009; Soytas & Sari, 2003). However, none of these studies has examined the influence of renewable energy consumption, specifically biomass energy consumption, on Turkey's economic growth and environmental quality. Therefore, unlike the previous studies, this research aims to investigate the impact of renewable energy use on Turkey's economic growth and environmental quality.

The rest of the paper is organised as follows: Section two reviews important literature on the subject. Section three presents the methodology. Section four shows the results and discussion, while section five provides the conclusion.

2. Literature Review

This study investigates the impact of biomass energy consumption on Turkey's economic growth and environmental quality. We classified the literature review into two parts: biomass energy consumption-economic growth nexus and biomass energy consumption-environmental quality nexus.

2.1. Biomass Energy Consumption-Economic Growth Nexus

Over the last few decades, many studies have investigated the association between economic growth and energy consumption in the context of causality. However, the empirical outcomes of the studies that examined the relationship between these variables are mixed and inconclusive. In his survey of the recent progress in the literature on energy consumption-economic growth, Oztürk (2010) concluded that using different data sets, alternative econometric methodologies, and other countries' characteristics are the main reasons for this conflicting result. In addition, the survey highlights that most empirical studies focus on either testing the role of energy (electricity) in stimulating economic growth or examining the direction of causality between these two variables. (Apergis & Payne, 2009a; Squalli, 2007; Chen et al., 2007; Mozumder & Marathe, 2007) argued that the directions that the causal relationship between energy consumption and economic growth could be categorised into four types of hypotheses:

First, the neutrality hypothesis; means no causal relationship between energy consumption and economic growth. In other words, neither conservative nor expansive policies about energy consumption affect economic growth. Second, the conservation hypothesis; means a uni-directional causality running from economic growth to energy consumption. The validity of this hypothesis is confirmed if an increase in economic growth increases energy consumption. Third, the growth hypothesis; means that energy consumption plays a substantial role in economic growth directly and indirectly in the production process as a complement to labour and capital. Fourth, the feedback hypothesis;

implies that energy consumption and economic growth are jointly determined and affected simultaneously.

Recently, many studies have examined the relationship between renewable energy consumption and economic growth. These studies are as follows: Shahbaz et al. (2016) examined the relationship between biomass energy consumption and economic growth by incorporating capital and trade openness in production function for the case of BRICS countries. The results showed that the feedback effect exists between biomass energy consumption and economic growth. Aydin (2019) found different results when he investigated the impact of biomass energy consumption on economic growth in BRICS countries using a country-specific panel data analysis. He concluded that the growth hypothesis is valid in Brazil and India; however, the conservation hypothesis is valid in China and South Africa. The feedback hypothesis is supported in the case of Russia. Ajmi and Inglesi-Lotz, (2020) found a feedback hypothesis when studying the short-run and long-run causality analyses between biomass energy consumption and economic growth nexus in OECD countries using panel cointegration analyses, dynamic OLS analyses, fully modified OLS analyses, and panel VECM Granger causality tests.

Bildirici and Özaksoy (2016) also tested the causal relationship between woody biomass energy consumption and economic growth in Sub-Saharan Africa using the ARDL model. They found a uni-directional causality from woody biomass energy consumption to economic growth for Angola, Guinea-Bissau, and Niger, from economic growth to woody biomass energy consumption for Seychelles. The bidirectional relationship is confirmed for Benin, Mauritania, Nigeria, and South Africa. Bhattacharya et al. (2016) used Renewable Energy Country Attractiveness Index to investigate the effects of renewable energy consumption on the economic growth in major renewable energy-consuming countries worldwide. They confirmed the evidence of long-run dynamics between economic growth and traditional and energy-related inputs. Ali et al. (2017) investigated the dynamic implication of biomass energy consumption on economic growth in Sub-Saharan African countries using panel data analysis. They concluded a causal relationship between biomass energy consumption and economic growth. Their findings reveal that biomass energy consumption, capital stock, and human capital positively influence economic growth at a 1% level.

Destek (2017) studied the relationship between biomass energy consumption and economic growth in the top ten biomass consumer countries. The obtained results indicate that the growth hypothesis is valid for Brazil, Germany, India, and Italy; the conservation hypothesis is proved in Sweden; the feedback hypothesis is supported in China and the United States, and the neutrality hypothesis is confirmed in Finland, Japan, and the United Kingdom. Bilgili and Ozturk (2015) tested the long-run dynamics of biomass energy consumption and GDP growth through homogeneous and heterogeneous variance structures for G7 countries. The study's findings indicate that the growth hypothesis is valid, which means that biomass energy consumption positively affects the economic growth of G7 countries. Aslan (2016) confirmed the growth hypothesis when studying the causal

relationship between energy consumption and economic growth in the U.S. using the ARDL model.

2.2. Biomass Energy Consumption-Environmental Quality Nexus

Many studies have examined the use of biomass energy to improve environmental quality using different econometric methods. However, researchers have no consensus on whether biomass energy use improves or worsens the environmental quality. Zafar et al. (2021) investigated the impact of biomass energy consumption on environmental quality in Asia-Pacific Economic Cooperation countries using the panel quantile regression. The results indicate that biomass energy consumption and technological innovation reduce environmental quality.

Umar et al. (2021) studied the imperativeness of environmental quality in the United States transportation sector amidst biomass-fossil energy consumption and growth by employing FMOLS, DOLS, and CCR cointegration regression. They concluded that biomass energy consumption has a negative impact on carbon dioxide emissions in the transportation sector. Unlike the previous studies, Shahbaz et al. (2019) found that biomass energy consumption contributes to CO₂ emissions when investigating the factors influencing CO₂ using the generalised method of moments.

By employing the generalised method of the moments, Wang (2019) checked the effect of biomass energy consumption on environmental pollution in BRICS countries. The empirical study findings show that biomass energy consumption behaves as a clean energy source in reducing environmental pollution. But Solarin et al. (2018) concluded that biomass energy consumption increases carbon emissions in developed and developing countries. Within the Environmental Kuznets Curve hypothesis, Bilgili et al. (2016) found a negative causality from renewables to CO₂ emissions.

However, Sarkodie et al. (2019) reported a negative relationship between biomass energy and carbon emissions when investigating the link between biomass energy consumption and carbon emissions and other control variables in Australia. The study results suggest that Australia can improve environmental quality by increasing the share of biomass energy in the total power. Ahmed et al. (2016) studied the link between biomass energy, technological progress, and the environmental Kuznets curve in selected European countries. In particular, the results indicate that biomass energy is insignificantly linked to CO₂ emission. However, technological innovation significantly facilitates the reduction of CO₂ emissions.

Adewuyi and Awodumi (2017) also examined the relationship between biomass energy use, economic growth, and carbon emissions in the simultaneous education model for West African countries. The panel methodology results suggested a positive link between biomass energy use and carbon emissions; however, they found mixed results for the time series analysis. Gao and Zhang (2021) used conventional methodology to study the link

between biomass energy use and emissions in developing Asian countries. Their study results show a positive relationship between biomass energy and carbon emissions. Sulaiman and Abdul-Rahim (2020) also tested the impact of clean biomass energy on carbon emission in selected African countries. The empirical findings reveal that clean biomass energy use decreases CO₂ emission in the long run. But the effect of biomass energy consumption on CO₂ emission is insignificant in the short run. The results imply that CO₂ emission can be decreased by increasing clean biomass energy in the energy mix of these selected African countries.

In the light of the importance of addressing the effect of renewable energy use on economic growth and environmental quality, many studies have investigated the association between biomass energy consumption, environmental quality, and economic growth under neutrality, conservation, growth, and feedback hypotheses. However, a significant limitation of previous studies is that carbon dioxide (CO₂) was used to proxy environmental quality. This measure, however, relates only to air pollution and excludes other pollutants impacting soil, forests, and other environmental aspects. Therefore, carbon dioxide as an indicator of environmental quality seems to be an inadequate measure. Therefore, to better understand the association between biomass energy use, economic growth, and environmental quality in Turkey, this study utilises the ecological footprint (EFP) to measure environmental quality.

The ecological footprint is widely used as an index of sustainability. The ecological footprint is an aggregate measure of the environment. It consists of six components of productive surface areas: carbon footprint, fishing ground, build-up, forest land, cropland, and grazing land (Solarin & Bello, 2018).

3. Research Methodology

3.1. Model Specification and Data

This article studies the impact of biomass energy use on per capita income and ecological footprint (EFP) in both the long-run and short-run following the empirical testing procedures suggested by Narayan and Narayan (2010). According to the idea of Narayan and Narayan (2010), our two models can be specified as follows:

$$\ln EFP_t = \alpha_0 + \alpha_1 \ln BEC_t + \alpha_2 \ln GDP_t + \alpha_3 \ln TCI_t + e_t \quad (1)$$

$$\ln GDP_t = \varphi_0 + \varphi_1 \ln BEC_t + \varphi_2 \ln EFP_t + \varphi_3 \ln TCI_t + e_t \quad (2)$$

Where the EFP is the ecological footprint, BEC is the biomass energy consumption, GDP is the per capita real income, and TCI is the technological innovation and $\alpha_1, \alpha_2, \alpha_3, \varphi_1, \varphi_2, \varphi_3$ are their long-run elasticities and e_t is the error term.

To investigate the relationship between biomass energy consumption, economic growth, and environmental quality in Turkey, this study uses the ecological footprint (EFP) and per capita real income proxy for environmental quality and economic growth. The time-

series data about EFP is obtained from the (Global Footprint Network). The per capita real income series is obtained from the World Bank (world development indicators). Data on biomass energy consumption is collected from U.S. Energy Information Administration (EIA). The data on technological innovation is obtained from European Innovation Scoreboard. All variables are transformed to the natural logarithmic form in empirical analysis.

3.2. Method of Estimation

Generally, most of the time-series data are non-stationary, resulting in misleading regression analysis outcomes. To test for the stationarity properties of the variables, this research applies the augmented Dickey-Fuller (1979) (ADF) and Phillips and Perron (1988) (PP) unit root tests. The null hypothesis of the ADF and PP tests indicates a unit root. To investigate the impact of biomass energy consumption on economic growth and environmental quality in Turkey, this research employs the Autoregressive Distributed Lag model due to many reasons. First, this model does not require that all variables be integrated of order zero or I(0). Second, both short-run and long-run models are estimated simultaneously. Furthermore, the ARDL method performs better in small sample sizes than other multivariate techniques. To test the existence of cointegration relationships among the variables in Models (1) and (2), the unrestricted error correction model (ECM) proposed by Pesaran et al. (2001) can be specified as follows:

$$\begin{aligned} \Delta \ln EFP_t = & \gamma_0 + \gamma_1 \ln EFP_{t-1} + \gamma_2 \ln BEC_{t-1} + \gamma_3 \ln GDP_{t-1} + \gamma_4 \ln TCI_{t-1} + \\ & \sum_{i=1}^q \gamma_5 \Delta \ln EFP_{t-i} + \sum_{i=0}^p \gamma_6 \Delta \ln BEC_{t-i} + \sum_{i=0}^m \gamma_7 \Delta \ln GDP_{t-i} + \sum_{i=0}^n \gamma_8 \Delta \ln TCI_{t-i} + \\ & \theta ECT_{t-1} + v_t \end{aligned} \quad (3)$$

$$\begin{aligned} \Delta \ln GDP_t = & \lambda_0 + \lambda_1 \ln GDP_{t-1} + \lambda_2 \ln BEC_{t-1} + \lambda_3 \ln EFP_{t-1} + \lambda_4 \ln TCI_{t-1} + \\ & \sum_{i=1}^q \lambda_5 \Delta \ln GDP_{t-i} + \sum_{i=0}^p \lambda_6 \Delta \ln BEC_{t-i} + \sum_{i=0}^m \lambda_7 \Delta \ln EFP_{t-i} + \sum_{i=0}^n \lambda_8 \Delta \ln TCI_{t-i} + \\ & \theta ECT_{t-1} + v_t \end{aligned} \quad (4)$$

Where equations (3) and (4) are ARDL models and the lag lengths (q, p, m, n) are chosen according to Akaike Information Criterion (AIC). The bound test for cointegration is conducted based on the joint null hypothesis of no cointegration $H_0: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$ against the alternative of cointegration $H_1: \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq 0$, for equations (3) and $H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$ of no cointegration against the alternative of cointegration $H_1: \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq 0$ for equations (4) The Wald F-statistic is employed to examine the existence of cointegration relationship among the selected variables. The F-statistic is compared with the lower and upper bounds critical values. If the F-statistic is greater than the upper critical bound, then the null hypothesis of no cointegration is rejected and thus cointegration does exist. If the F-statistic, however, is less than the lower critical bound the null hypothesis cannot be rejected and, therefore, cointegration does not exist. If the cointegration relationship exists, then the error correction model (ECM) can be estimated. The error correction model shows the short-run dynamics and the speed of adjustment.

4. Results and Discussion

In this segment of the study, we present the discussion of the results in the following manner: initially, we set off with analysis by the investigation into the summary descriptive statistic properties. The descriptive statistic reports the measure of central tendencies and dispersion. Table 1 indicates that economic growth has the highest average, followed by technological innovation, biomass energy consumption, and ecological footprint. All series show negative Skewness except for economic growth. Furthermore, only economic growth and biomass energy use mirror the normal distribution reported by Kurtosis, less than 3.

Table: 1
Descriptive Statistic Test

	LnEFP	LnBEC	LnGDP	LnTCI
Mean	0.656616	0.378916	9.394553	-1.991918
Median	0.675282	0.669900	9.388016	-1.937942
Maximum	0.799834	2.140066	9.628399	-1.599488
Minimum	0.437188	-2.302585	9.116223	-2.995732
Std. Dev.	0.101784	1.138985	0.170204	0.392062
Skewness	-0.474152	-0.745369	0.007729	-1.556997
Kurtosis	2.552414	3.034004	1.632686	4.640842
Jarque-Bera	0.733077	1.482306	1.246524	8.259547
Probability	0.693129	0.476564	0.536192	0.016087
Sum	10.50586	6.062651	150.3128	-31.87069
Sum Sq. Dev.	0.155398	19.45932	0.434541	2.305689
Observations	16	16	16	16

This section of the study examined the possible existence of stationarity of the variables. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were used to test the stationarity. The findings of the unit root test in Table 2 show that the variables are tested at the level and first difference. The Augmented Dickey-Fuller and Phillips-Perron test results are almost similar since none of the variables is integrated into the second-order or I(2). Specifically, the ADF and PP tests show that the EFP and TCI series are stationary at the level %5 and %1 level of significance, respectively. Like BEC and GDP, the other series is stationary at the first-difference level. Mainly, the series of GDP and BEC are stationary at %10 and %5 levels of significance, respectively, in the ADF test, while the same is true in the PP test.

Table: 2
Unit Root Tests

Variables	ADF		PP	
	C	C&T	C	C&T
LnEFP _{it}	-0.068889	-4.751255 ^b	-2.185505	-6.232310 ^a
LnBEC _{it}	-1.741074	-3.059223	-1.807294	-2.311215
LnGDP _{it}	-0.995893	-2.691298	-0.992581	-2.164045
LnTCI _{it}	-3.38205 ^a	-3.000889	-3.49879 ^b	-6.64549 ^a
DLnEFP _{it}	-6.256881 ^a	-5.597538 ^a	-5.347906 ^a	-4.652382 ^c
DLnBEC _{it}	-3.45915 ^b	-3.31557 ^c	-3.771194 ^b	-3.525015 ^c
DLnGDP _{it}	-3.034537 ^c	-2.910841	-3.051839 ^c	-2.811967
DLnTCI _{it}	-3.01075 ^b	-2.897759	-3.010753 ^b	-3.646600 ^c

Note: a,b,c denotes significant at %1, %5 and %10 respectively. C refers to intercept, and C&T refers to intercept and trend.

Although the Autoregressive Distributed Lag model or bound test to cointegration is preferable due to many advantages, it has low power since it does not consider the possibility of structural or regime shifts in the cointegrating vector (Gregory & Hansen, 1996; Hatemi-j, 2008). Table 3 illustrates the unit root test results with one structural break. The results indicate that all the variables are non-stationary at I(1). From the analysis of various unit root tests, the variables are compatible with the Autoregressive Distributed Lag model. After identifying the series order of stationarity and stationarity with a structural break, the next step is to apply the cointegration test to verify the long-run relationships among the variables.

Table: 3
ADF Unit Root Test with Structural Break

Variables	ADF			
	C	Break date	C&T	Break date
LnEFP_{it}	-1.421846	2016	-6.937272 ^a	2014
LnBEC_{it}	-4.110109 ^c	2012	-4.767953 ^c	2012
LnGDP_{it}	-3.155443	2010	-3.742357	2012
LnTCI_{it}	-18.01126 ^a	2011	-5.480869 ^a	2010
DLnEFP_{it}	-6.842827 ^a	2017	-6.121959 ^a	2016
DLnBEC_{it}	-4.153096 ^c	2013	-3.638243	2016
DLnGDP_{it}	-3.413075	2011	-11.00444 ^a	2012
DLnTCI_{it}	-6.518767 ^a	2014	-8.344287 ^a	2014

Note: a,b denotes significance at %1 and %5 respectively. C refers to intercept, and C&T refers to intercept and trend.

The most important test is the long-run cointegration test among the variables. We can conclude a long-run relationship among the variables if cointegration exists. Table (4) reveals that the cointegration exists among Model (1) variables. The F-statistic value (5.706345) is greater than the upper critical value (4.89). However, Table (4) indicates that Model 2 has failed to pass the cointegration test since the F-statistic value (1.315077) is less than the lower critical value (3.79). Therefore, only the short-run model can be estimated for Model 2. It is possible to conclude that the cointegration test shows long-run relationships among the variables in Model 1. Still, there is no evidence of a long-run relationship in Model 2, so Model 1 will focus on the subsequent analysis.

Table: 4
Bound Test for Cointegration

The Model	F-statistic	Critical Values	
		I(0)	I(1)
$\text{LnEFP}_{it} = F(\text{LnBEC}_{it}, \text{LnGDP}_{it}, \text{LnTCI}_{it})$	5.706345 ^a	3.69	4.89
$\text{LnGDP}_{it} = F(\text{LnBEC}_{it}, \text{LnEFP}_{it}, \text{LnTCI}_{it})$	1.315077	3.79	4.85

Note: a denotes significant at level 1%. According to Pesaran et al. (2001), the critical values are at a 1% level.

After verifying the existence of the long-run relationship in our model, we now can estimate the long-run and short-run coefficients for Model 1 and the only short-run coefficient for Model 2. Table (5) presents the long-run and short-run estimates for Model 1; it reveals that the biomass energy consumption (BEC) and per capita real income (GDP) are significant in explaining the change the environmental pollution. The results indicate that biomass energy consumption improves environmental quality since a 1% increase in biomass energy use leads to a -0.03487% and -0.00065% decrease in environmental pollution in the long-run and short-run, respectively. Meanwhile, more economic growth

and technological innovation are harmful to the environment since a 1% increase in GDP and TCI increases environmental damage by 0.68087% and 0.02163% in the long run and by 0.48329% 0.01535% in the short run, respectively.

Table: 5
ARDL Results - Model 1

Long-Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-5.675365	0.923499	-6.145500	0.0002
LnBEC _{it}	-0.034873	0.017960	-1.941696	0.0841
LnGDP _{it}	0.680876	0.097800	6.961911	0.0001
LnTCI _{it}	0.021636	0.032576	0.664176	0.5232
Short-Run Coefficients				
DLnBEC _{it}	-0.000653	0.008435	-0.077469	0.9399
DLnGDP _{it}	0.483299	0.119554	4.042518	0.0029
DLnTCI _{it}	0.015358	0.025379	0.605120	0.5600
ECT	-0.709820	0.184482	-3.847630	0.0039
R-squared	0.912480	Mean dependent var		0.671245
Adjusted R-squared	0.877471	S.D. dependent var		0.086206
S.E. of regression	0.030176	Akaike info criterion		-3.902369
Sum squared resid	0.009106	Schwarz criterion		-3.666352
Log likelihood	34.26777	Hannan-Quinn criteria.		-3.904883
F-statistic	26.06474	Durbin-Watson stat		1.427906
Prob(F-statistic)	0.000029			

Table (6) illustrates the findings of the short-run estimates for Model 2. The table shows that biomass energy consumption and ecological footprint are significant in explaining real per capita income changes. Moreover, the results also reveal that BEC and EFP contribute positively to economic growth. A one-unit increase in biomass energy use and ecological footprint result in 0.024473% and 0.672482% increase in per capita real income, respectively. Nonetheless, technological innovation plays a negative role in determining economic growth in the short run. The result reveals that a 1% increase in technological innovation reduces economic growth by -0.0217%.

Table: 6
Short-Run Coefficients - Model 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DLNBEC	0.024473	0.007174	3.411219	0.0077
DLNEFP	0.672482	0.163308	4.117862	0.0026
DLNEFP (-1)	-0.354694	0.209530	-1.692805	0.1247
LNTCI	-0.021785	0.022417	-0.971846	0.3565
C	2.599619	0.895536	2.902866	0.0175
R-squared	0.990062	Mean dependent var		9.413108
Adjusted R-squared	0.984540	S.D. dependent var		0.158544
S.E. of regression	0.019713	Akaike info criterion		-4.725908
Sum squared resid	0.003497	Schwarz criterion		-4.442688
Log likelihood	41.44431	Hannan-Quinn criteria.		-4.728925
F-statistic	179.3161	Durbin-Watson stat		1.820204
Prob(F-statistic)	0.000000			

* Note: p-values and subsequent tests do not account for model selection.

The speed of adjustment facilitates long-run convergence among the parameters with a significant and negative error correction term (ECT) coefficient. The result of ECT is -0.709, which presents evidence of cointegration among the parameters. This signifies the

capability of the model to witness a 70% speed of adjustment to verify the tendency to equilibrium in the long-term on economic growth because of dependent variables.

A diagnostic test further evaluates our Autoregressive Distributed Lag models. Table (7) presents the findings of the Breusch-Godfrey Serial Correlation LM Test for Model (1). It indicates that the model does not suffer from serial correlation since the null hypothesis of no serial correlation cannot be rejected due to a probability value that is less than a 5% level of significance. Furthermore, Table (8) summarises the Breusch-Pagan-Godfrey test of heteroskedasticity. The results show no evidence of heteroskedasticity is detected since the null hypothesis of no heteroskedasticity cannot be rejected because the p-value is 0.7391. In addition, our model is also further tested by the Histogram Normality. Figure 2 indicates that the model follows the normality since the probability value of the Jarque-Bera is 0.5557.

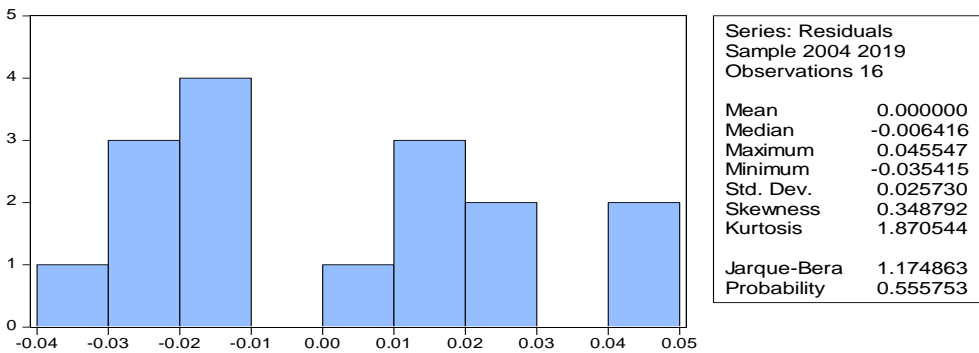
Table: 7
Breusch-Godfrey Serial Correlation lm Test: Model (1)

F-statistic	1.126597	Prob. F(2,10)	0.3620
Obs*R-squared	2.942179	Prob. Chi-Square(2)	0.2297

Table: 8
Heteroskedasticity Test: Breusch-Pagan-Godfrey: Model (1)

F-statistic	0.341404	Prob. F(3,12)	0.7959
Obs*R-squared	1.258224	Prob. Chi-Square(3)	0.7391
Scaled explained SS	0.308064	Prob. Chi-Square(3)	0.9585

Figure: 2
Histogram Normality Test: Model (1)



In recent years, the dilemma of increasing environmental deterioration has raised the demand for clean energy sources. Therefore, biomass energy use has received considerable attention because previous studies have found mixed results regarding the impact of biomass energy on environmental quality; the findings of the study provide evidence that renewable energy consumption improves environmental quality in the case of Turkey, indicating that biomass energy use plays an essential role in the environmental improvement in short-run and long-run. This result agrees with studies (see, for example, Wang, 2019; Ahmed, 2016;

Bilgili et al., 2016; Shahbaz et al., 2017; Kim et al., 2020; Ulucak, 2020). The main contribution of this study is the inclusion of ecological footprint as a measure of environmental quality instead of CO₂. Although this study differs from the earlier studies regarding the environmental quality indicator, it has a similar relationship -for biomass energy usage and environmental quality- with most of the earlier literature. Our results are similar to that of the BRICS countries examined by Wang (2019) and Shahbaz et al. (2017). This study differs from some studies by using only biomass (Bilgili et al., 2016; Sarkodie et al., 2019) instead of other renewable energy sources. The relationship between biomass energy consumption and environmental quality has the same direction.

But unsurprisingly, more economic growth causes further damage to the environment; this relationship between economic growth and environmental degradation has been much debated in literature within the framework of the environmental Kuznets Curve Hypothesis (EKC). This finding agrees with many studies (see, for instance, Al-Mulali et al., 2015; Lacheheb et al., 2015; Sirag et al., 2018). As discussed in the literature section, different hypotheses were tested to determine the relationship between energy consumption and economic growth. Generally, the literature has found that biomass energy consumption increases economic growth (Bilgili & Ozturk, 2015; Aslan, 2016; Destek, 2017). But the role of both economic growth and technological innovations on environmental quality was not tested too much. So, this study made an important contribution to the literature by testing this relationship. The results indicated that economic growth and technological innovations increase environmental pollution.

In addition to that, the stability of models is assessed using the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests, as suggested by Pesaran. Figures (3) and (4) present the findings of CUSUM and CUSUMSQ for Model 1 and Model 2, respectively. The models have passed the stability tests indicating the stability of the estimated parameters, except the CUSUM test for Model 2, since there is a slight deviation from 5% boundaries which means that the model is suffering from a bit of structural break.

5. Conclusion and Policy Recommendations

Over the last few decades, many countries have been experiencing continued economic growth and prosperity. Therefore, the demand for fossil fuels has increased over the past few years. Moreover, the instability of the price of fossil fuels and rising greenhouse gases motivated many countries around the globe to find renewable energy. Furthermore, the demand for clean energy sources has increased due to environmental damage. Therefore, biomass energy use on environmental quality and economic growth has received considerable attention from researchers and policymakers.

This study investigates the impact of renewable energy consumption on economic growth and environmental quality in Turkey to determine whether renewable energy use can mitigate the deterioration of the environment. Among other renewable sources, biomass is given priority in the study. It has been a subject of ongoing discussions throughout the

literature to explore if biomass is efficient to promote environmental quality. The ecological footprint (EFP) and per capita real income (GDP) measured environmental quality and economic growth. In addition to the technological innovation index. The study relied on time series data spanning 2004-2019 based on the data availability. The ADF and PP unit root tests were employed to test the stationarity of the variables and to determine the series order of integration. After the stationarity of the variables is confirmed, the cointegration test of Pesaran et al. (2001) was performed to verify the existence of long-run relations among the variables. The Autoregressive Distributed Lag Model approach for cointegration was employed to estimate the long-run and short-run models.

The results indicate that biomass energy consumption improves environmental quality in the long-run and short-run in Turkey, while economic growth and technological innovation increase environmental pollution. Furthermore, economic growth is positively affected by reusable energy consumption. These findings can help build a comprehensive policy framework for attaining the objectives of SDGs concerning environmental targets. Since renewable energy consumption can improve the quality of the environment, there will be a need to concentrate more on clean and renewable energy sources such as biomass energy. Turkey's government should seek more environmentally friendly energy sources to accomplish the environmental targets in its 2019-2023 development plan.

This research will contribute significantly to establishing the literature on the intersection of ecological footprint, renewable energy, and economic growth. These indicators are profoundly interconnected and affect one another. So economic policymakers, specifically in Turkey, should consider strategies that support sustainable economic growth using reusable energy sources.

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Appendix
Figure: 3
Stability Test - Model 1

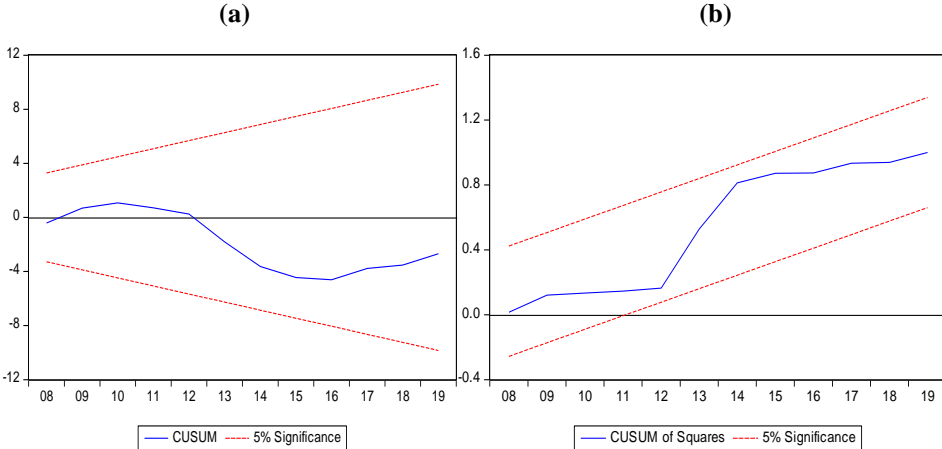


Figure: 4
Stability Test - Model 2

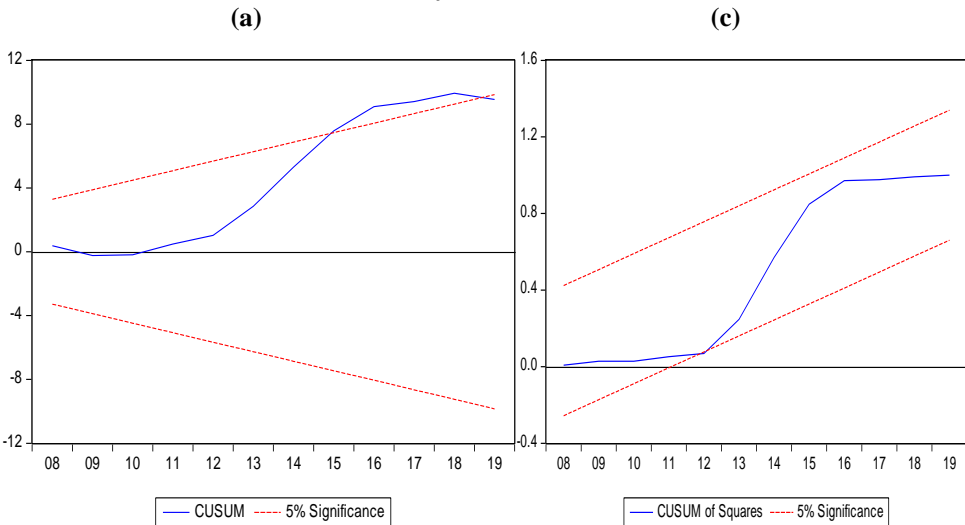


Figure: 5
Biomass Energy Consumption and Ecological Footprint

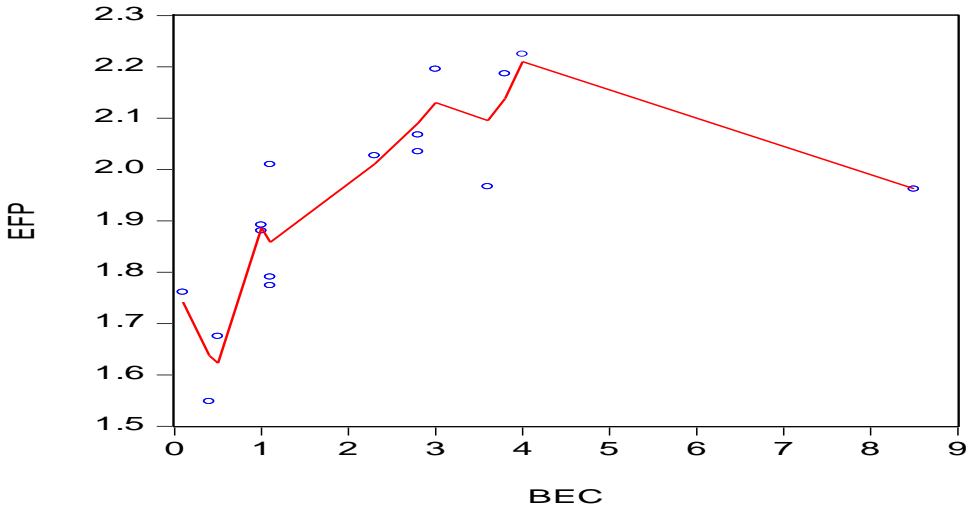
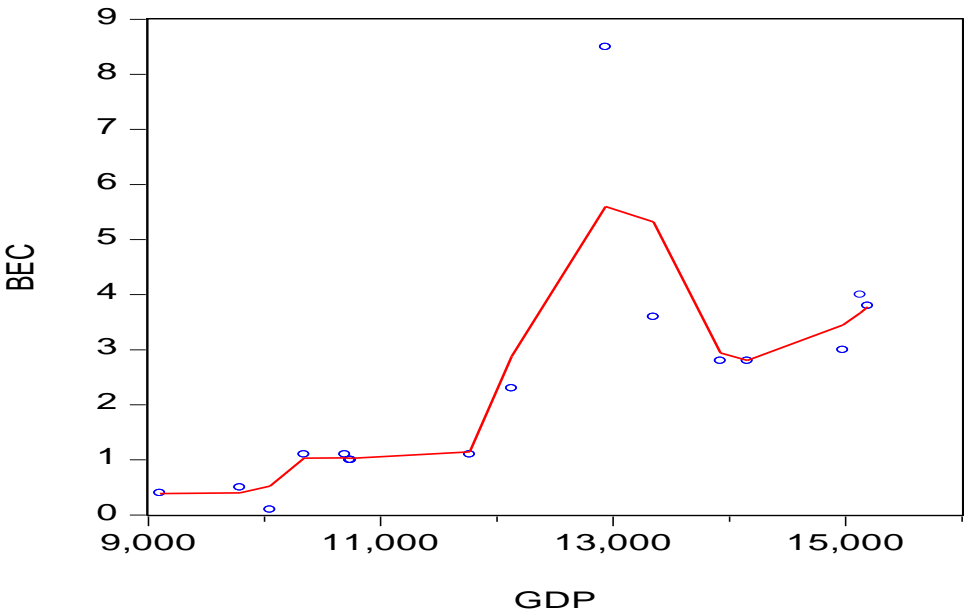


Figure: 6
Biomass Energy Consumption and Economic Growth



Alnour, M. & H. Atik (2022), "The Dynamic Effect of Biomass Energy Consumption on Economic Growth and Environmental Quality in Turkey", *Sosyoekonomi*, 30(52), 199-217.

Effect of Internet Addiction on Female Employee Performance: The Regulatory Role of Social Support

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İnternet Bağımlılığının Kadın Çalışan Performansına Etkisi: Sosyal Desteğin Düzenleyici Rolü

Abstract

The primary purpose of this study is to determine the effect of internet addiction on females' job performance. Additionally, the results were analysed by adding social support as a regulatory variable. The survey technique has been used to obtain the data, and surveys have been applied to 408 female employees in two private enterprises operating in the information and communication sector. According to the results, it has been found that internet addiction adversely affects individual performance. However, a decrease in adverse effects and an increase in personal performance have been identified with the addition of the regulatory variable to the model.

Keywords : Internet Addiction, Performance, Social Support, Female Employees.

JEL Classification Codes : M10, M12, M19, M54.

Öz

Bu çalışmanın temel amacı, internet bağımlılığının kadınların iş performansına etkisini belirlemektir. Ayrıca, sosyal destek düzenleyici değişken olarak eklenerek sonuçlar analiz edilmiştir. Verilerin elde edilmesinde anket tekniği kullanılmış ve bilgi ve iletişim sektöründe faaliyet gösteren iki özel işletmede 408 kadın çalışana anket uygulanmıştır. Sonuçlara göre internet bağımlılığının bireysel performansı olumsuz etkilediği tespit edilmiştir. Ancak düzenleyici değişkenin modele eklenmesiyle olumsuz etkilerin azaldığı ve bireysel performansın arttığı tespit edilmiştir.

Anahtar Sözcükler : İnternet Bağımlılığı, Performans, Sosyal Destek, Kadın Çalışanlar.

1. Introduction

Since the 1990s, the internet has been a part of public life and has made life more liveable in many areas with its facilities. Especially the changes in information technology with global factors make it easier to reach unlimited information and many outputs of information and provide a tremendous strategic advantage to businesses operating at an economic level. Besides this benefit, other possibilities, mainly social media and games, have led people to spend more time on mobile phones or computers. In fact, according to "Digital in 2019", published together by We Are Social and Hootsuite, 56% of the world's population uses the internet. Of this rate, 45% are social media users, 67% are mobile users, and 42% are mobile social media users. This situation, expressed as internet addiction, threatens many segments, especially the young population.

On the one hand, it leads to reductions in social relations and performance declines in the jobs they undertake. Restricting the social activity of individuals due to their addictions to the internet causes them to have difficulty performing their roles in families, communities, and organisations, which creates anxiety and stress, resulting in performance declines. To address all this negativity and increase productivity by providing customer satisfaction, especially in the present-day homogeneous products and services, the need to provide social support opportunities for employees addicted to this type is emerging. This study also focused on determining the impacts of the internet addictions of women employees on the performance levels and whether social support plays a regulatory role in this process.

2. Internet Addiction

We are in a period expressed as the age of information and technology. The developments experienced and their effects necessitate the technological developments to be followed, watched closely, and adapted. The developments that started with the industrial revolution have reached Industry 4.0, the product of artificial intelligence, with the internet and globalisation, resulting from the developments in science and technology. The globalisation process, which is reflected in many areas, does not only affect many places on the blue earth with the use of the internet, but its effect on people and is indispensable in life are also thought to affect social cohesion and work performance.

Internet, which came into people's lives at the end of the 1900s, has captivated users with each passing day and reached gigantic dimensions both in the world and Turkey (Taylan & Işık, 2015: 855-874). While many studies conducted in different parts of the world reveal that the internet is used mainly by children and young people (Castells, 2008: 744), it is stated that especially young people's addiction to the internet, together with the increase in usage times are among the important social problems of recent times (Whang et al., 2003: 143-150; Pallanti et al., 2006: 966-974; Siomos et al., 2008: 653-657; Peterson et al., 2009: 263-271; Tsai et al., 2009: 294-299; Taylan, 2015: 662-669; Aslan & Yazıcı, 2016: 109-117).

Internet addiction is defined as being unable to prevent the desire to use the internet excessively compared to the period it is already used, needing the time spent on the internet more and more, that the time spent without being connected to the internet loses its importance, getting extremely nervous, tense, restless when one is devoid of it and the gradual degradation of one's work, social and family life (Young, 1996: 237-244; Griffiths, 2000: 413-418). In this definition by Young, internet addiction is likened to "pathological gambling addiction" because it shows various impulse control disorder symptoms, and this addiction does not include chemical intake. The first serious diagnostic criteria have been tried to be established (Greenfield, 1999: 403-412). In the "Descriptive and Numerical Handbook of Mental Disorders" published by the American Psychiatric Association (APA) in 1994 and named with the abbreviation "DSM IV", internet addiction is still not defined as a disease (APA, 1995; Arısoy, 2009: 55-67). However, in DSM-V part 3, internet addiction was introduced in DSM-V by suggesting that digital game addiction can be diagnosed as a "disorder of playing games on the internet" (APA, 2013). On the other hand, with the increasing internet use in recent years, the publications and case report that the habit of using the internet has reached a level where the mention of addiction can be made has been increasing rapidly.

Thanks to the internet, it is easier to take the necessary precautions against the threats of competition in the globalising world and access information to evaluate the opportunities that may arise. It will benefit the person and the institution to realise the usage in a suitable period without any intellectual and behavioural discomfort to achieve the desired goal. In the study carried out by Hofstede for determining the cultural characteristics, the Turkish society was found to have a collectivist structure where the power distance is intense. High power distance also causes gender discrimination. The diversity of opportunities offered to boys and girls and the desire to keep girls under control from a young age restrict their relationship with the social environment. Our society, which also has a collectivist structure, desires to spend time together, have conversations, and keep friendship and kinship relations alive. While women who live in rural areas generally deal with housework and other work, together with the increase in the level of education, their participation in work-life causes the desire for social relations in question to decrease. This missing desire is generally realised through social media. Considering the studies conducted, it is seen that a large portion of internet users in Turkey are also on social media (Taylan, 2015: 662-669; Aslan & Yazıcı, 2016: 109-117; Batıgün & Hasta, 2010: 213-219) users¹. In a study conducted by Sancar (2012: 85), it was found that some women use the internet for nine hours a day. Therefore, these results reveal that the internet is used differently in many areas and senses. In addition to these benefits, the widespread use of the Internet has also led to a discussion of the possible harms of the internet. Almost all of the studies in this field have revealed that internet use occasionally gets out of hand and causes deterioration in social or professional

¹ *The Internet and social media statistics prepared every year by "We are social" and "Hootsuite" show in the part "Digital 2019 in Turkey" that 63% of our country, which has a population of 82.4 million are active social media users. See, <<https://dijilopedi.com/2019-turkiye-internet-kullanim-ve-sosyal-medya-istatistikleri/>>, 15.11.2020.*

functionality and low productivity in the workplace (Beard, 2005: 7-14). In addition, case reports of young people who spend days on the Internet without sleeping and die (Koyama et al., 2010: 69-74) have caused this topic to become increasingly more popular.

Nowadays, the person/organisation needs to access the information because the opportunity provided by the internet is significant in terms of competition. Today, when information plays a vital role that unlocks every lock, using this key to benefit the person/organisation will provide a significant advantage in delivering sustainable competitive advantage. However, other addictive opportunities such as social media, games, shopping, etc., served with the internet bring certain negatives, as mentioned above. Studies on the subject have shown that internet addiction adversely affects physical disorders, sleep, nutrition, hygiene, and family relationships that can cause disruption in jobs (Beard, 2002: 2-11; Hou et al., 2019: 1-4; Hawi, 2017: 576-586; Cao et al., 2019: 83-92; Forouzani & Mohammadzadeh, 2018: 77-99; Anderson, 2001: 21-26; Büyükgebiz & Tunca, 2019: 33-53; Young, 2007: 671-679). In some studies, it is stated that loneliness, interpersonal problems, mood disorders (Simcharoen et al., 2018: 2-7; Eichenberg et al., 2017: 170; Weinstein et al., 2016: 674-682; Shettar et al., 2017: 325-329; Kuss et al., 2021: 115; Engelberg & Sjöberg, 2004: 41-47), work-technology conflict (Turel et al., 2011: 88-95), life saturated (Lachmann, 2016: 363-367), and decrease in organisational citizenship (Şahin & Acar, 2016: 1094-1103) appear in individuals who are addicted to the internet.

3. Employee Performance

In today's business world, increasing productivity, providing efficiency, and reaching determined targets are indispensable elements of businesses. One of the vital factors for productivity and efficiency to get the desired levels and reach the targeted goals is the employees' job performance. Employees within the organisation try to contribute to the organisation's purposes by revealing the necessities of their work and responsibilities and their physical work, knowledge, skills, and abilities.

Performance can be defined as the level of performing a task in line with the determined conditions or the employee's way of behaviour (Soysal et al., 2019: 73-91), the level of the use of capacity (Uludağ, 2018: 171-193), the level of output achieved as a result of an action (Schermerhorn et al., 1985: 358). Employee performance, on the other hand, is the employee's taking on duties and responsibilities in the workplace s/he works in for the sake of meeting his/her personal needs and spending time and effort for the sake of getting what s/he wants (Barutçugil, 2002: 40; Rousseau & Mclean, 1993: 1-43; Kara et al., 2021: 47-64). In other words, employee performance is the ability of the individual to perform the job defined for him/her within the acceptable limits (Sonnentag & Frese, 2002: 375). Employee performance is directly related to the success of the organisational performance and is a process that shows the financial or non-financial skill of the employee (Konovsky & Cropanzano, 1991: 698). Employees' performance is extremely important in terms of the success of businesses and their future plans. Enterprises that want their employees to perform at the expected level should make the right choices and take steps.

In studies conducted on the subject by researchers, it is stated that the behaviours that are thought to impact job performance are gathered in four groups. These are (i) "main job performance", which includes the tasks required by the job, (ii) "citizenship behaviour", which comprises the behaviours put forth by the employee for the business to be rendered stronger beyond the work done, (iii) "creative and innovative behaviours" that enable the development of different ideas and their practice within the business, (iv) "damaging behaviours" defined as employee behaviours such as industrial sabotage or theft, which harm the enterprise (Ng & Feldman, 2013: 305-314; Tekingündüz et al., 2016: 683-694). The role of these behavioural models expressed in increasing the performance of employees can be important in achieving organisational goals and objectives and reaching the desired results. In this respect, it becomes very important to create suitable working environments. The studies show that employees who expect rewards in return for high-performance show more interest in their work and are thus more beneficial by offering creative and innovative suggestions to improve their organisations.

For this reason, managing the performance levels of the employees is of great importance for organisations. Lack of performance management may cause the employees' expectations not to be met (Dehaghi & Rouhani, 2014: 903-908). For example, in the city of Urmia, Iran, it was seen that the cooperatives were established for women to be more familiar with new understandings, for them to develop social relations with other women and at the same time, to have the same power as men, they could not benefit from information and communication technologies to achieve success, and this decreased the level of success (Forouzani & Mohammadzadeh, 2018: 77-99).

However, some studies show that internet browsing, also expressed as surfing the internet or virtual slate, causes low productivity in employees (Christensen & Foss, 2020: 84-94). The desire of employees who are addicted to the Internet to use the internet continuously causes work adaptation problems and loss of work productivity, efficiency, and motivation (Shrivastava et al., 2018: 151-155; Mohammad et al., 2019: 725-748; Cao et al., 2019: 83-92; Forouzani & Mohammadzadeh, 2018: 77-99; Anderson, 2001: 21-26; Büyükgemiz & Tunca 2019: 33-53; Young, 2007: 671-679). Too much time spent in the virtual environment undermines job satisfaction (Kim et al., 2016: 1041-1058) and organisational commitment and increases layoffs (Saleh et al., 2018: 87-92; Priyadarshini et al., 2020: 181-196). Munene and Nyaribo (2013: 141-150), in their studies, have seen that when employees use internet usage to obtain information, it causes positive results and negative consequences in unrelated situations, which reduces performance and work efficiency, and this decrease increases costs due to inefficient time usage (Sinyangwe, 2019: 1-30; Lim & Chen, 2012: 343-353; Moningkey & Franksiska, 2020: 251-258; Leung et al., 2017: 403-418; Cole, 2007: 592-615).

When studies on both internet addiction and performance evaluation are examined, it has been seen that internet addiction causes physical, social, and spiritual negative effects on employees. Businesses operating within the scope of the open system approach have been put forward by studies in which employees are influenced by these behaviours experienced

in and out of business, causing efficiency and performance losses. In line with these results, the following hypothesis can be created;

H₁: Internet addiction negatively and significantly affects women's performance.

3.1. Social Support

While the development of technology and its finding a place in every area of life often provide benefits, in some cases, this benefit can lead to negative experiences. Thanks to the internet, it is easier to obtain information, which is one of the main advantages of competition. It is supported by technology and meets needs with new products and services. Besides this benefit of the internet, another of its most prominent features is undoubtedly being used for communication and gaming purposes.

Under internet addiction, the internet has become a tool used by individuals in their daily social lives to establish and form social relationships (Karasu et al., 2017: 372-386). With the widespread use of the internet, there have also been differences in the behaviours of individuals regarding establishing friendships and maintaining friendship relationships and have begun to be moved to the virtual environment (Bonetti et al., 2010: 279-285). The spread of sites such as social sharing, games, and communication has become a phenomenon that connects millions of internet users worldwide. Such websites facilitate interpersonal relations and communications and have widespread use (Wilson et al., 2010: 173-177), causes addiction in people after a certain period, and prevent individuals from establishing and shaping social relations by estranging them from social activities. The restriction of individuals' social activities may cause them to have difficulty fulfilling their roles in the family, society, and organisations, experience anxiety and stress, and decrease their performance levels. This situation causes an increase in their social support needs.

The term "social support", defined as the social and psychological support that the individual gets from his/her environment, is theoretically based on Kurt Lewin's (1951) "*Field Theory and Definition of Behavior*". According to Lewin (1951), behaviour is the change in the psychological environment. Therefore, it may be possible to eliminate the negative behaviours of the individual and enable him/her to gain new behaviours by making changes in his/her psychological environment (Yıldırım, 1997: 81-87; Tulunay, 2016: 359-388). In the works of Yıldırım (2004a,b: 221-236), social support is expressed in two categories as structural and functional support. While the people that the individual gets support from, the number of supporters, and their degree of closeness to the individual are at the forefront of structural support, in operational support, what the support is given means for the individual, its degree of importance and to what extent it meets the need of the individual is researched.

According to some other researchers, two types of support are mentioned in social support emotional and instrumental support. Emotional support is closely related to the individual's psychological health, and this support includes feelings such as being loved, respected, and understood. These feelings lead to positive changes in individuals, such as

increased self-esteem and coping with motivation in problems (Çelik et al., 2012: 357-370). For example, in a study conducted to determine the relationship between partner support and quality of life of postpartum women, it was found that there was a moderate positive relationship between postpartum general partner support and quality of life (Akbaş & Taşcı-Duran, 2018: 29-45). Instrumental support includes concrete help behaviours such as assisting specific tasks (Redman & Snape, 2006: 167-175). Regarding social support, which is mainly perceived as if it was a concept unrelated to work, it was demonstrated in the studies conducted those individuals generally received social support from their colleagues, subordinates, and superiors and that social support perceived in business life has a significant effect on work stress (Lindorff, 2001: 274-282).

In the studies of the researchers aimed at determining the factors affecting social support, they found that the personality traits of the family members and close relatives and the individual had a significant impact on the perception of social support (Bowling et al., 2004: 339-350; Bowling et al., 2005: 476-489). For this reason, the social support perceived has important effects on both the private and business life of the individual. In general, since the perception of social support is vital in meeting the need for belonging (social needs), which is the third step of Maslow's hierarchy of needs, it has critical importance in the individual's socialisation and the development of trust in him/herself. It can be said that social support also has an important place, especially for new employees. Because the individual is connected to the organisation in the extent of social support s/he receives from his/her colleagues and environment and displays efficient work. According to the findings of the related studies, the high perception of social support increases organisational benefit elements such as organisational commitment, job satisfaction, motivation, and performance (AbuAlRub, 2004: 73-78; Hauck, 2008: 112; Tekingündüz vd., 2016: 683-694; Kırmızıgül, 2019: 225-241; Marcinkus et al., 2007: 86-111), it reduces work stress, anxiety, depression and burnout and the conflicts between work and life outside work (Redman & Snape, 2006: 167-175; Cieslak et al., 2007: 84-96; Lindorff, 2001: 274-282; Shaw & Gant, 2002: 157-171). According to the results of national and international literature research regarding students' internet addiction conducted by (Büyükgebiz & Tunca 2019: 33-53) between the years 2000-2018, it was found that the students were rapidly moving towards addiction to internet use, that this was causing a decrease in their lessons, social and familial relations and an increase in their anxiety, depression and insomnia levels and that such people needed social support. Leung et al. (2017: 363-367), Cole (2007: 592-615), and Harrison et al. (2021: 10) stated that the problems expressed by the social support to be provided been addressed, and there has been a noticeable increase in performance.

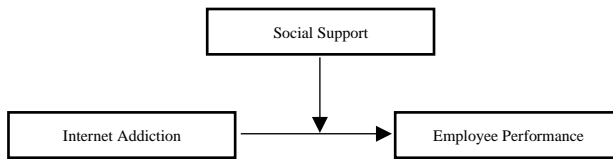
Therefore, managers should make measurements by monitoring the performance levels of the employees at various periods, determine the successful and unsuccessful performances, support and remedy the deficiencies of those who show unsuccessful performance, and appreciate and reward those who are successful, which will eventually enable the employees to show better performance. As stated by Taşdan (2010: 2569-2620), social support, which contributes to the behavioural development, social understanding, and value judgments of individuals in enterprises, also contributes to increasing the performance

of the employees in the organisation. As a result of theoretical explanations and literature reviews, the following hypothesis can be developed;

H₂: Social support plays a regulatory role regarding the impact of internet addiction on women's performance.

The research model will be within the framework of the specified hypotheses.

**Figure: 1
Research Model**



4. Research Methodology

In this part of the research, the research's determination of the research population and sample selection, the development of data collection tools, and the statistical methods and techniques used in the study are explained.

4.1. Determining the Research Population and Sample Selection

The population of our research covers 600 employees employed in two private-sector call centres operating in Kars province. The research consists of cross-sectional data. In order to determine the sample size in which the surveys will be applied in the study, the following formula has been used (Sancar, 2012: 85).

$$n = \frac{N * t^2 * (p * q)}{d^2(N-1) + t^2 * p * q}$$

$$n = \frac{600 * (1,96 * 1,96) * (0,5 * 0,5)}{0,05 * 0,05 * (600-1) + (1,96 * 1,96) * 0,5 * 0,5} \rightarrow n = 234$$

The sample size has been calculated as 234 by predicting 5% error margin within the 95% of the reliability limits of this main mass. The number of surveys subject to analysis is 408. This number is more than the targeted number of 234; thus, the α and d errors were tried to be reduced to the minimum level. Limitations of the research may be identified as using the questionnaire technique as a data collection tool of the study and confining it to scales.

4.2. Development of Data Collection Tools

Since the research and measurement method fundamentally based on quantitative data was adopted, the survey technique was used in collecting the data in our research. While preparing questionnaire forms, the scales are known to be valid and reliable, which were

used in previous studies on the subject as much as possible. In the first part of the questionnaire, "Internet Addiction Scale (IAS)" developed by Günüç and Kayri (2010: 220-232) to measure the level of internet addiction in women, in the second part, the Business Performance Scale used by Sigler and Pearson and in the third part, the social support scale developed by Zimet et al. and adapted to Turkish by Eker and Akar were utilised. The statements in all the scales mentioned were rated on 5-point Likert Scale (1- Strongly Disagree, 2- Disagree, 3- Undecided, 4- Agree, 5-Strongly Agree).

4.3. Analysis Methods

In this research, which was organised to determine the effect of internet addiction on women's performance and the moderating role of social support perceived in this effect, information related to the sample and scales was included. In the analysis, $p = 0,05$ was accepted as the level of importance. In the study, firstly, the reliability and validity of the scales were investigated. Descriptive and confirmatory factor analysis was applied to the scales used. To analyse the effect levels (effects between variables) in the model of the study, a regulatory effect analysis by Baron and Kenny was made. Accordingly, the macro named PROCESS (<www.afhayes.com>, 15.11.2020) was developed by Andrew Hayes.

4.4. Analyses and Results

4.4.1. Exploratory Factor Analysis on the Internet Addiction Scale

As a result of the item analysis conducted to determine the reliability of the internet addiction scale, the total score correlation for any item was found not to be lower than 30, which was taken as the cut-off point. Therefore, there was no need to remove any item related to the scale from the scale. Again, when any item is removed from the scale, the Cronbach alpha reliability coefficient of the scale does not change to a standard that can be considered important. In general, the reliability coefficient for the survey is 941. This shows that the scale is within acceptable limits. Therefore, it can be concluded that the 7 items in the scale are compatible and competent in ensuring the scale's reliability as a whole.

As a result of the exploratory factor analysis that we applied in our study, it was observed that the factor load of not item in the 7-item scale was lower than 0,40, and the items were loaded on a single factor. As shown in Table 1., the only factor obtained due to exploratory factor analysis explains 73.888% of the total variance. KMO (Kaise-Meyer-Olkin Measure of Sampling Adequacy) (0.942), which shows the condition of applying descriptive factor analysis to the data obtained from the research and the degree of globality, which indicates that significant factors may be deduced from research data (Barlett's Test of Sphericity; 839,707; $p < .000$) are at an adequate level.

Table: 1
Exploratory Factor Analysis on the Internet Addiction Scale

Factors	Factor Loads
<i>Factor: Internet Addiction</i>	
Int4	,885
Int6	,877
Int2	,873
Int3	,866
Int7	,856
Int1	,843
Int5	,816

4.4.2. Confirmatory Factor Analysis on the Internet Addiction Scale

Confirmatory factor analysis was also applied to the internet addiction scale to demonstrate the consistency of the factor structure resulting from the exploratory factor analysis. When the regression loads (parameter estimates) obtained from the model were examined, it was seen that the standardised regression load of the items was not lower than 0,50. However, in the confirmatory factor analysis applied to the internet addiction scale, it was observed that if the modification were made between Int3 and Int7 items, the chi-square value would increase, and the fit values would increase. After modification, the fit values of the model are given in Table 2.

Table: 2
Results of the Fit Indices on the Internet Addiction Scale

Indices	Measurement	Result
CMIN/DF	1,927	Good Fit
TLI	,991	Good Fit
RMSEA	,048	Good Fit
CFI	,995	Good Fit
GFI	,983	Good Fit
RMR	,028	Good Fit

4.4.3. Exploratory Factor Analysis Related to Performance Scale

As a result of the item analysis conducted to determine the reliability of the performance scale, the total score correlation was not found to be lower than 0,30, taken as the cut-off point regarding any item. Therefore, there was no need to remove any item related to the scale from the scale. Again, when any item is removed from the scale, the Cronbach alpha reliability coefficient of the scale does not change to a standard that can be considered important. In general, the reliability coefficient for the survey is .811. This shows that the scale is within acceptable limits.

As a result of the exploratory factor analysis, which we applied in our study, it was found that no item's factor load was lower than 0,40 in the 4-item scale and that the items were loaded on a single factor. As seen in Table 3, the sole factor obtained from the exploratory analysis explains 63,874 % of the total variance. KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) (0,767), which shows the condition of applying descriptive factor analysis to the data obtained in the research and the degree of sphericity, which

indicates that significant factors may be deduced from the research data (Barlett's Test of Sphericity; 541,469; $p < .000$) are at an adequate level.

Table: 3
Exploratory Factor Analysis on the Performance Scale

Factors	Factor Loads
<i>Factor: Performance</i>	
Perf1	,835
Perf2	,824
Perf3	,800
Perf4	,734

4.4.4. Confirmatory Factor Analysis regarding the Performance Scale

Confirmatory factor analysis was also applied to the performance scale to reveal the conformity of the factor structure, which ensued as a result of exploratory factor analysis. When the regression loads (parameter estimates) obtained from the model were examined, it was seen that the standardised regression load of the items was not lower than 0,50. Fit values regarding the model have been given in Table 4.

Table: 4
Results of the Fit Indices on the Performance Scale

Indices	Measurement	Result
CMIN/DF	1,206	Good Fit
TLI	,998	Good Fit
RMSEA	,023	Good Fit
CFI	1,000	Good Fit
GFI	,999	Good Fit
RMR	,015	Good Fit

4.4.5. Exploratory Factor Analysis regarding the Social Support Scale

As a result of the item analysis conducted to determine the reliability of the social support scale, it was found that the total score correlation of no item was lower than 0,30, considered the cut-off point. Therefore, there was no need to remove any item related to the scale from the scale. Again, when any item is removed from the scale, the Cronbach alpha reliability coefficient of the scale does not change to a standard that can be considered important. In general, the reliability coefficient regarding the scale is .889. This shows that the scale is within acceptable limits.

As a result of the exploratory factor analysis that we applied in our study, it was seen that, in the 12-item scale, no item's factor load was lower than 0,40 and that the items were loaded on three factors (Family-Friend-Special Friend). As seen in Table 5, the three factors obtained from the exploratory factor analysis explain 79,056 % of the total variance. KMO (Kaise-Meyer-Olkin Measure of Sampling Adequacy), which shows the condition of applying descriptive factor analysis to the data obtained in the research, and the degree of sphericity, which indicates that significant factors may be deduced from the research data (Barlett's Test of Sphericity; 3626,267; $p < .000$) are at an adequate level.

Table: 5
Exploratory Factor Analysis Regarding the Social Support Scale

Factors	Factor Loads		
<i>Factor: Social Support</i>			
SosSup2	,921		
SosSup4	,893		
SosSup2	,870		
SosSup1	,852		
SosSup10		,860	
SosSup11		,855	
SosSup12		,847	
SosSup9		,804	
SosSup6			,869
SosSup8			,853
SosSup5			,793
SosSup7			,781

4.4.6. Confirmatory Factor Analysis regarding the Social Support Scale

Confirmatory factor analysis was also applied to the social support scale to reveal the conformity of the factor structure, which ensued as a result of exploratory factor analysis results. When the regression loads (parameter estimates) obtained from the model were examined, it was seen that the standardised regression load of the items was not lower than 0,50. Fit values regarding the model have been given in Table 6.

Table: 6
Results of the Fit Indices Regarding the Social Support Scale

Indices	Measurement	Result
CMIN/DF	2,777	Good Fit
TLI	,967	Good Fit
RMSEA	,066	Acceptable Fit
CFI	,975	Good Fit
GFI	,948	Good Fit
RMR	,062	Acceptable Fit

4.4.7. Hypothesis Tests

Initially, correlation analyses were utilised to test the hypothesis, which forms the basis of our research, and to determine the relationship between internet addiction, social support, and performance.

In Table 7, correlation coefficients show the relations between social support and performance. As can be followed from the table, it is seen that internet addiction has a positively oriented relation with social support ($r = ,179^{**}$), and negatively oriented ($r = -,335^{**}$) and a significant relationship with performance. In this respect, we can state that hypothesis of H_1 is justified.

Table: 7
The Relationship Between Internet Addiction, Social Support, and Performance

Factors	1	2	3
1- Internet Addiction	1		
2- Social Support	,179**	1	
3- Performance	-,335**	,233**	1

4.4.8. The Regulatory Effect of Social Support on the Relationship between Internet Addiction and Woman Employees

The regulatory effect is the change in the relationship between two variables on the different levels of a third variable. On the other hand, the regulatory variable is defined as a qualitative or quantitative third variable affecting the direction and/or power between an independent variable and a dependent variable (Baron & Kenny, 1986: 1173-1182; Frazier et al., 2004: 115-134).

SPSS PROCESS macro developed by Andrew Hayes was utilised to question the regulatory role of social support in the relationship between internet addiction and performance, which is the central hypothesis of the research, and the data were subjected to regression analysis (<www.afhayes.com>, 15.11.2020). For the regulatory effect to be analysed, a new variable (interaction variable) should be obtained by multiplying the regulatory variable and the independent variable. If the interaction variable is significant, we can talk about the existence of a regulatory effect (Baron & Kenny, 1986).

Table: 8
The Regulatory Effect of Social Support on the Relationship Between Internet Addiction and Woman Employees

The Regulatory Effect of Social Support	β	Standard Error	t	p	LLCI	ULCI
Performance						
Constant						
Internet Addiction	-1,0389	,1544	-6,7300	,0000	-1,3424	-,7355
Social Support	-,3052	,1535	-1,9875	,0475	-,6070	-,0033
Internet Addiction x Social Support	,1863	,0399	4,6694	,0000	,1079	,2647
MODEL SUMMARY	R	R²	F	p		
	,4923	,2423	43,0686	,0000		
Values After Interaction	Change in R ² = ,0409 F = 21,8034 p = ,0000					

Dependent Variable = Performance

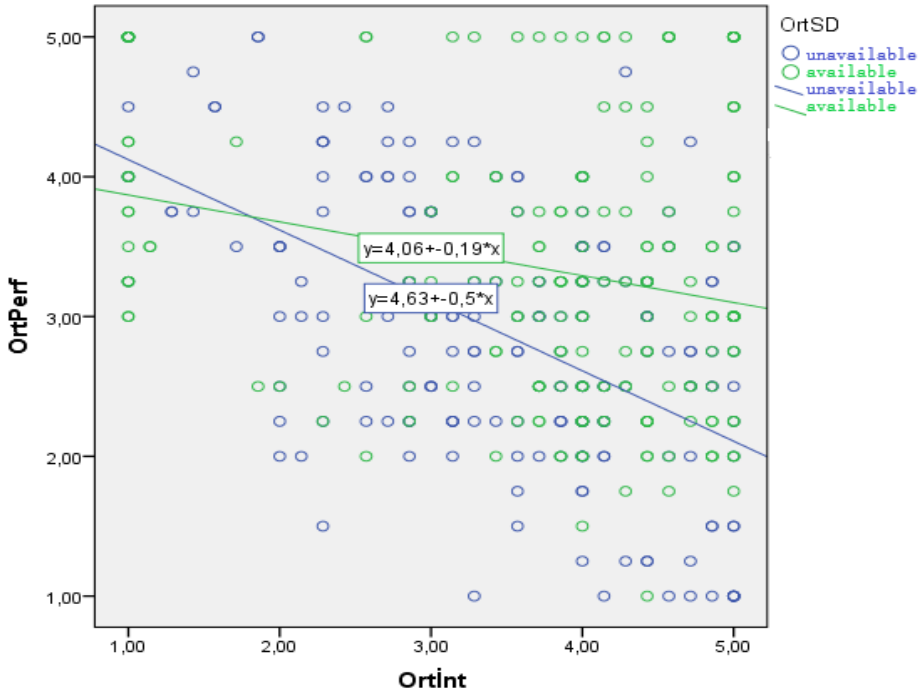
** LLCI (Lower-limit of confidence interval), ULCI (Upper-limit of confidence interval)

As seen in Table 8, the regression model established is statistically significant ($R = ,4923$; $R^2 = ,2423$; $F = 43,0686$; $p = ,000$). The results of the analysis show the statistically significant and negative relationship regarding the effect of internet addiction on the performance of women ($\beta = -1,0389$, $t = -6,7300$, $p < 0,05$). Accordingly, it is understood that the increase in internet addiction is a factor that decreases performance level.

In the calculations regarding regulatory effect analysis, the interaction variable (internet addiction x social support) was included in the model as suggested by Baron and Kenny (1986), and the regulatory effect was found to have a positively oriented and significant impact on performance ($\beta = ,1863$, $p = ,000$). When the table is examined, it is seen that together with the inclusion of the interaction variable in the model, the negative effect of internet addiction on performance decreases. Accordingly, social support was found to have a regulatory impact on the relationship between internet addiction and performance. In this respect, the hypothesis "H₂: Social support has a regulatory role in the effect of internet addiction on women's performance" was confirmed.

To see how the relationship between internet addiction and performance changes regarding the different levels of social support (high or low), it will be rational to examine Graph 1.

Graph: 1
Relationship between Internet Addiction and Performance regarding the Different Levels of Social Support



In the graph, the relationship between internet addiction and performance was examined according to the two different levels of social support (“high social support” and “low social support”). It is seen that when social support is low, internet addiction affects the performance of women more negatively. Still, if the social support is high, this negative effect decreases, i.e., there is an inevitable increase in performance.

5. Discussion

In our country, where gender discrimination is gradually losing importance, it is a gratifying situation for women to participate in business life, and laws by the current government support this. This situation also brought about the questioning of the performance of women and men in working life. While comparing the performance status of women and men without gender discrimination in many studies, this study has been aimed

to determine only the internet addiction status of female employees and the mediating role of social support in its reflection on their performance.

Of the employees who participated in the study, 161 people (39,5%) are married, and 247 (60,5%) are single. As of the age range, those between the ages of 21 and 40 are 74%, primary education graduates are 7,8%, high school is 32,8%, the associate degree is 44,9%, and those with undergraduate and graduate graduation are 14,5%. Looking at the purposes of using the Internet, it was seen that only 103 (25,2%) of the workers used the internet to obtain information and contribute to their personal development. In contrast, the rest used it for social media, gaming, and personal purposes (shopping, health, communication, education, etc.).

In the study, correlation analysis was primarily conducted to determine the relationship between variables. The research has observed that internet addiction has a negative directional ($r = -,335^{**}$) and meaningful relationship with performance. The findings show that excessive internet addiction has a negative impact on employees' work efficiency, productivity, sociality, and professional functionality. In particular, it can be considered that the late-night internet use of users causes factors such as sleep disorders, irregular nutrition, personal hygiene, antisocial relationships, and problems in family relationships, which are effective in experiencing these negatives and negatively affect organisational performance. It is seen that these results are similar (Christensen & Foss, 2020: 84-94; Mohammad et al., 2019: 725-748; Cao et al., 2019: 83-92; Forouzani & Mohammadzadeh, 2018: 77-99; Büyükgebiz & Tunca, 2019: 33-53) to the studies that have been done before. It can also be stated that the fact that most employees (75%) use the internet for non-work-related personal purposes (dating sites, games, shopping, etc.) may cause cost increases in the business due to other use of energy and time losses (Shrivastava et al., 2018: 151-155; Sinyangwe, 2019: 1-30). Managers need to turn the negative, a threat to organisational success, into an opportunity, primarily based on these results. In this way, the process will be transformed into social and emotional connections, emotional relationships, trust, and less psychological distance provided by social media. It will have a more positive impact on team and employee performance. As expressed in the theoretical framework, it has been revealed by the studies carried out in organisations that the use of the internet and business-oriented social media to obtain information, share information, and improve social relations positively affects organisational performance and facilitates business management, in-house communication and business auditing (Pavithra & Deepak, 2021: 1-5; Song et al., 2019: 103-160; Wu et al., 2021: 1-13).

A low level of positive and meaningful relationship ($r = ,179^{**}$) has been found between social support and internet addiction, which is the other variable of the study. This result shows that to save employees with internet addiction from the factors that affect their work and social lives and cause low productivity, the relationships that the managers within the family, friends, and organisations will establish with these individuals will lead to improvement in the quality level and can solve this problem with the positive support (Mo et al., 2018: 86-93) they will provide. As a matter of fact, there are also studies in the

literature that are identical to this result and support the result (Moge & Romano, 2020: 1-10; Karaer & Akdemir, 2019: 22-27; Al-Kandari & Al-Sejari, 2020: 1-19; Eskandari & Baratzadeh, 2020: 129-151; AbuAIRub, 2004: 73-78; Hauck, 2008: 112; Tekingündüz et al., 2016: 683-694). It is thought that the low level of relationship is because the study only covers women. Due to the cultural and religious beliefs, women's lack of adequate environmental interactions and the desire to remain family and confidential about some problems often hinder the need for support. This leads the person to become lonely and use the internet more by isolating them from the organisation and their friends (Chae et al., 2018: 339-350; Su et al., 2020: 113).

When the regulatory role of social support was examined in the relationship between internet addiction, which constitutes the central element of the study, and its functioning performance, it was observed that social support has a positive effect on the effect between the two variables ($\beta = ,1863$, $p = ,000$). Similar results are found in the literature for the variables used (Mo et al., 2018: 86-93; Lo et al., 2021: 113; Karaer & Akdemir, 2019: 22-27; Lin et al., 2018: 1-7). Qualitative and quantitative features of the labour factor, which is the main production factor in carrying out the organisation's main objectives, form the main element of this process. In today's conditions, where global competition is intense and customer satisfaction is becoming more complex every day, it should be recommended that businesspeople develop themselves by being guided at this level of consciousness. Knowledge is a vital force in the sustainability phase, and it will be effective in the process for managers to lead their employees in achieving this. Therefore, managers should make measurements by monitoring the performance levels of the employees at various periods, determine the successful and unsuccessful performances, support and remedy the deficiencies of those who show unsuccessful performance and appreciate and reward those who are successful, which will eventually enable the employees to deliver better performance. This result showed that the pre-expressed H_2 hypothesis was accepted.

The research has been conducted for women workers working in a privately owned call centre operating in Kars province in eastern Turkey. Kars province is among the underdeveloped areas in the industry, and there is no sector where women work intensively. This is why the call centre was selected for the study. Similar studies will be carried out in different industries and organisations where women's employment is more in other more developed metropolitan cities of Turkey. It is thought that they will contribute to a better understanding of variables and address the deficiency in the literature.

6. Conclusion

In this study, which was conducted to determine the effect of women employees' internet addiction on their performance and the regulatory role of social support regarding this effect, in line with the goal defined and the targets formed accordingly, initially, a conceptual framework was developed related to internet addiction, performance, and social support. In the last part of the study, a questionnaire was performed on 408 employees working in the call centre, and the data obtained were evaluated and interpreted.

As also stated in the part of the conceptual framework, internet addiction is described as being unable to prevent the use of the internet excessively compared to the present state, needing the time spent on the internet more and more each day than the time spent without being connected to the internet loses its importance, and that one becomes highly nervous, tense, uneasy, etc. when s/he is devoid of it (Young, 1996: 237-244; Griffiths, 2000: 413-418). The occurrence of such problems causes one's work, social and familial life to deteriorate gradually, bringing along many negativities. In today's business world, where competition is high-speed and merciless, the most crucial negativity faced is undoubtedly related to employee performance. Employee performance is an individual's ability to perform the work defined for him/her according to his/her skills and skills within the scope of acceptable limits (Sonnentag & Frese, 2002: 375). An employee devoid of this ability cannot perform the duties and responsibilities defined for him/her; therefore, there is a decrease in his/her performance and, together with it, unproductivity in organisational outputs. Internet addiction also affects individuals negatively and influences their performance without any doubt. Therefore, internet addiction is seen as a subject that needs to be treated and examined in today's business world. It should mainly dwell upon today when performance is critical.

Another concept discussed in the study is social support. Social support, defined as material and moral support provided by the individual's social environment, is a concept that significantly affects individuals both in private life and business life. The existence of social support has a positive impact on individuals and motivates them, which affects their business life and especially performance. As also stated above, internet addiction was mentioned in the study, and its negative relation with performance was emphasised. The regulatory effect of social support expressed as a positive concept in this negative relationship was also considered. It was determined whether it would decrease internet addiction's negative impact on performance.

Accordingly, correlation analysis was utilised to test the related hypotheses. As a result of the correlation analyses, a negatively oriented and significant relationship with a significance level of 99% was found between internet addiction and performance. This result indicates that internet addiction decreases women's version. Internet addiction was also found to have a negative effect on performance in the regulatory effect analysis conducted. In other words, internet addiction negatively impacts the performance of the employees in the organisation, and it also causes output.

The study's main finding is that social support has a regulatory effect on the relationship between internet addiction and performance. In cases when internet addiction affects performance negatively, the existence of social support increases performance and decreases the negative effect caused by internet addiction. The support provided for women in social life was found to reduce the negative impact of the internet. It has started to be evaluated as a sickness in our age and has become an addiction. This was reflected positively on their business lives, i.e., increased performance.

Women employees' being supported socially increases their respect and ensures that they are motivated in the face of problems and cope with them, which are positive changes. In today's organisations, where many factors are decreasing the performance of employees, that social support is provided, and the employees perceive this will increase performance, which will lead to the ensuing organisational outputs productively and bring along organisational success.

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Development of Islamic Insurance in Southeast Asia (Malaysia, Brunei Darussalam, and Indonesia): The Progress Perspective

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Güneydoğu Asya'da İslâmi Sigortacılığın Gelişimi (Malezya, Brunei Sultanlığı ve Endonezya): İlerleme Perspektifi

Abstract

This study compares the number of companies, assets, contributions, and Islamic insurance claims in Malaysia, Brunei Darussalam, and Indonesia. The method used is descriptive quantitative, with research questions: How is the number of companies, assets, contributions, and claims Islamic Insurance in Malaysia, Brunei Darussalam, and Indonesia? This study's findings show that Indonesia has the highest growth in Islamic insurance companies and assets. Malaysia has the highest average growth contribution because of increased product innovation and digital technology use. Brunei Darussalam had the lowest claim growth rate because the claims process was considered too bureaucratic and complicated.

Keywords : Islamic Insurance, Islamic Insurance Assets, Islamic Insurance Contributions, Islamic Insurance Claims.

JEL Classification Codes : F65, G15, G22.

Öz

Bu çalışma Malezya, Brunei Sultanlığı ve Endonezya'daki şirketlerin, varlıklarının, katkı paylarının ve İslâmi sigorta taleplerinin sayısını karşılaştırmaktadır. Kullanılan yöntem, araştırma sorularıyla birlikte tanımlayıcı nicel bir yöntemdir: Malezya, Brunei Sultanlığı ve Endonezya'daki İslâmi Sigorta şirketlerinin, varlıklarının, katkılarının ve alacaklarının hacmi nedir? Bu çalışmanın bulguları, Endonezya'nın İslâmi sigorta şirketleri ve varlıklarında en yüksek büyümeye sahip olduğunu göstermektedir. Malezya, artan ürün yeniliği ve dijital teknoloji kullanımı nedeniyle en yüksek ortalama büyüme katkısına sahiptir. Brunei Sultanlığı, talep sürecinin çok bürokratik ve karmaşık olduğu düşünüldüğünden, en düşük talep büyüme oranına sahiptir.

Anahtar Sözcükler : İslâmi Sigortacılık, İslâmi Sigorta Varlıkları, İslâmi Sigorta Katkı Payları, İslâmi Sigorta Talebi.

1. Introduction

Insurance was established to protect each other and help several people/parties through investment in the form of assets and *tabarru'*, which provides a pattern of return to face certain risks through a contract (engagement), where Islamic is a contract that does not contain *gharar* (fraud), *maysir* (gambling), usury (interest), *zhulm* (persecution) *risywah* (bribes), haram and immoral goods (Akram et al., 2021; Sukmadilaga et al., 2021; Utami et al., 2021). According to Miftakhul Jannah and Nugroho (2019), cooperation, mutual guarantee, and help among humans are needed to realise the principle of kinship and togetherness with others. Insurance continues to proliferate in several countries where most citizens are Muslim. As a result, the Islamic insurance business began to be looked at and experienced a significant increase in Southeast Asia, i.e., Malaysia, Brunei Darussalam, and Indonesia, which actively developed Islamic Insurance in Southeast Asia.

Islamic Insurance has a presence in Malaysia, a country with a leading Islamic economy globally. The Malaysian Government has a vital role in developing Islamic Insurance in Malaysia. The Government issued a law regulating Islamic Insurance, carried out one month after the inauguration of the industry. Islamic Insurance was first established in Malaysia in November 1984 through the establishment of *Syarikat Takaful Malaysia Sdn. Bhd.* (STMB), while the Islamic insurance law was issued in December 1984 regarding the Islamic insurance Act (Sharifuddin et al., 2016).

Islamic Insurance was offered in Brunei Darussalam on March 3, 1993, marked by establishing Islamic Insurance of the Brunei Islamic Board of Trustees (TAIB) Sdn Bhd. In this case, Brunei Darussalam's Government supports the development of Islamic finance in Brunei Darussalam through the Shari'ah Financial Supervisory Board in Brunei Darussalam, namely by the issuance of the Islamic insurance Order law that came into effect in 2008 (Bashir et al., 2011).

Islamic Insurance in Indonesia was just established in 1994, marked by PT Asuransi Takaful Keluarga (Family Takaful) and PT Asuransi Takaful Umum (Takaful Umum) and PT. Indonesian Takaful Syarikat (Takaful Indonesia). However, the existence of Islamic Insurance was not followed by supporting regulations, so constitutionally, Islamic Insurance still needed a supportive policy from the Government. As a result, new laws were issued in 2014, namely Law No.40 of 2014, concerning conventional insurance companies and Islamic Insurance. The matters regulated in the law include corporate governance, market behaviour, consumer protection, and licensing (Wan Daod et al., 2018). Therefore, based on the year of establishment and the phenomenon of government support, Islamic Insurance in Malaysia, Brunei Darussalam, and Indonesia can be described as follows:

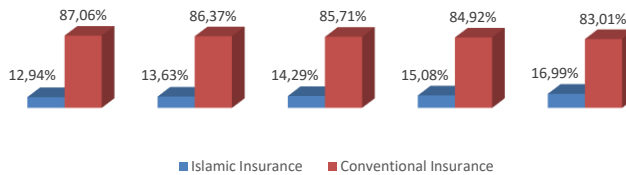
Table: 1
Establishment and Regulation of Islamic Insurance in Malaysia, Brunei Darussalam, and Indonesia

Malaysia	Brunei Darussalam	Indonesia
It was established in 1984 and received support from the Government with the Tafakul Act regulations issuance in 1984.	It was established in 1993 and received support from the Government through a regulation issued in 2008, namely the Islamic insurance Order law.	It was established in 1994 and received support from the Government through a regulation issued, namely Law No.40 of 2014 concerning Insurance 2014.

Source: Bashir et al., 2011; Sharifuddin et al., 2016; Wan Daod et al., 2018.

In addition, there are differences in public interest in Islamic Insurance in each of these countries. However, public interest in Islamic Insurance reflects the market share in the insurance industry.

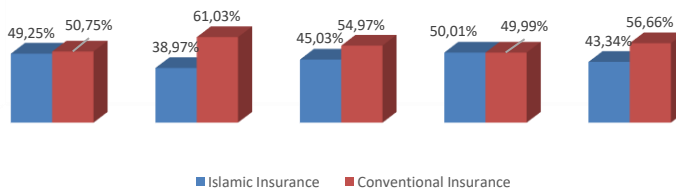
Figure: 1
Market Share of Malaysian Insurance Industry in 2015-2019



Source: Bank Negara Malaysia that has been processed (2021).

The market share of the insurance industry in Malaysia was still dominated by conventional Insurance. This can be seen from the total market share of conventional Insurance during 2015-2019, consistently reaching a figure above 80%. However, the Government continues to pay attention to Islamic insurance developments, marked by efforts to increase access to Insurance and increase penetration. In addition, greater technology adoption, particularly in distribution, will help Islamic insurance operators reach new population segments, including younger consumers. (Olano, 2019).

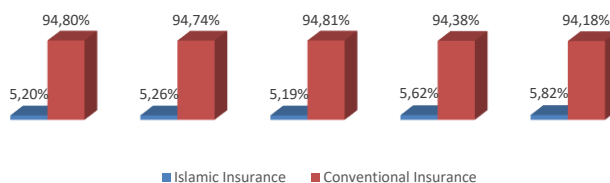
Figure: 2
Market Share of the Brunei Darussalam Insurance Industry in 2015-2019



Source: Brunei Darussalam Monetary Authority has been processed (2021).

The market share in Brunei Darussalam for Islamic Insurance and conventional Insurance is balanced. The Insurance and Islamic insurance sectors have adopted technology to communicate with customers using digital communication. In addition, in developing market share, Brunei Darussalam uses social media influencers (McNamara, 2021). There are several reasons people tend to avoid conventional Insurance because Islamic insurance companies have run their operations according to Islamic financial institutions' principles. The effective cost of Insurance is generally lower, and insurance companies' overall services have improved and improved. (Siddiqui & Athmey, 2008).

Figure: 3
Market Share of the Indonesian Insurance Industry in 2015-2019



Source: OJK, which has been processed (2019).

Market share in Indonesia is still very far from conventional Insurance, and it can be seen that the market share of Islamic Insurance during the 2015-2019 period was consistently below 6%. It shows that public interest in Islamic Insurance is still minimal. The low penetration of the Islamic insurance market should encourage the Islamic insurance industry to implement innovative strategies to introduce Islamic Insurance, encouraging public participation in Islamic insurance activities. (Nugraheni & Muhammad, 2019).

As for the Chairperson's response, the Indonesian Islamic insurance Association (AASI) Ahmad Syaroni revealed that increasing Islamic insurance agents could increase the market share of Islamic Insurance. However, currently, only 320,000 Islamic insurance agents have obtained licenses. And to date, Islamic insurance agents have contributed 40% as a distribution channel for Islamic Insurance for the community (Aldila, 2019). In addition, there is still a great need for literacy in the community. However, according to a survey by Bank Indonesia (BI), the level of Islamic economic literacy in Indonesia in 2019 has only reached 16.3% of the 100% scale. In addition, the OJK National Financial Literacy and Inclusion Survey specifically for Islamic Insurance recorded a new Islamic insurance literacy rate of 2.51% and Islamic insurance inclusion at 1.92%. (BKPP Demak, 2020). Based on this description, the problem's formulation can be drawn: Comparing the growth in the number of Islamic insurance companies, Islamic insurance assets, Islamic insurance contributions, and Islamic insurance contributions in Malaysia, Brunei Darussalam, and Indonesia?

2. Research Methodology

The methodology used is descriptive quantitative with a comparative approach. This research data uses secondary data from the regulations on Islamic Insurance issued in Malaysia, Brunei Darussalam, and Indonesia and Islamic insurance statistical data from the official government websites of each country during the 2015-2019 period.

3. Results and Discussion

3.1. Development of Islamic Insurance in Malaysia

In 1972 the National Fatwa Committee of the Malaysian Islamic Affairs Council stated that conventional Insurance in its operations was not by Islamic law. Meanwhile, the Fiqh Academy of the Organization of Islamic Conferences also states that people need to find Insurance based on Islam (Fauzi et al., 2016). With these several backgrounds, the concept of Islamic Insurance was first introduced in 1984, marked by its establishment in Malaysia in November 1984 through Syarikat Takaful Malaysia Sdn. Bhd. as the fulfilment of community needs based on Islamic principles. The Government has formed Islamic insurance arrangements, which is precisely one month after Islamic Insurance was established. In December 1984, the Government Issued the Tafakul Act (Sharifuddin et al., 2016).

The effortless development of Islam in Malaysia impacts the regulation and understanding of Malaysians towards activities based on Islam, including economic activities. The impact of economic activity was that the Islamic financial sector grew significantly and became a consideration from a global perspective. In the State of Global Islamic Report 2019/2020, Malaysia ranks first in the Islamic Finance sector of fifteen countries globally. In addition, Malaysia also ranks first in the Muslim-friendly Travel category (Standard Dinar, 2019).

Malaysia continues to progress in Islamic finance by making new regulations to make the Islamic financial system more accessible for the public to understand and its operations implemented according to Islam. Bank Negara Malaysia issued a new regulation on June 26, 2019, namely BNM / RH / PD 033-7, which discusses the Islamic insurance Operational Framework; with this regulation, there is greater clarity in the use of Islamic standards in Islamic insurance companies (Bank Negara Malaysia, 2019). The following is the growth of Malaysian Takaful (Islamic Insurance) operators from 2015 to 2019 as follows:

Table: 2
Growth of Malaysian Takaful Operators 2015-2019

Information		2015	2016	2017	2018	2019
Number of Takaful Companies	Family Takaful	11	11	11	11	11
	General Takaful				4	4
	Retakaful	4	4	4	4	3

Source: Bank Negara Malaysia (2021).

The development of Islamic Insurance from 2015 to 2019 has consistently increased. To improve the development of the Islamic finance industry, including Islamic Insurance, apart from the Government issuing a law regulating Islamic Insurance, the latest is BNM / RH / PD 033-7, which discusses the Islamic insurance Operational Framework. Previously, the 2013 IFSA law required Islamic insurance companies that have held a joint license to separate their business into general Takaful and family takaful (Malaysia, 2013).

Table: 3
Growth of Assets, Contribution, and Claims of Islamic insurance in Malaysia 2015-2019 (RM million)

Information	2015	2016	2017	2018	2019
Asset	24,711.0	26,781.7	29,283.3	31,373.8	36,517.7
Contribution	6,815.6	7,534.6	8,250.9	9,356.9	11,330.7
Claim	3,200.2	3,521.2	3,890.7	4,320.5	4,940.8

Source: *Bank Negara Malaysia (2021)*.

The development of assets, contributions, and claims from Islamic Insurance in Malaysia continued to increase from 2015 to 2019. As a result, company assets continued to grow with the highest increase in 2019, amounting to RM 5,143.9 million. The increasing contribution of Islamic Insurance also indicates the increasing market share in Islamic Insurance. However, this is offset by increasing claims every year from 2015 to 2019.

3.2. Development of Islamic Insurance in Brunei Darussalam

Islamic Insurance was offered in Brunei Darussalam on March 3, 1993, marked by establishing Islamic Insurance of the Brunei Islamic Board of Trustees (TAIB) Sdn Bhd. In this case, the Government of Brunei Darussalam supports the development of Islamic finance in Brunei Darussalam through the Shari'ah Financial Supervisory Board, namely by the issuance of the Islamic insurance Order law that came into effect in 2008 (Bashir et al., 2011). Since the introduction of Islamic Insurance in Brunei Darussalam, the products offered are primarily traditional. However, since 2017, new products have appeared on the market, particularly agriculture. The industry also plans to expand its offering of useful products for savings and protection. The growth of Brunei Darussalam Takaful (Islamic Insurance) operators from 2015 to 2019 is as follows:

Table: 4
Growth of Brunei Darussalam Takaful Operators 2015-2019

Information	2015	2016	2017	2018	2019
Number of Takaful Companies	Family Takaful	2	2	2	2
	General Takaful	2	2	2	2

Source: *Brunei Darussalam Monetary Authority, (2021)*.

Brunei Darussalam's Islamic insurance operators from 2015 to 2019 have not increased, but Brunei Darussalam has carried out its management optimally. It can be seen from the development of market share in Brunei Darussalam using social media influencers, word of mouth, traditional beliefs, and traditional understanding that customers have had a good experience when they buy Islamic Insurance make claims (McNamara, 2021).

Table: 5
Growth of Islamic insurance Assets, Contributions, and Claims in Brunei Darussalam 2015-2019

Description (Millions of Brunei Dollars)	2015	2016	2017	2018	2019
Asset	1,880.05	1,824.74	2,005.35	2,095.30	2,217.98
Contribution	174.25	153.01	152.89	141.79	126.13
Claim	58.07	92.88	68.05	60.60	63.75

Source: Brunei Darussalam Monetary Authority has been processed (2021).

Islamic insurance assets in Brunei Darussalam continued to increase from 2015 to 2019. Meanwhile, the contribution of Islamic Insurance in Brunei continued to decline, with the lowest contribution in 2019 amounting to 126.13 billion Brunei dollars. The contribution of Islamic Insurance still fluctuates from 2015 to 2019. Islamic insurance claims have also fluctuated, with the lowest claims in 2015 amounting to 58.07 billion Brunei dollars.

3.3. Development of Islamic Insurance in Indonesia

Islamic insurance company in Indonesia was first established in 1994, marked by the establishment of PT Asuransi Takaful Indonesia. However, the existence of Islamic Insurance is not followed by supporting regulations, so constitutionally Islamic Insurance still needs a supportive policy from the Government. The law regulating Islamic Insurance was only issued in 2014, namely Law No.40 of 2014 concerning Insurance. The law states efforts to create a reliable, healthier, more competitive, and trustworthy insurance industry. These efforts were made by establishing Islamic insurance and Islamic reinsurance businesses (Diantanti et al., 2021; Karyanto et al., 2021). The following is the growth of Islamic Insurance as seen from the total Islamic insurance companies in Indonesia from 2015 to 2019:

Table: 6
Growth of Indonesian Islamic Insurance Companies 2015-2019

Information	2015	2016	2017	2018	2019
Islamic insurance Company	Islamic Life Insurance	5	6	7	7
	Islamic General Insurance	3	4	5	5
	Islamic Reinsurance	-	1	1	1
Total	8	11	13	13	13
Islamic insurance Business Unit	Islamic Life Insurance	19	21	23	23
	Islamic General Insurance	24	24	25	24
	Islamic Reinsurance	3	2	2	2
Total	46	47	50	49	49

Source: OJK (2019).

The Islamic insurance business is considered to continue to grow and is very promising. It can be seen because Indonesia is a country with a Muslim majority. This population influences and attracts domestic and foreign investors to establish an Islamic insurance company in Indonesia. As for now, the Government has begun to play an active role in the Islamic insurance industry, namely with an appeal for Islamic business units to spin off with a deadline no later than 2024 immediately (Aziz et al., 2021).

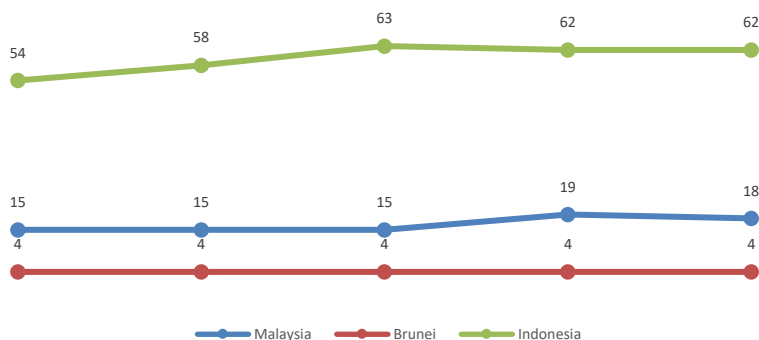
Table: 7
Growth of Assets, Contribution, and Claims of Indonesian Islamic insurance 2015-2019

Information (Billion Rp)	2015	2016	2017	2018	2019
Asset	26.69	33.12	40.53	41.60	45.80
Contribution	10.23	12.31	13.74	15.41	16.75
Claim	3.49	4.29	4.95	8.66	10.68

Source: OJK (2019).

The development of Islamic insurance assets has experienced consistent asset growth from 2015 to 2019. The company's contribution and claims have also increased from 2015 to 2019. The total contribution in 2015, with a value of Rp 10.23 trillion until 2019, has grown to become Rp 16.75 trillion. However, the increase in contributions was not matched by the rise in the share of the Islamic insurance market. As a result, total claims in 2015 amounted to IDR 3.49 trillion, increasing in 2019 to IDR 10.68 trillion.

Figure: 4
Comparison of growth in the number of Islamic insurance companies in Malaysia, Brunei Darussalam, and Indonesia in 2015-2019



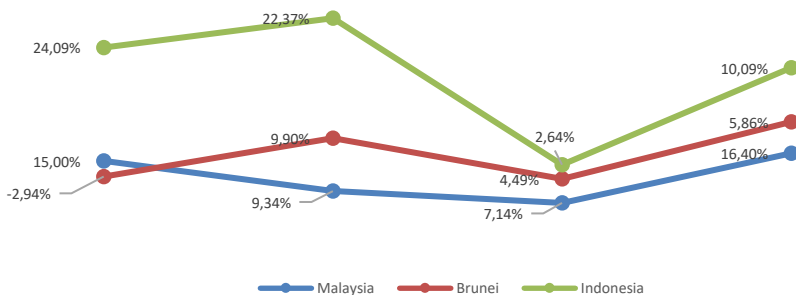
Source: (Autoriti Monetari Brunei Darussalam, 2021; Bank Negara Malaysia, 2021; OJK, 2019).

Based on this graph, it can be seen that Indonesia has the most significant number of Islamic Insurance compared to Malaysia and Brunei Darussalam. Several factors cause Islamic insurance companies in Indonesia to proliferate because Indonesia has the most considerable number of Muslims, which is estimated to be 229 million Muslims in 2020, or 87.2% of Indonesia's 263 million population and around 13% of the world's Muslim population (World Population Review, 2021). According to the Axco Insurance Information Services report, Islamic Insurance in Indonesia has great potential for development because it has a Muslim majority population (Olano, 2018). It is also supported by writing from Siregar (2017), who states that the Muslim population is large in Indonesia, reaching 87% of the total population, and the penetration rate is still low. Therefore, Islamic insurance life insurance product rates reflect great opportunities in the market. In addition, according to the Fintech Report, the Islamic insurance sector in Indonesia continues to grow, with a

market share in 2019 reaching 5.9%. The Islamic insurance sector's long-term growth potential was high due to Indonesia's low life insurance penetration-reaching 1.4% in 2019. Furthermore, Indonesia has the largest Muslim population globally (Fitch Ratings, 2021).

The next factor is that the Indonesian Government continues to appeal to the Islamic insurance industry so that the business community should immediately spin off until the deadline is 2024 at the latest Law 40/2014 concerning Insurance and OJK Regulation (POJK) 67/2016 concerning Business and Institutional Licensing of Insurance Companies, Islamic insurance Companies, Reinsurance Companies, and Islamic Reinsurance Companies (OJK, 2016). According to the Millan Report, these regulations were intended to strengthen the Industry by expanding markets and products and increasing long-term sustainability (Milliman, 2019).

Figure: 5
Comparison of Asset growth of Sharia insurance companies in Malaysia, Brunei Darussalam, and Indonesia in 2015-2019

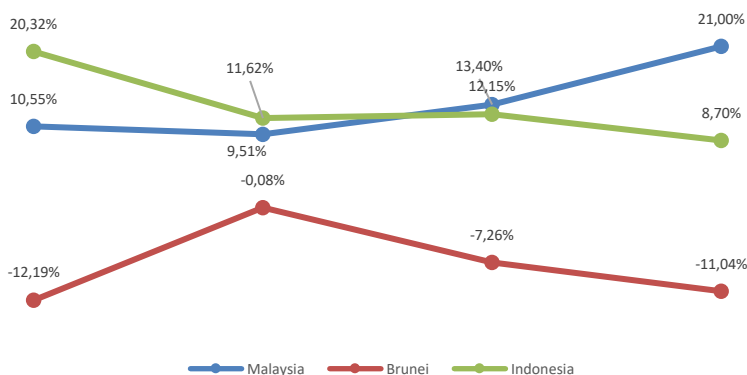


Source: (Autoriti Monetari Brunei Darussalam, 2021; Bank Negara Malaysia, 2021; OJK, 2019).

Islamic insurance assets in Malaysia continue to experience growth, with the average growth of Islamic insurance assets in Malaysia each year from 2015 to 2019 amounting to 10.38%. Furthermore, the growth of Islamic insurance assets in Brunei Darussalam from 2015 to 2019 fluctuated with the average increase of Islamic insurance assets in Brunei Darussalam each year from 2015 to 2019, 4.33%. Then, Indonesia's growth of Islamic insurance assets fluctuates with an average increase of Islamic insurance assets in Indonesia of 14.80%. The average growth of Islamic insurance assets in Indonesia from 2015 to 2019 is the highest. It was influenced by the amount of contribution of Islamic insurance assets, which also increases every year. Research by Warsani Purnama Sari (2020) stated that the contribution/premium income would increase significantly, increasing the asset growth of Islamic insurance companies in Indonesia. Apart from that, Sari et al. (2020) research states that contribution/premium income level has a positive and significant effect on the growth of Islamic insurance assets. It was thought to change the behaviour of Islamic insurance

consumers in allocating their funds. With the rules, the policy of separating the Islamic units then increases Islamic insurance assets in Indonesia. It can be seen that the addition of the number of Islamic insurance companies in Indonesia will increase the assets of Islamic Insurance itself. It was in line with research (Nawasiah & Alkaf, 2020). The spin-off policy has a positive and significant effect, which means that the increase in the number of assets causes an increase in the Capital Adequacy Ratio (CAR).

Figure: 6
Comparison of the growth in the number of contributions of Islamic insurance companies in Malaysia, Brunei Darussalam, and Indonesia in 2015-2019

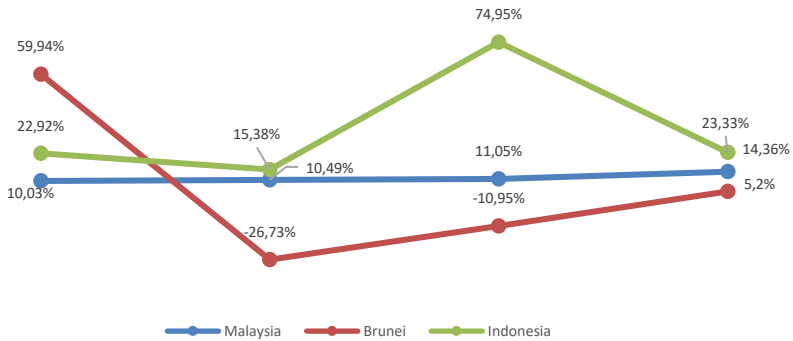


Source: (Autoriti Monetari Brunei Darussalam, 2021; Bank Negara Malaysia, 2021; OJK, 2019).

The amount of the contribution of Islamic Insurance in Malaysia has fluctuated. It tends to experience growth with the average growth of the contribution of Islamic Insurance in Malaysia each year from 2015 to 2019, amounting to 13.64%. Furthermore, Islamic Insurance's contribution in Brunei Darussalam from 2015 to 2019 has always been in the minus figure, with the average growth of the contribution of Islamic Insurance in Brunei Darussalam each year from 2015 to 2019 at 7.64%. Then, the increase in the contribution of Islamic Insurance in Indonesia fluctuates with the average growth of the contribution of Islamic Insurance in Indonesia of 13.20%. In this case, Malaysia is superior in the average contribution growth of Islamic Insurance compared to Brunei Darussalam and Indonesia's contribution. The factors that can cause this are the high loyalty of the Islamic insurance participants in Indonesia, and the market share of Islamic Insurance is increasing every year from 2015 to 2019. Loyalty can be obtained from the innovation of Islamic insurance products in Malaysia. According to research by Hassan et al. (2014), it was said that innovation could be an essential determinant of participant loyalty in family takaful in the Malaysian Islamic insurance industry. In addition, the increasing use of digital applications can also be a catalyst for the growth of the Islamic insurance industry. Virtual or peer-to-peer Islamic insurance providers that support technology enable Islamic insurance

companies to provide services at a lower cost and be more flexible and customer-centric (Vasu, 2020).

Figure: 7
Comparison of the growth in the number of claims of Islamic insurance companies in Malaysia, Brunei Darussalam, and Indonesia in 2015-2019



Source: (Autoriti Monetari Brunei Darussalam, 2021; Bank Negara Malaysia, 2021; OJK, 2019).

The number of Islamic insurance claims in Malaysia has increased with the average growth of Islamic insurance claims in Malaysia each year from 2015 to 2019, amounting to 11.48%. Furthermore, the growth of Islamic insurance claims in Brunei Darussalam from 2015 to 2019 fluctuated with the average increase of Islamic insurance claims in Brunei Darussalam each year from 2015 to 2019, 6.85%. Then, Indonesia's growth of Islamic insurance claims fluctuated from 2015 to 2019, with an average increase of Islamic insurance claims in Indonesia of 34.15%. In this case, Brunei Darussalam excels on the claimed average because it has Malaysia and Indonesia's lowest average claims rate. The factors that cause it include the most common problem faced by Islamic insurance policyholders is the claim process. Most policyholders stated that it was difficult to get their claims. The process is too bureaucratic and complicated (Bashir & Mail, 2011). In addition, the dominating claims are mostly only in the field of motorbikes compared to claims for health (Oxford Business Group, 2016).

4. Conclusion

Indonesia has the highest growth in insurance companies compared to Malaysia and Brunei. Indonesia has the largest Muslim population globally, and there are rules for spin-off until 2024. In addition, Islamic Insurance in Indonesia has an average growth rate. The highest Islamic insurance assets are caused by being influenced by the amount of contribution of Islamic insurance assets, increasing every year. Malaysia has the highest average growth contribution due to increased product innovation and digital technology. Brunei Darussalam had the lowest average claims growth.

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Eğitim ve Suç İlişkisi: OECD Ülkelerinde Ortaöğretim Eğitim Harcamaları ve Hırsızlık Suçları Arasında Karşılaştırmalı Bir Değerlendirme¹

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The Relationship between Education and Crime: A Comparative Evaluation of Secondary Education Expenditures and Theft in OECD Countries²

Abstract

This study examines the relationship between education expenditures per student and theft crime. When evaluated in Turkey, the concept of crime has been limited to theft, which is among property crimes, due to the increase in the number of convicted persons in the last ten years. In the study, an evaluation was made for Turkey by using the education expenditures per student and the data of those convicted of theft crimes. In addition, the relationship between crime rates and education expenditures in OECD countries whose data can be accessed was analysed with the Spearman Rank Correlation Coefficient. As a result of the analysis, a negative and significant relationship was found between the selected two variables. It has been concluded that there is a negative and significant relationship between the annual expenditures per student at the secondary education level and the number of people convicted of theft in Turkey, which has both the lowest spending per student and a seriously high number of criminals.

Keywords : Education Service, Education Expenditure, Property Crimes, Robbery, Crime Rates.

JEL Classification Codes: I22, I28, H52.

Öz

Bu çalışmada, öğrenci başına yapılan eğitim harcamaları ile hırsızlık suçu ilişkisinin incelenmesi amaçlanmıştır. Türkiye özelinde değerlendirildiğinde son on yılda hüküm giymiş kişi sayısındaki artış nedeniyle suç kavramı, mülkiyet suçları arasında yer alan hırsızlık ile sınırlandırılmıştır. Çalışmada öğrenci başına yapılan eğitim harcamaları ve hırsızlık suçundan hüküm giyenlerin verilerinden yararlanılarak Türkiye için bir değerlendirme yapılmıştır. Ayrıca verilerine ulaşılabilen OECD ülkelerindeki suç oranları ile eğitim harcamaları arasındaki ilişki Spearman Sıra Korelasyon Katsayısı ile analiz edilmiştir. Analiz sonucunda seçmiş olduğumuz iki değişken arasında negatif ve anlamlı bir ilişki bulunmuştur. Hem öğrenci başına en düşük harcamaya hem de ciddi

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² This study has been adapted from the thesis titled "Impact of Educational Services on Crime Rate Reduction: An Analysis on Turkey" prepared by Ezgin Yavuz under the supervision of Prof.Dr. Nazan Susam and accepted at İstanbul University, Institute of Social Sciences, Public Economics Master's Program in 2018.

seviyede yüksek suçlu sayısına sahip olan Türkiye’de ortaöđretim seviyesinde öđrenci başına yapılan yıllık harcamalar ile hırsızlık suçundan hüküm giyen kişi sayısını arasında negatif ve anlamlı bir ilişki olduđu sonucuna ulaşılmıştır.

Anahtar Sözcükler : Eđitim Hizmeti, Eđitim Harcamaları, Mülkiyet Suçları, Hırsızlık, Suç Oranları.

1. Giriş

Suç, toplumların büyük ölçüde güvensizlik ve huzursuzluk sebebidir. Bireysel koruma önlemi alma amacıyla kaynak kullanılmasına, bireylerin yatırım yapmamasına ve zamanın daha verimli kullanılabileceđi bir alandan suça ayrılmasına neden olmaktadır (Glaeser, 1999). Ortaya çıkan suç eylemi toplumun tamamını etkilemekte ve toplum için ekonomik maliyetin yanında sosyal maliyet de yaratmaktadır. İşlenen suç sonucu oluşan maliyetler sadece toplumsal deđil, aynı zamanda bireyseldir. Hem şiddet içeren hem de şiddet içermeyen suçlar, birçok kişi için hayat kalitesinde düşüş yaratmaktadır. Bu nedenle suç sebebiyle oluşan maliyetleri (parasal ve parasal olmayan) incelemek önemlidir. Sağlık harcamaları, ücret kayıpları ya da suç korkusu ile suçu önlemek için yapılan harcamalar topluma parasal bir maliyet yüklerken; ekonomi içerisinde başka alanlarda kullanabilecek kaynakların tüketilmesine sebep olarak toplumu optimum refah seviyesinden uzaklaştırmaktadır. Bir suçun işlenmesi sonucu mağdur olan kişiler, yaşadıkları olaylar sonucunda refahlarında düşüş yaşarlar. Bireyler suçtan doğrudan etkilenmeseler bile toplumda sık sık suç işlenmesi güvensizliğe neden olur. Güvensizlik ve huzursuzluk bireylerin davranışlarını, aktivitelerini kısıtlayarak toplum refahını olumsuz yönde etkiler. Genel olarak suç olaylarında azalış, suç sonrasında uygulanacak cezalarla caydırıcılık kazandırılarak ya da suç meydana gelmeden önce engel olma yollarına başvurularak gerçekleştirilir. Bu bağlamda bireylerin ceza ile sonuçlanabilecek davranışlarının suç işlenmeden önce engellenmesinde eđitimin önemli bir unsur olabileceđi düşünülmektedir (Groot & Van den Brink, 2010: 279).

Eđitim, doğumdan ölüme kadar bireyin dili, ahlakı, düşünceyi, bilimi, sanatı, kültürü, toplum içinde öğrenmesidir. Bireyler doğdukları andan itibaren öğrenmeye başlarlar. Bu nedenle eđitim sadece okul içinde deđil; aile içinde, sokakta kısaca hayatın içinde sürekli olarak var olmaktadır. Eđitim; beşerî sermayeye katkı sağlanması, eşitsizlik-yoksulluđun azalması, sağlık alanında bilinçli bireylerin yetiştirilmesi, demokratikleşme-siyasal istikrar sağlanması ve suç oranlarının azalması gibi toplum refahını artıran pozitif dışsallıkları da bünyesinde barındırmaktadır. Dolayısıyla eđitim sadece hizmetten yararlananlara fayda sağlamakla kalmaz; toplum geneline de fayda sağlar. Yayıđı bu pozitif dışsallık nedeniyle eđitim, sadece piyasa tarafından deđil, devlet tarafından da sunulması gereken bir hizmet olarak konumlandırılır.

Eđitim hizmetleri konusunu, suç oranları üzerindeki etkisi bakımından sınırlandırdığımızda, devlet tarafından sunulan eđitim hizmetleri, potansiyel suçların gerçekleşmeden engellenmesinde önemli bir sosyal politika aracı olarak ele alınmaktadır.

Türkiye’de özellikle son yıllarda giderek artan suç oranları, eğitim hizmetlerinden beklenen çıktıların alınamadığını göstermektedir. Bu çalışmada, suç ile eğitim hizmetleri arasındaki ilişkinin incelenmesi amaçlanmıştır. Çalışma kapsamında ortaöğretim seviyesinde öğrenci başına yapılan eğitim harcamaları ile mülkiyet suçlarından biri olan hırsızlık arasındaki ilişki, değerlendirmeye alınan yıllarda verilerine ulaşılabilen OECD ülkeleri ile Türkiye’de karşılaştırmalı olarak incelenecek ve Spearman Sıra Korelasyon Katsayısı ile analiz edilecektir.

2. Eğitim Hizmetlerinin Sunumu ve Eğitimin Yarattığı Faydalar

Neoklasik iktisadi düşüncede piyasa mekanizması tarafından gerçekleştirilemeyen ve/veya eksik gerçekleştirilen hizmetler devlet tarafından yerine getirilir. Bunun arkasında yatan ana neden etkinlik ve adaletin sağlanmasıdır. Etkinlik ile piyasada etkin kaynak tahsisinin sağlanması ve pozitif dışsallıkların azamileştirilmesi istenirken, adalet ile vurgulanmak istenen ana düşünce sosyal adalettir. Eğitim hizmetlerinin de bu iki unsur ile hizmetin bireysel ve toplumsal etkileri göz önünde tutulduğunda özel sektör yanında kamu sektörü tarafından da sunulması uygun görülür.

Maliye literatüründe incelediğimiz eğitim hizmetleri dışlanabilirlik ve rekabet özelliklerine sahip olan özel bir maldır ve piyasa koşulları içinde kolaylıkla fiyatlandırılabilir. Ancak eğitimin hem bireye sağladığı içsel faydalar hem de topluma sağladığı dışsal faydalar nedeniyle bu hizmet karma bir mal/dışsal faydası olan mal olarak da tanımlanmaktadır. Örneğin; bir sınıfta öğrenci sayısının artması, o sınıftaki öğretim kalitesinin düşmesi sebebiyle rekabet özelliğini içinde barındırırken; özel okulların kabul edecekleri öğrencilere karar verme yetkisi de dışlanabilirlik özelliğinin var olduğunun kanıtıdır (Gruber, 2011: 292-294). Diğer yandan yaratılan pozitif dışsallıklar nedeniyle devletin bu alana müdahale etmesi, kaynak tahsisinde etkinlik sağlayarak toplum refahında artış ile sonuçlanmaktadır. Barındırdığı bu özellikler nedeniyle eğitim, özel sektör ve kamu sektörü tarafından bir arada sunulan yarı kamusal mal kategorisinde ele alınır.

Bu kapsamda eğitim hizmetinin özel ve kamu sektörü tarafından sunulmasındaki belirleyici faktör fayda kavramıdır. Eğitim hizmetlerine hem etkinlik hem de adalet açısından bakıldığında sağladığı kişisel faydaların yanı sıra bir toplumda ekonomik, sosyal ve siyasal niteliği olan dışsal faydalar oluşturduğu görülür. Pozitif dışsallıklar olarak tanımladığımız bu faydaların yaygınlaştırılması ise eğitim hizmetlerine verilen önem ve bu hizmetlerin kalitesiyle ilişkilidir.

Eğitim hizmetinin sağlamış olduğu faydalar, ekonomik ve dışsal (toplumsal) faydalar olarak dikkate alınabilir.

2.1. Eğitimin Ekonomik Faydaları

Eğitimin etki alanlarından biri ekonomidir. Makro ölçüde bakıldığında eğitim, ekonomik sistemin gereksinim duyduğu ihtiyaçları üretmesini sağlarken, mikro açıdan

bakıldıđında ise bireylerin mesleki geliřimini saęlayarak kiřisel kazançlarını etkilemektedir (Kurul-Tural, 2002: 3).

Makro Ekonomik Faydalar: Eđitim bir lkenin kalkınmasının itici gcdr ve bu baęlamda fakirlięin azaltılması, cinsiyet eřitsizliklerinin giderilmesi, saęlık kořullarının iyileřtirilmesi, barıř ve istikrarın saęlanması iin kullanılan en nemli aratır. Dnya Bankasının eđitim konusunda hazırladıęı pek ok raporda da eđitim, "kalkınma ve bymenin olmazsa olmazı" olarak gsterilmektedir (Hanushek & Wbmann, 2010). zellikle geliřmiř lkeler kalkınma ařamalarında nitelikli eđitim hizmetlerini kullanmıřlardır. Eđitimin retime ve verimlilięe verdięi destek kısa sre iinde milli gelirlerin de artmasını saęlamıřtır.

Eđitimin ekonomik byme zerindeki etkileri farklı ynlerden deęerlendirilebilir. Birinci olarak eđitim, iřgc ierisindeki beřer sermayeyi artırmakta, neticede retim artmaktadır. İkinci olarak eđitim, ekonominin yeniliklere aık olmasını, teknolojik rnler ve sreler ile ilgili yeni bilgilerin uyarlanması saęlamaktadır. Son olarak eđitim, bilginin yayılmasını saęlayarak bařka blgelerdeki kiřilerin de yeni teknolojileri kullanmalarına olanak tanımaktadır (Hanushek & Wbmann, 2010: 245).

Bu kapsamda Theodore W. Schultz, genel anlamıyla bir toplumun sahip olduęu nitelikli iřgc olarak tanımlanan beřer sermaye kavramını eđitim ve saęlık hizmetleri aısından deęerlendirmiřtir. Schultz'a gre dinamik ve byyen bir ekonomi iin temel gereksinim insanlara yatırım yapmaktır. Bireylerin yeteneklerinin geliřmesini saęlayan temel hizmetlerin eđitim ve saęlık hizmetleri olduęunu kabul etmekte, saęlıklı ve eđitilmiş bireylerden oluřan toplumların retken olacaęını savunmaktadır (Schultz, 1961). Schultz, eđitim kurumlarını sanayiye benzeterek, eđitime yapılan harcamaların bireylerin artan verimlilik ve kazançları arasında bir yatırım olduęunu kabul etmektedir. Eđitim aracılıęıyla sunulan bilgi ile teknoloji yaratma ve teknolojiden faydalanma, bunun retim srecine katkısı ve sosyal etkileri bir sermaye eřidi olarak eđitimin nemini gstermektedir (Schultz (1971)'dan aktaran ztrk, 2005: 29-30).

Beřer sermaye ve fiziki sermayenin ortak noktası řimdi gerekleřebilecek tketimin, ileri bir zamanda verimlilięi ve tketimi artırmak iin, ertelenmesini gerektirmektedir. Fiziksel yatırım řu anda tketime aık olan kaynakların yeni bir malın retimine ayrılmasına neden olmaktadır. Dięer yandan beřer sermaye yatırımları da benzer bir zellik tařımaktadır. Nfusun alıřabilecek yařta olan bir kesimi gelecek zamanda emek verimlilięini artırma gayesi ile emek gcnden alınıp, retim yapmak yerine okullara gnderilmektedir (Storesletten & Zilibotti, 2000: 43). Beřer ile fiziksel sermaye karřılařtırıldıęında, beřer sermayenin daha yksek oranda olması en az iki sebeple daha yksek ekonomik byme meydana getirmektedir. Bunlardan ilki, yksek beřer sermayeye sahip olmak, geliřmiř seviyedeki lkelerden ileri teknolojilerin benimsenip lkeye katılmasına olanak tanımaktadır. İkinci olarak fiziksel sermayeye kıyasla yksek beřer sermaye oranına sahip bir lke, savař gibi bir řok durumu sonrasında, daha hızlı byyp toparlanabilmektedir (Barro, 2002: 17). Beřer sermaye teorisini odak noktası alan isel

büyüme teorisyenleri, fiziksel sermaye ve doğal kaynakları pasif üretim faktörleri olarak kabul ederler. Pasif üretim faktörlerini aktifleştiren, yani fiziksel sermayenin yaratılmasını ve günlük yaşamda kullanılmasını; ayrıca doğal kaynakların verimli bir şekilde değerlendirilmesini sağlayan ise beşerî sermayeyi oluşturan bireydir (Afşar, 2009: 86).

Mikro Ekonomik Faydalar: Beşerî sermaye teorisine göre eğitim, kişilerin iş bulma ihtimalini yükselterek yaşam boyu gelirlerine olumlu etki eder. Dolayısıyla emek piyasasında işsizlik seviyesini aşağı doğru çeken önemli bir faktördür (Çalışkan vd., 2013: 33). Yüksek eğitim seviyesi iş bulma imkanını artırmasının yanında bireysel gelirleri de pozitif etkilemektedir (Michaelowa, 2000: 3-5; Angrist & Keueger, 1991: 981). Gelişmiş kapitalist ekonomilerde bireysel gelirler üzerine yapılan çalışmalar, fazladan bir yıl eğitim almanın gelirleri %5 ile %10 arasında artırdığını vurgulamaktadır (Dowrick, 2002). Toplumdaki bireylere uygun eğitim koşulları sağlandığında, kişilere verilen bilgi ve beceriye bağlı olarak, işgücünün verimliliği ve gelir düzeyi önemli ölçüde artacaktır. Bu ise ekonomide yoksulluğun azalması ve gelir dağılımında yaşanan eşitsizliklerin önlenmesi olarak sonuç verecektir.

2.2. Eğitimin Dışsal (Toplumsal) Faydaları

Beşerî sermayeye yapılan yatırımlar mikro seviyede kişi, aile ve firmaları etkilerken; makro ölçüde topluma yayılmaktadır. Eğitimin yarattığı bu dışsal etkileri eşitsizlik ve yoksulluk, sağlık, gelir ve kazançlar, siyasal istikrar ve suç kavramları ile ilişkilendirerek açıklamak mümkündür.

Eşitsizlik ve Yoksulluk: Eğitim ve eşitsizlik arasındaki ilişki, eğitim hizmetlerinden kimin nasıl faydalandığı ile ilgili bir durumdur. Eşitsizliklerin görüldüğü bir toplumda düşük gelirli kesim kaliteli eğitime erişemez iken yüksek gelirli kesim erişebilmektedir. Bu durum döngüsel bir hale gelerek (Tilak, 2002: 198) çocukların yaşamları boyunca ailelerinin bulunduğu ekonomik sınıfta kalmalarına neden olmaktadır. Böylece eğitimin özel mal olduğu, talebinin gelir ile doğru orantılı arttığı ve özel olarak finanse edildiği bir dünyada yüksek gelirli ailelerin çocukları düşük gelirliyle göre daha avantajlı hale gelecek ve düşük gelirli ebeveyne sahip çocuklar gelecek dönemde de düşük gelir grubunda kalmaya mahkûm olacaktır (Mutluer, vd., 2013: 98-100; Ladd, 2012: 204). Bu kısır bir döngü haline geldiğinde ise ekonomi, düşük eğitimli bireylerden oluşan bir yoksulluk tuzağına sıkışacaktır (Storesletten & Zilibotti, 2000: 48).

Eşitsizliğin boyutu da önemli bir noktadır. Gelir ve servet dağılımı arasındaki eşitsizliğin azaltılması, yüksek eşitsizlik seviyesinin görüldüğü bir ülkede sosyal bütünlük ve huzurun sağlanmasında etkilidir. Yüksek oranda görülen eşitsizlikler sosyal olarak bölücü etki oluşturabilir. Düşük gelirli kesimi suça yönlendirebileceği gibi, kaynakların verimsiz kullanılmasına neden olarak ekonomik büyümeye zarar verebilir. Gylfason ve Zoega çalışmalarında 1965-1998 yılları arasında eşitsizlik, eğitim ve ekonomik büyüme ilişkisini, gelişmiş ve gelişmekte olan ülkeleri içeren 87 örnek üzerinden araştırmışlardır. Bulgularına

göre, eğitimin beşerî sermayeyi artırıp geliştirme etkisinin yanında eşitsizliği azaltarak da ekonomik büyümeye katkı sağladığı gözlenmiştir (Gylfason & Zoega, 2003: 1-9).

Konuyu adalet açısından değerlendirdiğimizde ise bir toplumda sosyal adaletin varlığı fırsat eşitliği ile mümkündür. Fırsat eşitliğinin varlığı, adaletli bir gelir dağılımını olanaklı hale getirebilir. Eğitim harcamaları ile gelir dağılımında adaleti sağlama imkânı nedeni ile fırsat eşitliğinin temelini kurmaktadır. Çünkü eğitime yapılan harcamalar toplumda beşerî sermaye birikimini tetikleyerek sosyal hareketliliği mümkün kılar. Gelir eşitsizliğine bağlı bir eğitim eşitsizliği söz konusu ise eğitim piyasaya bırakıldığında düşük sosyoekonomik seviyede olan bazı gruplar eğitim sisteminden yeterince faydalanamayacak ve okuma çağında olup ailesinin yeterli geliri olmayanlar eğitim fırsatına kavuşamayacaklardır. Bunun bir uzantısı olarak bu grupta yer alan bireylerin daha üst tabakalara erişmesi zorlaşacaktır (Dinçer & Uysal-Kolaşın, 2009: 3).

Eğitim hizmetinin sunumunun devlet tarafından yapılmasının, özellikle temel eğitimin zorunlu kılınmasının önemli nedenlerinden biri, gelir dağılımındaki eşitsizliğin eğitim eşitsizliğine dönüşmesini engellemektir (Bulutoğlu, 1997: 303-307). Çünkü eğitim hizmetinin devlet tarafından sunulmadığı bir dünyada, çocuklarının eğitim ihtiyaçlarını karşılamak için ebeveynlerin yeterli maddî imkana sahip olması gerekmektedir. Bahsedilen dünyada, gelir düzeyi düşük olan bir ailenin çocuğuna eğitim hizmeti sağlaması oldukça güçtür. Ailenin maliyeti karşılayamaması, çocuğun ve toplumun temel eğitim hizmetinden faydalanamaması ile sonuçlanmaktadır (Gruber, 2011: 292-294).

Eğitim eşitliğinin gerekliliğine bağlanan bu düşünceler, devletin eğitim hizmetlerinin sunumunda rol alması gerektiği konusunda hemen hemen evrensel bir görüş birliği oluşturmuştur. Bu noktada devletin üstlenmesi gereken en önemli görev ise kamusal eğitime eşit erişimi sağlayarak, eğitim üzerinden toplumsal statünün yeniden dağıtılması ve toplumsal eşitsizliklerin engellenerek gelecek nesillere aktarılmasının önüne geçilmesidir (Candaş, 2010: 108).

Sağlık: Yapılan pek çok araştırmada eğitim seviyesi ile sağlık arasında anlamlı bir ilişki olduğu tespit edilmiştir. Eğitim, sağlık hizmeti ihtiyacını, buna bağlı maliyetleri, kazanç kayıplarını ve insan ıstırabını azalttığı için, bireylerin sağlığını ve refahını artırmada önemli bir mekanizmadır. Aynı zamanda insan gelişimini, insan ilişkilerini ve kişisel, aile ve toplum refahını destekleyerek sağlıklı yaşam tarzlarını ve olumlu seçimleri teşvik edip sürdürmeye yardımcı olur (Feinstein vd., 2006: 173). İyi eğitilmiş insanlarda düşük eğitim seviyesine sahip kişilere göre daha az hastalık, ölüm, sakatlık oranlarının görüldüğü ve bu kişilerin fiziksel sağlıklarına dair verilerin çok daha pozitif olduğu görülmektedir. Öte yandan bazı çalışmalar, düşük eğitim seviyesi ile bulaşıcı hastalık, kronik hastalık, kötü sağlık durumu, daha kısa hayatta kalma ve daha kısa yaşam beklentisinin ilişkili olduğunu da göstermektedir (Feldman vd., 1989: 923-924; Gutzwiller vd., 1989: 456; Liu vd., 1982: 1312-1313). Örnek olarak ortaöğretim içinde geçirilen zaman arttıkça olası bir hastalığa karşı farkındalık, hastalık görülmekte ise tedavi süreçleri ile ilgili yüksek miktarda bilgiye

erişim kapasitesi, güvenli işlere ve son olarak daha sağlıklı yaşam biçimlerine yönelim artmaktadır.

OECD verilerine göre, annelerin eğitim seviyeleri yükseldikçe çocuklarının sağlıkları ile ilgili daha fazla bilgi sahibi oldukları görülmektedir. Özellikle ortaöğretim ve daha yüksek seviyede eğitim almış anneler çocuk sağlığı ile ilgili kitap okumakta, sterilize olmak hakkında daha doğru bilgilere sahip olmakta, aşılar ve beslenme gibi konularda daha dikkatli olmaktadır. Yoksul OECD ülkeleri ve Sahra-altı Afrika ülkelerinde kadınların eğitime erişimi yükseldikçe yeni doğan ölümlerinde azalma ve yaşam süresinin uzamasıyla eğitimin sağlık üzerindeki olumlu etkisi çok daha çarpıcı hale gelmektedir (McMahon, 2000: 10-14).

Siyasal İstikrar: Eğitim; diğergamlığa, yardımseverliğe, sivil sorumluluk duygusuna ve sosyal bilince yol açarak (Tilak, 2002: 197), kişilerin siyasete olan ilgisini ve katılımını artırdığından, eğitilmiş insanların politik süreçlerde yer alma olasılığını yükseltir (Weakliem, 2002: 142). Özellikle ortaöğretim ve sonrasında sunulan eğitim hizmetinden faydalanan bireylerin farkındalıklarının arttığı ve siyasi süreçlerde yer aldıkları gözlemlenmektedir. Eğitim hizmetinden uzun süre faydalanan toplumlarda siyasi karışıklık daha az ortaya çıkmakta ve bu durum siyasi istikrarı beraberinde getirmektedir. Siyasal istikrar ise özellikle başka ülkelerden gelecek olan yatırımlara güven vermektedir. Siyasal istikrarın bulunduğu ülkelerde, demokratikleşmenin yatırımlar üstünde olumlu etkisi gözlenmekte ve bu durum hem toplumsal huzuru hem de ekonomik büyümeyi pozitif etkilemektedir (McMahon, 2000: 15-16).

Eğitim hizmetlerinin kalitesinin artması ya da eğitimde geçirilen sürenin uzamasının faydaları daha da artırılabilir. Eğitim, tüm toplum için çevresel kaliteyi artıran bireysel davranışları teşvik edebilir (Smith, 1997: 175). Bir başka fayda ise kadınların güçlendirilmesidir. Daha fazla eğitim ile kadınlar istihdam fırsatlarına daha fazla erişebilir ve kendi ekonomik kaynaklarını güvence altına alma becerisini artırabilir (Schendel vd., 2014: 7; Sundaram vd., 2014: 83). Eğitilmiş bir kişinin artan gelir ve verimliliği sadece kendisinin değil, çalışma arkadaşları gibi üçüncü şahıslar üzerinde dışsal etki yaratmakta ve onların da gelir ve verimliliğini artırmaktadır. Bu durum eğitimin bireysel kazançlar üzerinde doğrudan etki göstermesi gibi üçüncü şahısların kazançlarını da dolaylı yollardan etkilemesine neden olmaktadır (Michaelowa, 2000: 9-13).

Eğitim hizmetinin hem bireysel hem de toplumsal açıdan sunduğu faydalar, ekonomik ve sosyal alanları olumlu etkileyerek, büyüme ve kalkınmayı sağlamakta; bireylerin yaşam standardını yükseltmektedir. Topluma yayılan dışsal faydalar eğitim hizmetinin sunumunda devlet müdahalesini vazgeçilmez kılmaktadır. Eğitim hizmetine yeterli önem verilmediği takdirde toplum çeşitli sosyal maliyetlerle karşılaşmaktadır. Bu sosyal maliyetleri yaratan bir unsur da suçtur.

3. Suç Oranlarının Azaltılmasında Eğitimin Rolü

Suç kavramını tanımlamada farklı yaklaşımlar olmakla birlikte genel olarak suç, toplumun kabul ettiği sosyal kuralların bireyler tarafından ihlal edilmesidir. Suç, geleneksel norm ve değerler sisteminin dışında gerçekleşen bir eylem olması ve ona karşı yıkıcı bir nitelik taşıması nedeniyle toplumsal yapıya yönelmiş bulunan başlıca tehditlerden birisidir (Topses, 2013: 703). Suçun sebep olduğu ciddi seviyedeki sosyal maliyetler kıt kaynakların etkinlikten uzak kullanımına neden olmaktadır (Besci, 1999: 38).

Suçta birebir maruz kalan bireylerin yüklediği maliyetler hayat kaybı, mal kaybı, hayat kalitesindeki düşüş, çalışılmayan günler nedeniyle ücret/kazanç kaybı, eğitime devam edilememesi durumunda eğitimin faydalarından yararlanılamaması (kariyer kaybı, vb.) ile bunun sonucunda oluşacak gelir kaybı, sigorta tarafından geri ödeme yapılmaması nedeniyle yaşanan kayıplar ve karşılanmayan sağlık hizmetleri ile mağdur ailelerinin yaşadıkları kayıplar olarak sıralanabilir (Cohen, 2000: 274).

Suçun, topluma yansıyan maliyetleri ise doğrudan ve dolaylı olarak gruplanmaktadır. Dolaylı maliyetler yasal iş alanlarına yeterince yatırım yapılamaması, iş verimliliği ile beşeri ve sosyal sermayede düşüş, iş gücüne katılımında azalma gibi unsurları kapsarken; doğrudan maliyetler ise güvenlik güçlerine yapılan harcamalar, mahkeme ve hapisane harcamaları, eğitim ve sağlık harcamalarından oluşmaktadır (Fajnzylber vd., 2000: 222). Doğrudan maliyetler aynı zamanda vergiler aracılığı ile finanse edildiği için toplumsal maliyetlerin daha da artmasına sebep olmaktadır.

Bu çerçevede, suç eylemi toplumun tamamını etkilemekte ve toplum için sosyal maliyetin yanında önemli bir ekonomik maliyete de sebep olmaktadır. McCollister vd. tarafından yapılan bir çalışmada, 2007 yılında ABD'nde 23 milyondan fazla suç işlendiği ve bu suçların mağdurlar açısından 15 milyar dolar; polis koruması, yargı ve kanun ile ceza infaz kurumları gibi alanlara yapılan kamu harcamaları açısından ise 179 milyar dolar gibi ciddi rakamlarda ekonomik kayba neden olduğu sonucuna ulaşılmıştır. Bireysel ve ulusal seviyelerde ekonomik kayıp göz önüne alındığında doğrudan ya da dolaylı politikalar azımsanmayacak ekonomik ve sosyal fayda yaratabilirler (McCollister vd., 2010: 1-2). Suçun yarattığı tüm maliyetler ekonomi içerisinde başka alanlarda kullanılacak kaynakların tüketilmesine sebep olarak, toplumu optimum refah seviyesinden uzaklaştırmaktadır.

Suçun yarattığı toplumsal ve bireysel maliyetlerin azaltılmasında suça uygulanacak cezaların caydırıcılık niteliği, suçun işlenmesine engel olabilir (Groot & Van den Brink, 2010: 279). Sosyal sermaye ve eğitim ise suç eyleminin gerçekleşmeden önlenmesinde etkili araçlardır. Toplum içinde geliştirilen ilişkilerin gücüne dayanan sosyal sermaye, yokluğunda gerçekleştirilmesi mümkün olmayacak belirli amaçların hayata geçirilmesini sağlar. Sosyal sermayenin içinde barındırdığı dayanışma ve güven sadece belirli eylemleri kolaylaştırmakla kalmaz, suç gibi kimi eylemleri de kısıtlar (Coleman, 1988: 98, 105). İçinde yaşanan sosyal çevre tarafından onaylanmayacağı ve yaptırımlara maruz

kalınacağıının bilinmesi, suç gibi olumsuz bir eylemin gerçekleşmesine engel olabilmektedir (Altun & İsmail, 2011: 118).

Yapılan teorik ve istatistiki çalışmalar, bu araştırmanın da esas konusu olan eğitimin suç oranları üzerinde önemli bir etkiye sahip olduğunu göstermektedir. Fella ve Gallipoli (2014)'in yaptıkları teorik çalışmada, lise mezuniyetlerinin teşvik edilmesinin refah seviyesini artırdığı ve suç oranlarını azalttığını öne sürmüşlerdir. Benzer şekilde Lochner tarafından 2007 yılında yapılan çalışmada, eğitimin sağladığı fırsatlardaki artışın, suç oranlarını düşüreceği ele alınmıştır. Lochner'e göre, özellikle eğitimin bireylerin ücret haddini artırması, suç işlemenin maliyetini de yükseltmektedir. Yüksek ücretler suçun fırsat maliyetini iki açıdan etkiler. Birincisi suç işlemek için bireyler zamana ihtiyaç duymaktadır. Fakat eğitim seviyesi yüksek bireyler zamanlarını çalışmak gibi üretici amaçlarla kullanırlar. İkincisi ise suç işleme sonucunda ceza alma/cezaevine girme olasılığının piyasa fırsatları ve ücretlerinin yanında daha maliyetli olmasıdır (Lochner, 2007: 2).

Suç ekonomisi üzerine yapılan çalışmaların çoğunda, suç ile çalışma arasında bir tercihte bulunulduğuna dikkat çekilmiştir. Fayda maliyet karşılaştırması yapmak, suç işleyip işlememe kararında etkili olur. Emek piyasası, suç işleme tercihini maliyet açısından etkilemektedir. Çünkü emek piyasasında yüksek gelir elde eden bir bireyin suç işleme yatkınlığı daha düşük olacaktır. Zamanlarının daha değerli olması, risk alma isteği az olan bireyler için suç işlemenin fırsat maliyetini daha yüksek hale getirmektedir. Bu yüzden eğitim hizmeti, iş bulma imkanını artırmakta ve dolaylı olarak suç işleme olasılığını düşürmektedir (Freeman, 1982: 4).

Beşerî sermaye çalışmadan elde edilen marjinal getiriyi suçtan daha fazla artırıyorsa, beşerî sermayeye yapılan yatırım ve eğitim suçu azaltmalıdır. Bu nedenle, eğitime (veya eğitimin verimliliğine) yönelik politikalar, yetişkinler arasındaki çoğu sokak suçunu azaltabilir. Ancak bu durum, eğitimin her zaman suçları azaltacağı anlamına gelmez. Zira zimmete para geçirme, dolandırıcılık gibi bir takım beyaz yakalı suç türleri eğitimle doğru orantılı şekilde artabilir (Lochner, 2020: 109). Groot ve Van den Brink (2010) tarafından suç dağılımları ve suçluların eğitim seviyelerinin incelendiği bir çalışmada, basit suçlar (toplu taşımada ücretin ödenmemesi, dükkânda fiyat değiştirme, vb.) daha çok yüksek eğitilmiş kişilerce işlenirken; tehdit, yaralama, hırsızlık (ev, araba hırsızlığı, vb.) gibi daha ciddi suçları işleyen bireylerin eğitim seviyesinin düşük olduğu sonucuna ulaşılmıştır (Groot & Van den Brink, 2010: 281).

Buonanno ve Leonida'nın 1980-1995 tarihleri arasında İtalya'nın 20 bölgesinde yaptıkları eğitim ve suç ilişkisini inceleyen çalışmalarında, ortalama okullaşma süresindeki artışın suç oranlarını azalttığı sonucuna ulaşılmıştır. Ayrıca 2001 yılında İtalya'daki mahkûmların yüzde 75'inin liseyi tamamlayamamış olması bu bulguları destekler niteliktedir (Buonanno & Leonida, 2006). Lochner ve Moretti (2004) beyaz ve siyahi Amerikalılar için ortaöğretim eğitiminin suç oranlarına etkisini inceledikleri çalışmada, beyaz Amerikalılar için ortaöğretim eğitiminin cezaevine girme ihtimalini %0,76 azalttığı, siyahi Amerikalılar içinse bu oranın %3,4'e çıktığı sonucuna ulaşmışlardır. Çalışmaya göre,

ortaöğretim mezunu olmanın en çok etkilediği suç grubu ise cinayet, yaralama ve araç hırsızlığıdır (Lochner & Moretti, 2004). Lochner'in ulaştığı bir diğer sonuç ise mülkiyet ve şiddet suçlarında eğitimin negatif etkisinin olduğudur. Buna göre eğitim seviyesi arttıkça mülkiyet ve şiddet suçları azalmaktadır (Lochner, 2004). Machin vd. ise 1972-73 döneminde İngiltere ve Galler'de minimum okullaşma yaşındaki bir yıllık artıştan yola çıkarak okul eğitiminin mülkiyet ve şiddet suçları üzerindeki etkilerini araştırmışlardır. Çalışmada erkekler arasında ortalama okullaşma düzeylerindeki bir yıllık artışın, mülk suçları için mahkûmiyet oranlarını %0,26-0,30 oranında azalttığı sonucuna ulaşılmıştır (Machin vd., 2011: 474).

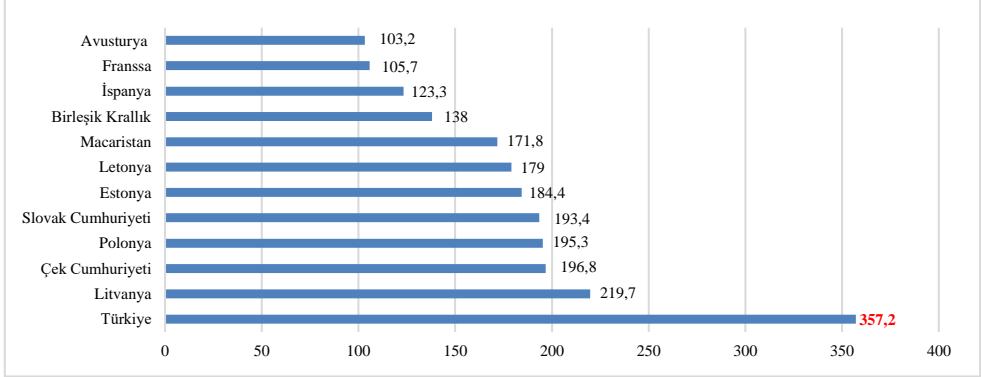
Ayrıca eğitim, okulda geçirilen zaman açısından da suç oranlarını etkilemektedir. Tauchen ve Witte (1994)'nin çalışmasına göre okulda geçirilen zaman, suç ile ilişkili davranışlar sergileme ihtimalini düşürmektedir. Okulda geçireceği zamanı sokakta geçiren bir çocuğun suç ile tanışma olasılığı daha yüksektir (Tauchen & Witte, 1994). Sonuçta eğitim kazanç sağlayacak beceriler öğretmek dışında, bireylerin suça yönelmesine engel olabilir. Ayrıca, bireylerin toplum değerlerini tanımasını sağlayıp çalışma ve dürüstlüğü teşvik ederek topluma pozitif dışsallık yayılmasını sağlar (Usher, 1997).

4. OECD Ülkelerinde Suç ve Eğitim Harcamaları İlişkisi

Çalışmanın bu kısmında suç ve eğitim ilişkisi devlet tarafından sunulan eğitim hizmetlerinin niceliği bağlamında incelenecek ve eğitim hizmetlerine yapılan harcamalar dikkate alınacaktır. Bu kapsamda Türkiye'nin de içinde bulunduğu, belirli bir yıl aralığında verilerine ulaşılabilen OECD ülkelerindeki suç oranları ile öğrenci başına yapılan eğitim harcamaları arasındaki ilişki değerlendirilecektir. Bu kısımda öncelikli olarak verilerine ulaşılabilen OECD ülkelerindeki suç oranları değerlendirilecek, daha sonra da bu ülkelerdeki ilgili eğitim harcamaları ile suç oranları arasındaki ilişki ortaya çıkarılmaya çalışılacaktır.

Tüm suç türlerinde ortalama olarak her 100.000 kişiye düşen hükümlü sayısının yüksek olduğu ülkeler sırasıyla Grafik 1'de gösterilmiştir. Bu sıralamaya göre 100.000 kişi içinde 357 kişi ile en çok hükümlü sayısına sahip ülke Türkiye'dir. Türkiye'den sonra en yüksek sayıya sahip ülkeler sırasıyla Litvanya, Çek Cumhuriyeti, Polonya ve Slovak Cumhuriyeti'dir. Bu ülkelerde de hükümlü sayısı yüksek olmakla birlikte Türkiye ile karşılaştırıldığında oldukça azdır. Bu durum Türkiye'deki sayının ciddiyetini daha net bir şekilde ortaya koymaktadır.

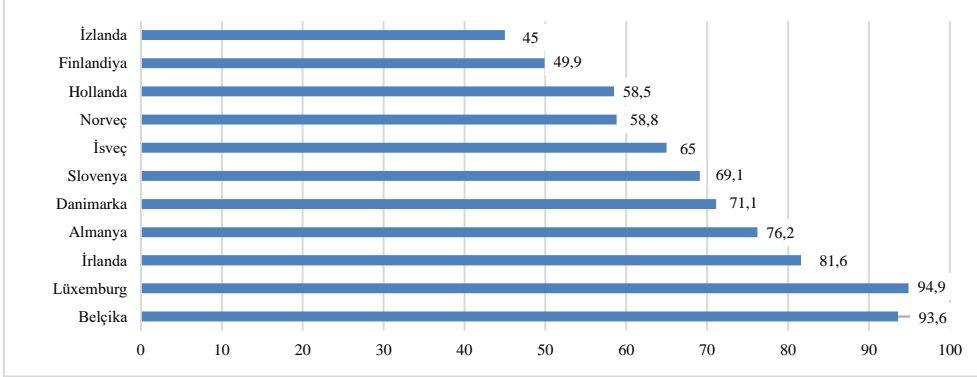
Grafik: 1
OECD Ülkeleri Arasında Her 100.000 Kişi İçinde Hükümlü Sayısı Yüksek Ülkeler (2020)



Kaynak: Council of Europe Annual Penal Statistics, Space I 2020, <https://wp.unil.ch/space/files/2021/04/210330_FinalReport_SPACE_I_2020.pdf>, 11.05.2021.

Grafik 2 ise OECD içinde 100.000 nüfusa oranla hükümlü sayılarının düşük olduğu ülkeleri vermektedir. Yapılan sıralamaya göre her 100.000 kişi içinde 45 hükümlü ile en düşük ülke İzlanda'dır. İzlanda'yı sırasıyla Finlandiya, Hollanda ve Norveç takip etmektedir. Grafik 1 ve Grafik 2 karşılaştırıldığında Türkiye'deki hükümlü sayısının yüksekliği daha da dikkat çekici hale gelmektedir. Her 100.000 kişi içinde Türkiye'deki hükümlü sayısı Grafik 2'deki ülkelerin sayısının yaklaşık olarak 4 ile 8 katı arasında değişmektedir. Hükümlü sayılarındaki bu farklılık ülkelerin eğitim harcamalarının yanı sıra farklı tarihi, siyasi, sosyoekonomik yapılarından kaynaklanabilir. Örnek olarak Liu vd. (2013) 32 Meksika eyaletinde sosyoekonomik ve demografik faktörlerin ulusal ölçekteki göstergeleri ile suç oranları arasındaki ilişkiyi araştırmış ve ekonomik büyüme, ücretler ile işsizliğin suç oranlarını olumsuz etkilediğini tespit etmiştir (Liu vd., 2013: 689). Buradan yola çıkarak Grafik 1'deki son iki ülke ile Grafik 2'deki ilk iki ülkede kişilerin yıllık ortalama gelirine bakıldığında Türkiye'de 18.302\$ ve Litvanya'da 21.660\$ iken bu rakamın İzlanda'da 61.787\$ ve Finlandiya'da 42.964\$ olduğu görülmektedir (OECD-Better Life Index, 2020).

Grafik: 2
OECD Ülkeleri Arasında Her 100.000 Kişi İçinde Hükümlü Sayısı Düşük Ülkeler (2020)



Kaynak: Council of Europe Annual Penal Statistics, Space I 2020, <https://wp.unil.ch/space/files/2021/04/210330_FinalReport_SPACE_I_2020.pdf>, 11.05.2021.

Verilerine ulaşılabilen OECD ülkelerinin son 10 yılda cezaevindeki nüfus değişimine bakıldığında ise 26 ülke³ arasındaki 19 ülkede cezaevi nüfusunun son 10 yıl içinde düştüğü sonucuna ulaşılmaktadır. Cezaevi nüfusunda azalma görülen bu 19 ülke arasında en yüksek değişim % -44 ile Letonya'da gerçekleşmiştir. 26 ülke içinde geriye kalan 7 ülke arasında ise son 10 yılda cezaevi nüfusunda en keskin artış yaşanan ülke % 115,3 ile Türkiye olmuştur. Türkiye'de görülen bu artış yine verilen ülkeler arasında en yüksek seviyededir (Bkz. Tablo 1).

Tablo: 1
OECD Cezaevi Nüfus Değişimi (2010-2020)

Ülkeler	Hükümlü Sayısı (% Değişim)	Ülkeler	Hükümlü Sayısı (% Değişim)
Almanya	-12,9	İsviçre	1,1
Avusturya	-2,2	İtalya	-12,4
Belçika	-10,9	İzlanda	-13,3
Birleşik Kr. (İng+Galler)	-9,9	Letonya	-44
Birleşik Kr. (Kuzey İrlanda)	1	Litvanya	-22,3
Birleşik Kr. (İskoçya)	-2,5	Lüksemburg	-31
Çek Cumhuriyeti	-6,2	Macaristan	4,5
Danimarka	-0,2	Norveç	-21,4
Estonya	-29,2	Polonya	-8
Finlandiya	-19,5	Portekiz	13,1
Fransa	1,7	Slovak Cumhuriyeti	3,5
Hollanda	-17,4	Slovenya	4,8
İrlanda	-14,7	Türkiye	115,3
İspanya	-24,4	Yunanistan	0,2
İsveç	-12,3		

Kaynak: Council of Europe Annual Penal Statistics, Space I 2020, <https://wp.unil.ch/space/files/2021/04/210330_FinalReport_SPACE_I_2020.pdf>, 11.05.2021.

³ Birleşik Krallık tek bir ülke olarak değerlendirilmiştir.

Toplum dinamikleri ile ilişkili olarak bir ülkede işlenen suç türlerinin ağırlıkları da farklı olmaktadır. Türkiye'nin de içinde bulunduğu ve verilerine ulaşılabilen 22 OECD ülkesinden 18'inde ağırlıklı olarak görülen suçlar; cinayet, cinayete teşebbüs, yaralama, tecavüz suçlarını içinde barındıran şiddet suçları ve hırsızlık, gasp gibi mala karşı işlenen mülkiyet suçlarıdır (Yorulmaz & Giray-Yakut, 2017: 308).

Avrupa Konseyi ve Lozan Üniversitesi'nin araştırmalarında yer alan Türkiye verilerine göre, Türkiye'de 250.594 mahkûm içinde şiddet ve mülkiyet suçu nedeniyle ceza alanların toplam sayısı 184.936'dır. Bu sayı Türkiye'deki mahkûmların yaklaşık olarak %74'ünün şiddet ve mülkiyet suçlarından birini işlediğini göstermektedir. Yine bu çalışmaya göre değerlendirilen ülkelerde tüm suç türlerinden hükümlülerin 30-40 yaş aralığında olduğu görülmektedir (Council of Europe Annual Penal Statistics, 2020). Türkiye özelinde şiddet ve mülkiyet suçlarından hüküm giymiş kişilerin 2010-2019 yılları arasında yaş dağılımlarına baktığımızda 18-24 ile 25-34 yaş aralıkları ön plana çıkmaktadır. İncelenen yıllarda hırsızlık ve gasp suçlarından hüküm giyenlerin ağırlıklı olarak 18-24 yaş aralığında; öldürme ve yaralama suçlarından hüküm giyenlerin ise ağırlıklı olarak 25-34 yaş aralığında olduğu gözlenmiştir. Cinsel suçlardan hüküm giyenlerin sayısı ise her iki yaş aralığında birbirlerine yakındır (TÜİK, 2020a).

Şiddet ve mülkiyet suçlarının zarar gören kişideki, maddi ve manevi/fiziksel ve psikolojik etkinin dışında, bir önemli etki de ülkede oluşturduğu ekonomik maliyettir. Suçun devlete maliyetinin özünde tüm topluma sebep olduğu maliyet yatmaktadır. Bunun sebebi devlet için ortaya çıkan maliyetlerin, o çatı altında yaşayan toplumun vergileri ile giderilmesidir. Suç oranlarında görülen artış güvenlik ortamını sağlamak amacıyla devletin iç güvenlik hizmetlerini artırarak polis/zabıta/bekçi vb. güvenlik personel harcamalarının; yargılanma ve tutuklanma oranlarını artırarak adalet harcamalarının; suçların tekrar etmesini önleme ve topluma geri kazandırma adına eğitim, sağlık gibi alanlarda yapılan harcamaların yükselmesine neden olmaktadır. Ortaya çıkan harcamaların esas olarak toplumdan sağlanan vergiler aracılığı ile karşılandığı düşünüldüğünde, bu durum vergilerin daha etkin kullanılabileceği alanlara aktarılmasına da engel olacaktır (Cohen, 2000: 275).

Suçların ekonomik maliyetlerini araştıran çalışmalarda da dikkate değer sonuçlar ortaya çıktığı görülmektedir. Örneğin Kopenhag Konsensüs Merkezi tarafından 2014 yılında şiddet ve çatışma üzerine yapılan bir çalışmada şiddet (toplumdaki, ailedeki, özel ilişkideki), çocuklara kötü muamele, cinsel istismarı içeren şiddet suçlarının maliyeti dünya çapında gayri safi yurt içi hasılanın yaklaşık olarak %11'ini oluşturmaktadır (Hoeffler & Fearon, 2014). Lochner ve Moretti, 2004 yılında yaptıkları çalışmada ABD'de ortaöğretimden mezun olma oranının %1 artmasının, suçtan kaynaklanan maliyetlerin yılda 1,4 milyar dolar azaltacağını ve dolayısıyla maddi kazanç sağlanacağını hesaplamışlardır (Lochner & Moretti, 2004: 31).

5. Değerlendirme ve Analiz

5.1. Değerlendirme Kriterleri

Şiddet ve mülkiyet suçlarının ortaya çıkmasında tek etkili nedenin sunulan eğitim hizmetlerinin yetersizliği ya da kalitesizliği olmadığı kabul edilmekle birlikte, şiddet ve mülkiyet suçlarının yarattığı olumsuz sonuçların hiç doğmadan önlenmesinde eğitim hizmetlerinin önemli bir araç olarak değerlendirilmesi gerekliliği yapılan pek çok ampirik çalışma ile desteklenmiştir.

Bu çalışmanın analiz kısmında eğitim hizmetlerine yapılan harcamalar ile hükümlü sayıları arasındaki ilişki, ulaşılabilen ülke verileri ile karşılaştırmalı olarak değerlendirilecek ve Spearman Sıra Korelasyon katsayı değerleri yorumlanacaktır. Modelde eğitim hizmetlerine yapılan harcamalar için öğrenci başına yapılan harcamalar kullanılacaktır. Hükümlüler için ise mülkiyet suçları arasında yer alan ve hırsızlık suçundan hükümlü olan kişiler değerlendirme kapsamında tutulacaktır.

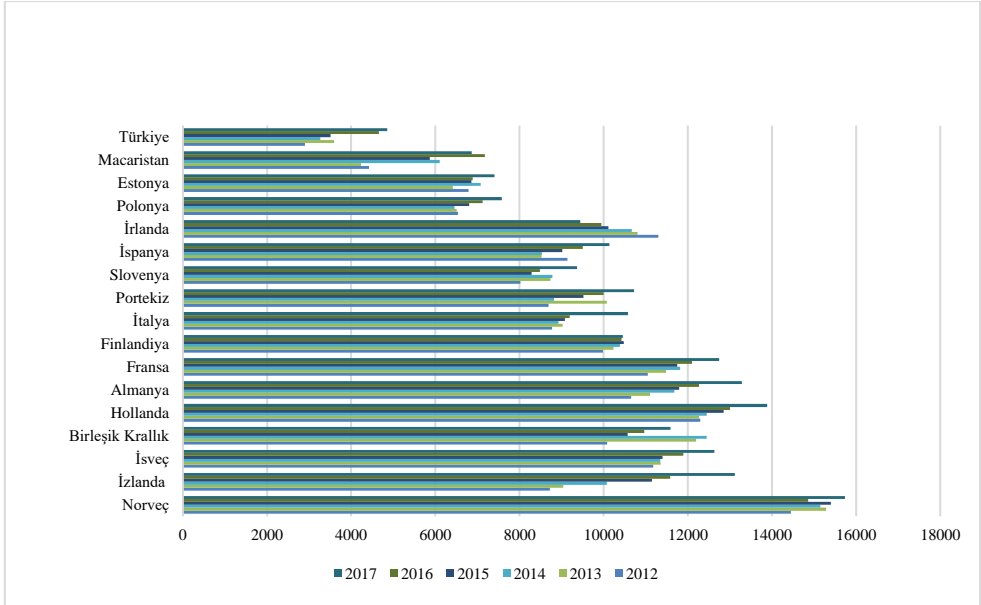
Analize alınan OECD ülkelerinde hükümlülerin ortalama yaş oranı 30 ile 40 yaş arasındadır. Türkiye’de ise 2020 yılında hükümlülerin ortalama yaşının 35 olduğu görülmektedir (Council of Europe Annual Penal Statistics, 2020: 42). Yukarıda da bahsedildiği üzere 25-34 yaş aralığında Türkiye’de en çok görülen suç türü öldürme ve yaralamadır. Bu yaş aralığındaki kişilerin eğitim aldıkları yılların harcama verilerine ulaşılmasındaki güçlük nedeniyle şiddet suçları çalışma kapsamı dışında tutulmuş ve bir sonraki en çok işlenen suç türünün görüldüğü yaş aralığı olan 18-24 yaş arası tercih edilmiştir. Bu yaş aralığında ise en sık gerçekleşen suç türü, bir mülkiyet suçu olan hırsızlıktır (Bkz. Ek: 1).

2019 yılı itibari ile hırsızlık suçu nedeniyle cezaevinde bulunan 18-24 yaş aralığındaki kişilerin yaş aralıkları dolayısıyla ilköğretim ve ortaöğretime tabi oldukları yıllar, Türkiye eğitim sisteminde 2004 ile 2018 yılları arasında kapsamaktadır. Seçili ülkelerde erişilebilir verilerin özellikle ortaöğretimde olması nedeniyle, çalışmada sadece 2012-2017 yılları arasında ortaöğretimde öğrenci başına yapılan yıllık harcama miktarları değerlendirmeye alınmıştır. 2012-2017 yılları arasında ortaöğretim seviyesinde öğrenci başına yapılan yıllık harcama miktarına bakıldığında seçili ülkelerin harcama eğilimlerindeki sıralamada yıllar itibari ile önemli bir farklılık olmadığı görülmektedir. Değerlendirmeye alınan yıllarda en çok harcama yapan ülke Norveç’tir. Söz konusu 5 yıl içinde Norveç’te ortaöğretimde öğrenci başına harcama miktarı 14.000 ile 16.000\$ arasında değiştiği görülmektedir. 2012-2017 yılları arasındaki zamanda genel dağılım olarak Norveç’ten sonra ortaöğretimde öğrenci başına harcama oranı en yüksek ülkeler İzlanda, İsveç, Birleşik Krallık ve Hollanda olarak sıralanabilir. Türkiye ise söz konusu yıllarda verilerine ulaşılabilen ülkeler arasında en az harcama yapan ülkedir⁴. Türkiye’de bu yıllar

⁴ İlkokul ve ortaokulda öğrenci başına yapılan eğitim harcamalarında da Türkiye, verilerine ulaşılabilen ülkelere kıyasla oldukça az paya sahiptir (Bkz. Ek: 2 ve Ek: 3).

arasında ortaöğretimde öğrenci başına harcama miktarı yaklaşık olarak 2.000 ile 6.000\$ arasında değişmektedir (Bkz. Grafik 3).

Grafik 3
2012-2017 Yılları Arasında Ortaöğretimde Öğrenci Başına Harcama Miktarı, \$



Kaynak: OECD, *Education at a Glance 2015/2016/2017/2018/2019/2020: OECD Indicators*, OECD Publishing Paris'den yararlanarak tarafımızca düzenlenmiştir.

5.2. Analiz

2012-2015 yılları arası ortaöğretim ortalama öğrenci başına düşen harcamalar (\$) ve hırsızlık suçu oranları Grafik 4'te incelenmiştir. Dikey eksenle 2012-2015 yılları arasında ortaöğretimde öğrenci başına yapılan ortalama harcamalar ile yatay eksenle 100.000 kişi içinde hırsızlık suçundan hüküm giyen kişi sayısı karşılaştırılmıştır. Bu karşılaştırmaya göre verilerine erişim sağlanabilen ve öğrenci başına yüksek harcama eğiliminin olduğu ülkelerin çoğunda, hırsızlık suçundan mahkûm olanların sayılarının daha az olduğu tespit edilmiştir. Öğrenci başına yapılan harcamaların daha düşük olduğu ülkelerde ise hırsızlık suçundan hüküm giymiş kişilerin sayısının nispeten daha yüksek olduğu gözlenmektedir⁵.

Ortaöğretimde öğrenci başına en çok harcama yapan beş ülke sırasıyla Norveç, Hollanda, Fransa, Birleşik Krallık ve İsveç'tir. Bu ülkeler ortaöğretimde öğrenci başına

⁵ Çalışmada ilköğretim harcamalarına dair yılların ortalaması değerlendirmeye alınmış olmakla beraber, ülkelerin ilköğretim harcamalarının genel eğilimlerinde yıldan yıla ciddi değişiklik olmadığı gözlenmiştir (Bkz. Ek 2 ve Ek 3).

ortalama olarak 12.341\$ harcarlarken yine bu ülkelerde her 100.000 kişi içinde hırsızlık suçundan hüküm giyenlerin ortalama oranı 6,48'dir. Ele alınan ülkeler arasında ortaöğretimde öğrenci başına en çok harcama yapan ülke ise Norveç'tir. Bu ülkede 100.000 kişi içinde hırsızlık suçundan hüküm giymiş kişilerin oranı ise 1,40'tır.

Ortaöğretimde en az harcama yapan beş ülke ise sırasıyla Türkiye, Macaristan, Polonya, Estonya ve Slovenya'dır. Bu beş ülkenin ortaöğretimde öğrenci başına ortalama harcaması 6.060 \$'dır. Yine bu beş ülkede her 100.000 kişi içinde hırsızlık suçundan hüküm giyenlerin ortalama oranı ise 18,88'dir.

Ortaya çıkan tabloda, en çok harcama yapan ülke grubu en az harcama yapan ülke grubuna göre yaklaşık olarak iki kat daha fazla öğrenci başına harcama yapmaktadır. Her 100.000 kişi içinde hırsızlık suçundan hüküm giyenlerin sayısı ise daha çok harcama yapan ülkelerde yaklaşık olarak üçte bir oranında daha azdır.

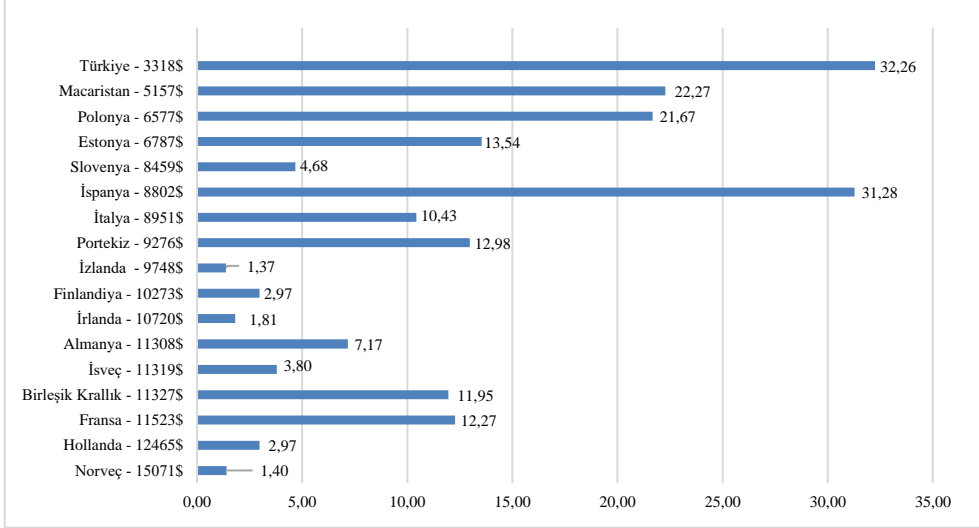
Grafik 4'te dikkat çekici ülkelerden biri İspanya'dır. İspanya'nın 2012-2015 yılları arasında ortaöğretimde öğrenci başına harcamaları ortalama bir seviyede gerçekleşirken, 100.000 kişi içinde hırsızlık suçundan hüküm giyenler karşılaştırmasında 31,28 oranla Türkiye'den sonra ikinci sırada geldiği görülmektedir. İspanya'nın sahip olduğu yüksek hırsızlık suçu oranı yapılan eğitim harcamalarının, tek başına kompleks bir olgu olan suç engellemeyeceğinin göstergesidir. Sosyoekonomik arka plan, sosyal sermaye, hukuk/ceza sistemleri, kurumsal yapı, eğitim hizmetinin kalitesi gibi unsurlarda görülen yapısal farklılıklar da suç engel olabilir.

Türkiye, incelenen ülkeler içinde en az harcama yapan ülke olurken suç oranlarında ise lider durumdadır. Bu durum öğrencilere ve hükümlülere yapılan harcamalar açısından değerlendirildiğinde daha da dikkat çekici olmaktadır. Adalet Bakanlığı 2020 yılı faaliyet raporunda yer alan Ceza İnfaz Kurumları ile Tutukevleri İşyurtları Kurumunun 2020 yılı harcama rakamlarından yola çıkarak Türkiye'de hükümlü ve tutuklu başına yapılan harcamalar incelendiğinde, 2020 yılında kişi başına yıllık harcamanın 28.897 ₺⁶ olduğu görülmektedir (Adalet Bakanlığı Faaliyet Raporu, 2020: 41). Avrupa Konseyi ve Lozan Üniversitesi'nin araştırmasında ise 2019 yılı boyunca Türkiye'de hükümlü başına yapılan yıllık harcama miktarı ise yaklaşık olarak 35.910 ₺'dir⁷. 2019 yılında öğrenci başına yapılan eğitim harcaması ise 11.769 ₺'dir (TÜİK, 2020b).

⁶ Adalet Bakanlığı 2020 yılı faaliyet raporunda yer alan Ceza İnfaz Kurumları ile Tutukevleri İşyurtları Kurumunun 2020 yılı harcama rakamlarının (8.582.968.891 ₺) 2019 yılı için verilen Ceza İnfaz Kurumları'ndaki kişi sayısına (297.019) bölünerek yıllık kişi başına harcama miktarına ulaşılmıştır.

⁷ Avrupa Konseyi ve Lozan Üniversitesi'nin yapmış olduğu SPACE I çalışmasının verilerine göre 2019 yılı itibarıyla hükümlü başına günlük 15€ harcanmaktadır. Buradan yola çıkarak yapılan matematiksel hesaplamada 31 Aralık 2019 tarihli Euro kuru 1€=6,65₺ kabul edilmiştir.

Grafik: 4
2012-2015 Yılları Arası Ortaöğretim Ortalama Öğrenci Başına Düşen Harcama¹ (\$) ve Hırsızlık Suçu Oranları² (2019)*



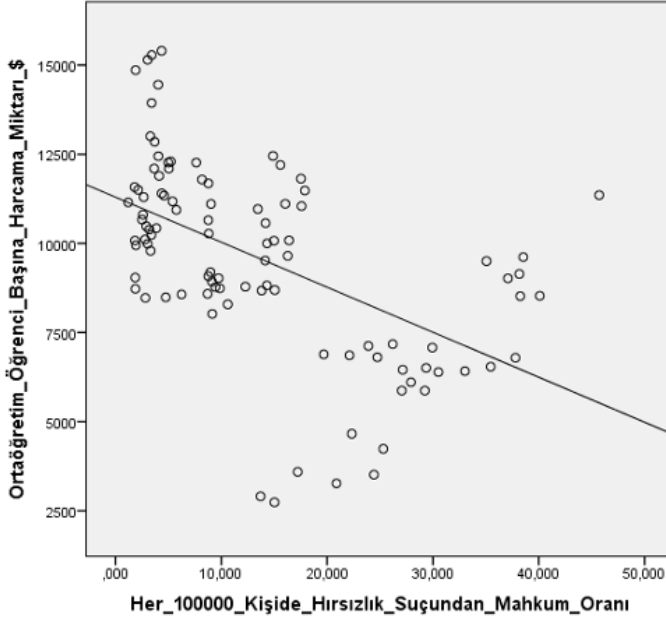
Kaynak: ¹ OECD, *Education at a Glance 2015/2016/2017/2018: OECD Indicators*, OECD Publishing Paris.

² Council of Europe Annual Penal Statistics, *Space I 2020*, <https://wp.unil.ch/space/files/2021/04/210330_FinalReport_SPACE_I_2020.pdf>, 11.05.2021.

* Dikey ekseninde öğrenci başına yapılan yıllık eğitim harcamaları; yatay ekseninde her 100.000 kişi içinde şiddet ve mülkiyet suçundan mahkûm sayıları gösterilmektedir.

Çalışmada incelediğimiz eğitim harcamaları ve hırsızlık oranları arasındaki ilişkiyi istatistiki açıdan değerlendirmek amacıyla Spearman Sıra Korelasyon Katsayıları hesaplanmış ve anlamlılıkları sınanmıştır. İncelediğimiz bu iki değişken arasında yapılan analiz sonucunda anlamlı negatif ve doğrusal monotonik bir ilişki bulunmuştur (Bkz. Şekil 1).

Şekil: 1
2011-2016 Yılları Arasında Ortaöğretim Ortalama Öğrenci Başına Düşen Harcamalar (\$) ve Hırsızlık Suçu Oranları Arasındaki İlişki



Değerlendirmeye aldığımız 17 ülkede 2011-2016 yılları arasında her yıl için⁸ ortaöğretimde öğrenci başına yapılan eğitim harcamaları ile her 100.000 kişi içinde hırsızlık suçundan hüküm giymiş kişilerin oranı arasında bir ilişki olup olmadığını incelemek amacıyla yapılan Spearman Sıra Korelasyon Katsayısı incelendiğinde söz konusu iki değişken arasında %58, negatif ve anlamlı bir ilişki olduğu bulunmuştur, $r_{spearman} = -.575$, $p = .000$.

Şekil: 2
Çalışmadaki Değişkenlerin Betimleyici İstatistikleri ve Spearman Korelasyonları

		Her 100000 Kişide Hırsızlık Suçundan Mahkûm Oranı	
Spearman's rho	Ortaöğretim Seviyesinde Öğrenci Başına Harcama Miktarı	Correlation Coefficient	-.575
		Sig. (1-tailed)	.000
		N	99
	Her 100000 Kişide Hırsızlık Suçundan Mahkûm Oranı	Correlation Coefficient	1.000**
		Sig. (1-tailed)	.
		N	99

** Correlation is significant at the 0.01 level (1-tailed).

⁸ 2011 ve 2012 yıllarında Macaristan ile 2015 yılında Fransa'ya ait hırsızlık suçuna ait veri bulunmadığından, söz konusu üç veri değerlendirme dışında tutulmuş ve korelasyon analizi 99 veri üzerinden yapılmıştır.

Eđitim harcamalarının dođrudan su unsurunu etkilemediđi kabul edilmekle birlikte, alıřmada yapmıř olduđumuz Spearman Korelasyon analizi sonucunda semiř olduđumuz iki deđerriken arasında negatif ve anlamlı bir iliřki olduđu sonucuna ulařılmıřtır.

Deđerlendirilen lkeler arasında Trkiye incelendiđinde hem đrenci bařına en dřk harcamaya sahip olduđu hem de sulu sayısının nemli lde yksek olduđu grlmektedir. Analiz sonucunda iki deđerriken arasında ortaya ıkan negatif ve anlamlı iliřki, Trkiye'de de ortađretim seviyesinde đrenci bařına yapılan yıllık harcamalar ile hırsızlık suundan hkm giyen kiři sayısının iliřkili olabileceđini gsterir.

Hkmller ile đrencilere yapılan harcamalar arasındaki bu karřılařtırma Trkiye'nin gemiřte eđitim hizmetine yapmıř olduđu yetersiz harcamaların, bugnn harcamalarını daha fazla artırmıř olabileceđini gstermektedir. đrenci bařına yapılan harcamalar yeterli miktarda ve etkin bir řekilde gerekleřtirilerek kaliteli bir eđitim hizmeti sunulduđu takdirde, suun gelecekte yaratacađı potansiyel maliyetler azaltılabilir. Aynı zamanda yaratılan ekonomik ve dıřsal faydalarla toplumun refah seviyesine olumlu katkı sađlanmıř olur.

6. Sonu

Su kavramı zaman ve kltre gre farklılık gstermekle birlikte kavrama ynelik ortak yargı, toplum geneli tarafından kabul edilen dzene karřı gsterilen uyumsuzluktur. Su, bireysel tercihler sonucunda iřlenir. Suun iřlenmesini ortaya ıkaran nedenler farklı yaklařımlarla aıklanmıřtır. Bu nedenler ekonomik ve sosyal aılardan deđerlendirilmektedir.

Su iřlenmesi beraberinde hem bireysel maliyet hem de sosyal maliyet getirmektedir. Suu arz edenler, mađdurlar ve potansiyel mađdurlar bireysel maliyeti yklenirken; aynı zamanda su, topluma da retkenlik kaybı, beřeri ve sosyal sermaye kaybı, vergi gelirlerinde kayıp gibi olumsuz etkiler yaratmaktadır. Su nedeniyle oluřan ekonomik ve dıřsal maliyetler, devleti bu alanda nlem almaya ve caydırıcı yaptırımlar uygulamaya ynelmektedir.

Toplum refahını en oklařtırma adına yapılan uygulamalar ise devleti; emniyet ve soruřtırma, adalet, hapisane giderleri gibi harcamalar yapmakla ykml kılar. 2020 yılında Trkiye'de bir hkml iin aylık harcama miktarının 2000 ile 3000  arasında olduđu tahmin edilmektedir. Hkmllere yapılan harcamaların nemi hkml sayısı zerinden deđerlendirildiđinde, devletin bu alana ayırdıđı kaynak olduka arpıcı olmaktadır. Hkml bařına yıllık yapılan harcama miktarı (yaklařık 30.000-40.000 ) ile đrenci bařına yapılan yıllık harcamaların (11.769 ) karřılařtırılması farkın boyutunu grnr kılmaktadır. Eđitim aracılıđıyla su gerekleřmeden nlenilebilirse, ortaya ıkacak bu yksek kaynak eđitim, sađlık, arařtırma-geliřtirme hizmetleri gibi toplum refahını oklařtıracak alanlara aktarılabilir. Sonu olarak tm toplum adına daha etkin ve verimli bir kaynak kullanımı yaratılabilir.

Çalışmada değerlendirmeye alınan OECD ülkeleri arasında, Türkiye'deki hükümlü sayısının oldukça yüksek olduğu görülmektedir. Türkiye'de 2020 yılı itibari ile toplam hükümlü sayısı 250.594'tür. Benzer nüfusa sahip Almanya, Fransa gibi gelişmiş ülkeler ile karşılaştırıldığında bu sayının çok yüksek olduğu ortaya çıkmaktadır. Yine OECD ülkeleri arasında son on yılda (2009-2019) cezaevi nüfus değişiminde %115,3 ile en yüksek artışı gösteren ülke Türkiye'dir.

Suç türleri arasında ise şiddet ve mülkiyet suçları çoğu ülkede en çok işlenen suç türleridir. OECD ülkeleri içinde Türkiye, suç türleri arasında şiddet ve mülkiyet suçlarının toplam payı %74 ile en yüksek orana sahip ülkelerden biridir. Bu nedenle söz konusu suç türünün suç arzı meydana gelmeden önlenmesi hem yaşam standardı hem de kaynak kullanımı açısından çok daha etkin olacaktır.

Çalışmada devletin sunduğu eğitim hizmetlerinin suç oranları üzerine etkisi incelenirken değişken olarak ülkelerin ortaöğretimde öğrenci başına yapılan yıllık eğitim harcamaları eğilimi ile hırsızlık suçuna odaklanılmıştır. Öğrenci başına eğitim harcaması açısından bakılmasının nedeni yapılan harcamaların, devletin eğitim hizmetine verdiği önemin ve yeterli olup olmadığının bir göstergesi olmasıdır. Ülkelerin ortaöğretimde yıllar içinde öğrenci başına yaptıkları harcama miktarları karşılaştırılmış ve kendi aralarındaki sıralamalarda ciddi değişiklikler olmadığı görülmüştür. Geçmiş yıllara ait düzenli veri bulunamadığı için bu durum bir eğilim olarak değerlendirilmiştir. Şiddet suçundan hüküm giyenlerin ağırlıklı olarak 25-34 yaş aralığında olması, ilgili yaş aralığına ait geriye dönük öğrenci başına eğitim harcamaları verilerine erişim sağlanmasında kısıt oluşturmuştur. 18-24 yaş aralığında ise bu kısıt ortadan kalktığından, söz konusu yaş aralığında en çok işlenen suç türü olan hırsızlık seçilmiştir.

Verilerine ulaşılabilen OECD ülkeleri içerisinde Türkiye, ortaöğretim seviyesinde öğrenci başına yıllık harcama miktarının en düşük olduğu ülkedir. Hem öğrenci başına harcama eğiliminin düşük olması hem de hırsızlık suçu nedeniyle hükümlü olanların sayısının yüksek olması çalışmanın özgün değerini ortaya koymaktadır.

Eğitim, bireylerin sadece suça yönelmesini ve dolayısıyla suç nedeniyle oluşan negatif dışsallıkları ortadan kaldırmakla kalmaz. Aynı zamanda eğitim hizmetlerinden yararlanan bireyler pozitif dışsallık sebebiyle hem ekonomik hem de sosyal anlamda topluma katkı sağlar; toplum genelinin yaşam standardının yükselmesinin önünü açarlar. Bu nedenle eğitim hizmetleri, suç eylemini gerçekleştirmeden engellemekle bir artı sağlarken yarattığı dışsal faydalar ile de bu olumlu etki daha geniş alana yayılır.

Kâr maksimizasyonu amaçlayan piyasa aktörleri topluma yayılan dışsal faydaları göz önünde bulundurmadığı için piyasalar tarafından sunulan eğitim hizmeti optimal toplum refahını gerçekleştiremez. Oysa, optimum toplumsal refah hedefindeki devletin ortaya çıkacak dışsal faydaları gözeterek eğitim alanında etkinlik sağlaması ve okul çağındaki bireylere ulaşması kaçınılmazdır.

Türkiye’de suç oranlarının yüksekliği ve eğitim harcama eğilimi, okullaşma oranlarının ve okul çıktı başarılarının düşük olması, öğretmenlik mesleğinin talebinin düşük olması, istihdam ve eğitimde yer almayan gençlerin oranının yüksek olması; devletin yeterli ve etkin müdahalede bulunmadığını göstermektedir. Türkiye, eğitim alanına ayırdığı kaynakların yetersizliğini gidermeli ve kaynakları etkin kullanarak okul çağındaki tüm bireylere ulaşmayı hedeflemelidir. Böylece eğitimden sağlanan faydaların artmasını, suçun ortaya çıkardığı sosyal ve ekonomik maliyetlerin azalmasını ve aynı zamanda hükümlülere yapılan harcamaların da toplumun geneli adına daha etkin kullanılmasını sağlayacaktır.

Çalışmada 17 ülke 2011-2016 yılları için yapılan korelasyon analizi hırsızlık suçu ile ortaöğretimde öğrenci başına yapılan yıllık harcamalar arasında anlamlı ve negatif bir ilişki olabileceğini göstermiştir. Bu araştırma, korelasyonun nedensellik olmadığını kabul etmektedir. Dolayısıyla bu çalışmada ortaya konan eğitim-suç ilişkisinin arkasında yatan nedensellik bağının derinlemesine incelenmesi önemlidir. Bunun için ise öncelikli olarak uzun dönem veri toplanması ve veri paylaşımının şeffaflaşması gereklidir. Ayrıca eğitim harcamalarının dışında eğitime erişimde fırsat eşitliği, öğretmen eğitiminin niteliği, müfredat, eğitim ile işgücü piyasası arasındaki ilişki gibi konunun diğer muhtemel boyutlarıyla da ekonometrik ve istatistiki analiz yöntemleriyle çalışılması önerilmektedir.

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Ekler:

EK Tablo: 1
Suç Türü ve Suçun İşlendiği Yaş Grubuna Göre Ceza İnfaz Kurumuna Giren Hükümlüler, 2009-2019

Suç Türü / Yaş Aralığı	12-14	15-17	18-24	25-34	35-44	45-54	55-64	65 +
2019								
Öldürme	66	619	2.764	3.200	1.661	843	344	76
Yaralama	48	415	8.142	12.481	8.601	3.862	1.155	192
Cinsel Suçlar	245	630	1.328	1.533	1.071	579	298	112
Hırsızlık	950	4.609	18.178	12.079	4.801	1.680	383	64
Yağma (Gasp)	572	2.478	5.318	3.436	1.143	282	55	12
2018								
Öldürme	66	602	2.823	3.148	1.516	777	313	86
Yaralama	34	427	7.960	11.936	7.840	3.561	1.061	192
Cinsel Suçlar	287	608	1.493	1.409	1.016	568	289	99
Hırsızlık	980	5.365	19.956	12.578	4.654	1.512	318	52
Yağma (Gasp)	709	2.887	6.117	3.942	1.260	329	57	6
2017								
Öldürme	55	530	2.364	2.794	1.346	642	260	55
Yaralama	43	393	6.878	9.701	5.821	2.775	769	155
Cinsel Suçlar	239	643	1.381	1.340	824	457	220	67
Hırsızlık	759	4.438	16.567	10.221	3.728	1.205	270	33
Yağma (Gasp)	459	2.191	5.039	3.293	1.027	230	40	4
2016								
Öldürme	48	424	2.125	2.588	1.282	656	263	58
Yaralama	33	326	5.999	8.484	5.402	2.524	700	118
Cinsel Suçlar	238	673	1.445	1.396	880	547	241	86
Hırsızlık	485	3.146	13.756	9.162	3.518	1.264	289	35
Yağma (Gasp)	389	1.911	3.857	2.507	801	198	28	1
2015								
Öldürme	73	551	2.332	2.818	1.419	777	261	72
Yaralama	30	357	5.864	8.697	5.500	2.528	643	107
Cinsel Suçlar	228	601	1.481	1.350	922	473	218	62
Hırsızlık	497	3.065	13.051	8.730	3.304	1.125	274	35
Yağma (Gasp)	325	1.920	4.114	2.605	852	182	39	5
2014								
Öldürme	58	523	2.425	3.049	1.673	795	290	74
Yaralama	29	317	5.860	8.957	5.768	2.858	857	156
Cinsel Suçlar	210	626	1.589	1.440	917	471	215	63
Hırsızlık	396	2.822	12.626	8.893	3.620	1.203	298	40
Yağma (Gasp)	243	1.258	3.350	2.266	681	177	30	4
2013								
Öldürme	70	380	1.570	2.155	1.326	723	239	68
Yaralama	108	580	7.012	10.575	6.901	3.401	1.016	221
Cinsel Suçlar	166	418	1.048	1.119	752	418	164	52
Hırsızlık	390	1.777	9.341	6.804	2.732	992	237	39
Yağma (Gasp)	153	739	2.105	1.319	423	100	24	
2012								
Öldürme	49	325	1.688	2.130	1.226	697	233	73
Yaralama	24	170	3.974	5.451	3.509	1.649	414	91
Cinsel Suçlar	72	241	613	592	376	208	76	32
Hırsızlık	107	883	5.147	3.576	1.515	554	120	28
Yağma (Gasp)	136	661	1.503	954	302	87	7	1
2011								
Öldürme	25	250	858	1.017	626	330	97	33
Yaralama	12	127	1.965	2.579	1.515	733	172	36
Cinsel Suçlar	11	58	231	214	130	81	27	8
Hırsızlık	67	410	2.242	1.753	929	386	117	16
Yağma (Gasp)	85	413	884	508	125	28	6	1

2010								
Öldürme	15	168	676	887	489	271	64	29
Yaralama	5	81	1.948	2.434	1.557	716	158	36
Cinsel Suçlar	19	80	205	211	132	63	17	6
Hırsızlık	62	348	2.168	1.667	909	377	83	18
Yağma (Gasp)	72	393	631	360	96	13	8	

Kaynak: TÜİK, 2020a, <<https://data.tuik.gov.tr/Bulten/Index?p=Ceza-Infaz-Kurumu-Istatistikleri-2019-33625->>, 07.05.2021.

EK Tablo: 2 Seçili Ülkelerde İlkokulda Öğrenci Başına Yapılan Eğitim Harcamaları, \$

Ülkeler	2004	2005	2006	2007	2008	2009	2010
Norveç	8.533	9.001	9.486	9.922	11.077	11.833	12.255
İzlanda	8.434	9.254	9.299	9.629	10.599	10.099	9.482
İsveç	7.469	7.532	7.699	8.338	9.080	9.382	9.987
İngiltere	5.941	6.361	7.732	8.222	8.758	9.088	9.369
Hollanda	6.222	6.266	6.425	6.552	7.208	7.917	7.954
Almanya	4.948	5.014	5.362	5.548	5.929	6.619	NA
Fransa	5.082	5.365	5.482	6.044	6.267	6.373	6.622
Finlandiya	5.581	5.557	5.899	6.234	7.092	7.368	7.624
İtalya	7.390	6.835	7.716	7.383	8.671	8.669	8.296
Portekiz	4.681	4.871	5.138	5.011	5.234	5.762	5.922
İspanya	4.965	5.502	5.970	6.533	7.184	7.446	7.291
İrlanda	5.422	5.732	6.337	6.901	7.795	8.219	8.384
Polonya	3.130	3.312	3.770	4.063	4.855	5.302	5.937
Estonya	2.894	3.384	3.675	4.058	5.579	5.493	5.140
Macaristan	3.841	4.438	4.599	4.656	4.495	4.467	4.684
Türkiye	1.120	NA	1.130	NA	NA	NA	1.860

Kaynak: OECD (2007), *Education at a Glance 2007/2008/2009/2010/2011/2012/2013*: OECD Indicators, OECD Publishing, Paris.

EK Tablo: 3 Seçili Ülkelerde Ortaokulda Öğrenci Başına Yapılan Eğitim Harcamaları, \$

Ülkeler	2009	2010	2011	2012	2013	2014	2015
Norveç	12.505	12.603	12.769	13.373	14.103	13.975	14.486
İzlanda	9.778	9.482	10.160	10.706	11.276	12.359	12.872
İsveç	9.642	9.776	10.823	10.966	11.306	11.411	11.493
Birleşik Krallık	10.124	10.533	13.894	10.271	13.092	12.478	10.249
Hollanda	11.708	11.925	12.031	12.227	12.334	12.404	12.491
Almanya	8.130	NA	9.247	9.521	9.967	10.554	10.680
Fransa	9.111	9.399	9.668	9.588	9.947	10.309	10.268
Finlandiya	11.338	11.705	12.545	12.909	13.312	13.865	14.682
İtalya	9.165	8.548	8.686	8.905	8.797	9.033	9.258
Portekiz	8.448	8.504	8.294	8.524	9.667	8.634	9.568
Slovenya	9.386	9.368	9.947	9.802	10.085	10.432	9.925
İspanya	9.484	9.208	9.335	9.137	8.303	8.347	8.765
İrlanda	11.069	11.477	11.442	11.087	10.773	10.518	9.983
Polonya	4.871	5.428	5.995	6.682	6.900	7.058	6.985
Estonya	6.225	5.948	6.009	6.524	7.009	7.272	6.614
Macaristan	4.874	4.657	4.709	4.459	3.994	3.915	4.711
Türkiye	NA	NA	2.250	2.448	3.337	2.953	3.491

Kaynak: OECD (2012), *Education at a Glance 2012/2013/2014/2015/2016/2017/2018/2019/2020*: OECD Indicators, OECD Publishing, Paris.

Kamu Yönetiminde Blokzincir: Kullanım Alanları ve Örnek Uygulamalar

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Blockchain in Public Administration: Usage Areas and Practices

Abstract

The use of current technologies in public administration is becoming more and more widespread. In this context, the study aims to reveal the potential benefits of blockchain technology for public administration. For this purpose, the structure of this technology and its usage areas in terms of administration were examined. Moreover, literature and case studies questioned its potential benefits in terms of public administration. It aims to determine the current situation and develop policy recommendations through usage areas and projects in Turkey. In this respect, it seeks to discuss the usability of technology-based applications in public administration and discuss the possible benefits and risks of the blockchain.

Keywords : Blockchain, Cryptocurrency, Bitcoin, Digitalization, Cyber Security.

JEL Classification Codes : O33, O38, D73, D78, D83.

Öz

Kamu yönetiminde güncel teknolojilerin kullanım alanları gittikçe yaygınlaşmaktadır. Bu kapsamda çalışmanın amacı blokzincir teknolojisini kamu yönetimi gözünden ele alarak potansiyel kullanım alanlarını ortaya koymaktır. Bu amaçla teknolojinin yapısı ve yönetim açısından kullanım biçimleri incelenmiş, alanyazın ve örnek uygulama analizleriyle kamu yönetimi açısından potansiyel faydaları sorgulanmıştır. Türkiye'deki kullanım alanları ve projeler üzerinden mevcut durumun tespiti ve geleceğe yönelik politika önerileri geliştirilmesi hedeflenmektedir. Bu minvalde, çalışmanın kamu yönetimi alanına yönelik teknoloji tabanlı uygulamaların kullanılabilirliğini tartışması, blokzincir üzerinden olası faydaların ve risklerin tartışılması hedeflenmektedir.

Anahtar Sözcükler : Blokzincir, Kayıtzincir, Kripto Para, Bitcoin, Dijitalleşme, Siber Güvenlik.

1. Giriş

Bilgi iletişim teknolojileri (BİT), özellikle 2000'li yılların başından itibaren, insan hayatını radikal denilebilecek ölçüde etkilemeye başlamıştır ve bu etkinin hızı gün geçtikçe devam etmektedir. Son yıllarda ortaya çıkan pek çok teknolojik yenilik kamusal hizmetleri, kamu görevlilerinin rollerini ve vatandaşların beklentilerini değiştirmektedir. Yakın dönemde öne çıkan yeni bir gelişme ise 'blokzincir/kayıtzcincir' (blockchain) teknolojileridir. Gıda güvenliğinden finans sektörüne, tapu kayıtlarından plaka bilgilerine, ilaç sektöründen sağlık kayıtlarına kadar pek çok alanda kullanım imkânı sunan blokzincirler yeni bir dijital devrim olarak adlandırılmaktadır (Doğantuna vd., 2018). Blokzincir, kaydedilen bilgilerin zaman damgası taşıdığı ve bu bilgilerde geriye dönük işlem yapılamadığı, birden çok kullanıcısı olan, kullanıcılar arasındaki güvene duyulan ihtiyacı minimize eden ve bu itibarla araçları ortadan kaldıran, merkezi olmayan bir veri tabanı (Sert, 2019: 11) şeklinde ifade edilebilir. Blokzincire dair ilk çalışmalar 1990'lı yıllarda kriptolama çalışmaları kapsamında yapılmış bloklar ve zincirleme çabalarıdır. Bu teknolojiye dair en önemli kırılma 2008 yılında Satoshi Nakamoto olarak bilinen bir grup ya da kişi tarafından yayınlanan bir makaleyle yaşanmıştır. Bu kişi ya da kişiler makaleden sonra blokzincir teknolojisini kullanarak bitcoin adı verilen bir dijital para tasarlanmış ve bu para birimi kısa süre içerisinde küresel ölçekte talep gören bir yenilik halini almıştır. Söz konusu teknoloji 2014 yılında ise daha etkileşimli, kişilere daha fazla yetki veren bir biçime dönüşerek "blockchain 2.0" olarak anılan günümüzdeki haline gelmiştir (Narayanan et al., 2016). Yeni gelişmelerle yeni uygulama alanlarına kavuşan blokzincir teknolojileri pek çok alanda politika başlıklarını etkilemektedir. Özellikle bankacılık ve finans sistemi açısından tartışılan yeni uygulamalar, farklı kamu politikalarında da değişim ve dönüşüm imkanları sunmaktadır. Bu kapsamda çalışmada öncelikle blokzincir teknolojisi ve potansiyelin üzerinde durulacak, ardından kamu yönetimi açısından örnek kullanım alanları ve mevcut uygulamalar ele alınacaktır.

2. Blokzincir ve Nitelikleri

Blokzincirler aslında verilerin güvenliğini sağlayan ve milyonlarca kullanıcı tarafından bilginin aynı anda paylaşılmasına olanak sağlayan bir yöntemdir. Merkezi bir sunucunun veya güvenilir bir merkezi otoritenin ortadan kaldırılmasına olanak sağlayarak, merkezi güvenin internet ortamında dağıtılmasını ifade etmektedir. Bu yapılar genellikle internet üzerinden gerçekleştirilen işlemleri ve ilişkileri etkilemektedir. E-devletin temelindeki anlayış olarak ortaya çıkan devlet-vatandaş ilişkisinde ya da kurum-kurum, kurum-firma, firma-kullanıcı gibi ilişkiler ağında kullanılan kayıtların blokzincirler ile yeni bir yapıyla tutulması ve saklanması mümkün olmaktadır. Öyle ki, devletten vatandaşa yönelik ilişkiyi, vatandaştan devlete doğru dönüştüren, ayrıca vatandaş-vatandaş ilişkisi içerisinde gerçekleşen işlemlerde devleti aradan çıkartan bir yapı olanaklı hale gelmektedir (Killmeyer et al., 2017: 5). Böylece gayri-merkezi, daha güvenli, gerektiğinde veri mahremiyetinin korunduğu bir yapı ortaya çıkmaktadır. Bu sayede kişiler kişilerle, kişiler kurumlarla, kurumlar kurumlarla hem daha güvenli hem daha hızlı bir ilişki ağı kurmakta ve işlemler hızlı ve ucuz bir biçimde gerçekleşebilmektedir.

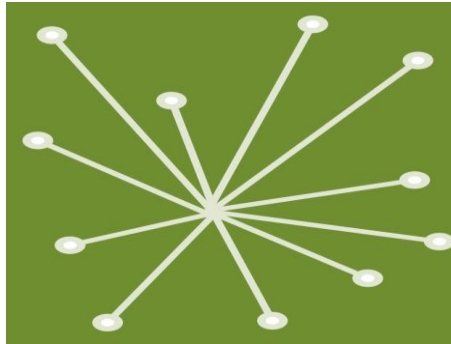
Blokzincir, genel veya özel bir ağdaki birden fazla bilgisayarda depolanan kodlanmış bir dijital defter olarak algılanabilir. Bu defterler o kurum, firma, vatandaş grubu ya da ilgililere dair veri kayıtlarını veya "blokları" içerir. Bu bloklar bir zincirde toplandıktan sonra, tek bir aktör tarafından değiştirilemez veya silinemez. Bunun yerine, otomasyon ve paylaşılan yönetim protokolleri kullanılarak doğrulanır ve yönetilirler. Blokzincir teknolojisinin rolü bir tür güvenlik protokolünün gelişmesi ve bu protokolün gerektiğinde bloklar arası hızlı işlem hacmini sağlayabilmesidir. Böylece kamu kurumları dilerlerse verilerin güvenliğini sağlama rolünden feragat edebilmekte ya da bu rolü daha etkin bir şekilde yerine getirebilmektedir. Ayrıca bu verilerin dağıtık yapıya bürünmesi pek çok işlemin aracısız yerine getirilmesine olanak sağlamaktadır. Örneğin, halihazırda bir kamu kurumunun istediği bilgiler vatandaş eliyle diğer kurum üzerinden sunulabilmektedir. Bu sistemin amacı vatandaşın sahip olduğu verileri istediği ilgililerle aracısız paylaşabilmesini sağlamaktır.

Basit bir tanımla blokzincir aslında bir kayıt defteridir. Küresel çapta ve herkese açık olan bu defter şeffaf, dağınık ve zaman damgalı verileri içeren dijital özellikte bir defterdir. Bu kayıt defteri, düz bir veri dosyası ve basit bir veri tabanı olma özelliği taşır. Sadece kayıt eklenebilen bu defterde eklenen kayıt silinemez veya değiştirilemez. Blokzincir üzerindeki kayıtlar, birbirleri ile rekabet halinde olan tarafların oluşturduğu bloklardan meydana gelir. Blokzincire atfedilen güvenlik de bu rekabet unsurundan kaynaklanmaktadır. Bu kapsamda blokzincir, "güvenli bir veri tabanının teknik bir planı" şeklinde de tanımlanmaktadır (Aydın, 2018: 17; Kaya, 2019: 5). Bir başka tanım yapmak gerekirse blokzincir, genel veya özel bir ağdaki birden fazla bilgisayarda depolanan kodlanmış bir dijital defterdir. Bu defter veri kayıtlarını veya "blokları" içerir. Bu bloklar bir zincirde toplandıktan sonra, tek bir aktör tarafından değiştirilemez veya silinemez; bunun yerine otomasyon veya paylaşılan yönetim protokolleri kullanılarak doğrulanır ve yönetilirler (Cheng et al., 2017).

Günümüzde kullanılmakta olan internet teknolojisi sayesinde ortak bir ağa bağlı olan makineler birbirleri ile iletişim sağlamaktadır. Blokzincir teknolojisi ise bu ağa bağlı her makinenin diğerleri ile şifreli olarak konuşmasına imkân tanımaktadır. Blokzincir, her makinenin anlık olarak birbirleri ile konuşmasına imkân vermesi yanında, anlık olarak "bu işlem gerçekleştirildi" şeklinde onay vermelerini de sağlayan bir mutabakat mekanizmasını da beraberinde getirmektedir. Blokzinciri önemli kılan nokta da burasıdır. Çünkü önceden (ve günümüzde halen) güveni sağlamak için bir aracıya (veya otoriteye) ihtiyaç duyulmaktayken, blokzincir sayesinde bu güven makineler arasında mutabakat yoluyla otomatik olarak sağlanacaktır. Blokzincir sisteminde birbirlerine uzaktan bağlı makineler, ortak bir mutabakat yoluyla, değiştirilemez bir biçimde belli işlemlerin kaydını tutmaktadır. Bu noktada öne çıkan unsur, günümüzde araçlar tarafından yürütülen her işlem ve bu işlerin olmazsa olmazı olan güven ihtiyacı, şifreleme teknolojisi sayesinde araçlardan makinelere geçmektedir (Cheng et al., 2017; Poenitzsch, 2018; Sert, 2019: 11, 42-49). Buradaki verilerin değiştirilmesi ya da sonuçların manipüle edilmesi düşük bir ihtimaldir. Sistemin ve yapının genel özelliklerine bakıldığında şu temel nitelikler öne çıkmaktadır (Aydın, 2018: 19-20; Killmeyer et al., 2017: 5-8; Şen & Alınacı, 2019: 665-666; Yiğit & Yiğit, 2018):

- Hızlı doğrulama: Sistem içerisindeki tüm işlemler kriptografik olarak hızlı doğrulanır ve tüm taraflar arasında hemen güncellenir.
- Devamlılık: Verilerin ve verilere dayalı bilgilerin kesintisiz ve zamanında kaydedilmesi sağlanır.
- Süreklilik: Sistem birden fazla merkezde çalıştığı için tek bir noktadaki arıza bütün sistemi etkilemez; sistem sorunsuz bir şekilde sürekli olarak çalışır.
- Uzlaşmaya dayanması: Veriler ancak çoğunluğun değişiklik talebini olumlu karşılması yoluyla değiştirilebilir ya da bloklar üzerinde oynama yapılabilir.
- Karşılıklılık: İşlemlerin gerçekleşmesi için karşılıklı iki kişi ya da grubun uzlaşısı yeterlidir. Üçüncü bir onay mekanizmasına ihtiyaç olmadığı gibi ikili anlaşmaların kurulması da rıza temeline dayanır.
- Herkese açık bir veri tabanı olması: Kısıtlanmadığı takdirde blokzincir, herkese açık bir veri tabanıdır. İstedığı zaman herkes, sisteme veri girebilir ve sistemde işlem yapabilir.
- Şeffaflığı sağlaması: Blokzincir üzerinde bulunan bütün bilgilerin herkes tarafından görülebilir ve incelenebilir olması tüm gruplar için şeffaflık sağlamaktadır.
- Dağıtık Bir Sistem Olması: Blokzincir, merkezi bir noktası olmayan bir ağıdır. Ağda bulunan katılımcılardan bir veya birkaçının hile yapması veya kaybolması ağın işleyişini etkilemez. Ağda bulunan katılımcıların çoğunluğunun protokol kurallarına uyması durumunda ağ işleyişine devam eder.
- Verilerin Sıralı ve Zaman Damgalı Olması: Blokzincir üzerindeki kayıtlı veriler sıralı ve birbirlerine bağlıdır. Verilerin sırası değiştirilemez. Veriler, kaydedildikleri zamanı içeren bir zaman damgasına sahiptirler.
- Bilgilerin Değiştirilemez Olması: Kaydedilen bilgiler, ortakların çoğunluğu anlaşmadığı sürece silinemezler. Bilgilerin silinmeye çalışılması durumunda, daha eski zincir herhangi bir kişide bile bulunuyorsa, silinmeye çalışan bilgilerin varlığı ve doğruluğu teyit edilebilir.

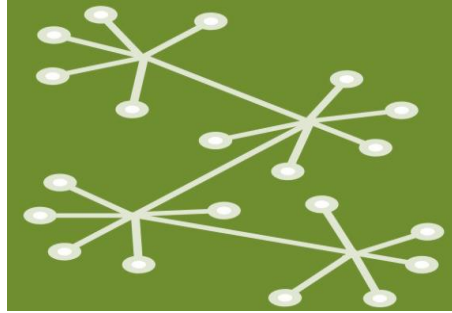
Şekil: 1
Merkezi Veri Sistemi



Kaynak: Poenitzsch, 2018.

Web 1.0 teknolojilerinin dönüşmesi tek elden değil, etkileşimli veri ve bilgi akışının sağlandığı Web 2.0 teknolojileri sosyal medya gibi platformları olanaklı kılmıştır. Bu sayede kamu sektörü açısından, devlet-vatandaş ilişkisinde karşılıklı prensibi hayata geçirilmiştir. Şekil 2’de bu prensibe göre çalışan veri sistemi olarak adem-i merkezi yapılanma görselleştirilmiştir:

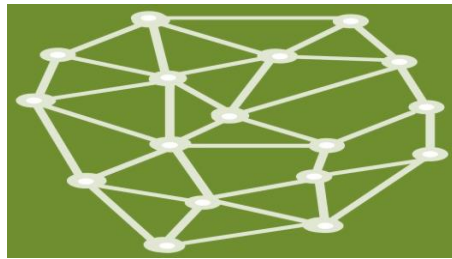
Şekil: 2
Adem-i Merkezi Veri Sistemi



Kaynak: Poenitzsch, 2018.

Son olarak Web 3.0 teknolojileri kişilere daha fazla rol veren ve kişilere özgü ve özgün modelleri olanaklı kılan bir teknoloji olarak öne çıkmaktadır. Blokzincir teknolojisi de kişiye özgü kriptografi çalışmaları mantığıyla hayata geçirilmiş ve dağıtık bir veri sistemiyle çalışan bir yapıdır. Aşağıda Şekil 3’te bu tip bir veri sistemi modeli görselleştirilmiştir:

Şekil: 3
Blokzincir Tipi Dağıtık Veri Sistemi



Kaynak: Poenitzsch, 2018.

İlk görselde yer alan merkezi sistemler Web 1.0 olarak tanımlanan, merkezde tutulan ve merkezden dağıtılan veriyi ifade etmektedir. İkinci şekilde ise belirli merkezlerde toplanabilen ve merkezler eliyle dağıtılabilen veriler söz konusudur. Son görselde ise dağıtık bir yapı kurgulanmış ve pek çok farklı yerde tutulan ve her biri bir veri merkezine dönüşen sistem görselleştirilmiştir.

3. Blokzincir Teknolojisinin Potansiyel Kullanım Alanları

Blokzincir teknolojisinin kamu yönetimi alanında meydana getireceği potansiyel yenilikler sayesinde devlet kurumlarının işlem maliyetinin azalması; kamu sektörü, özel sektör ve sivil toplum kuruluşları arasındaki uyumluluğun artması; dolandırıcılık ve sahteciliğin azaltılması; aracıları ortadan kaldırarak zamandan ve paradan tasarruf sağlaması; işlemlerde geriye dönük tahribat yapılamaması nedeniyle yolsuzluğu azaltılması ve kamu bürokrasisine olan güvenin artması gibi bir takım olumlu yönlerden bahsedilmektedir. Blokzincir teknolojisi incelendiğinde, yenilikçi uygulamalara destek veren bir yan ürün olarak kullanılabilmesi dikkat çekicidir. Örneğin veri güvenliğinin sağlanması, kimlik doğrulama sistemlerine altyapı sağlaması, evrak/bilgi kayıt ve saklama konusunda yenilikçi uygulamalar imkân tanınması, lojistik ve ürün takip sistemlerinde, tarım, finans, sağlık, sosyal güvenlik, güvenlik gibi alt politika başlıklarında kullanılması bu teknolojinin kamu yönetimi açısından önemini ortaya koymaktadır. Ayrıca sistemin yönetişimci yapısı açık veri gibi yenilikçi uygulamalarla birlikte paylaşımcı yönetimlere imkân tanımaktadır.

İşlem maliyetlerini düşürmesi, işlemleri hızlandırması, veri güvenliği, veri gizliliği gibi katkılarının yanında blokzincir de diğer teknolojiler gibi sihirli bir değnek değildir. Önemli olan uygun projelerde ve gerekli başlıklarda devlet tarafından kullanılmasıdır. Hangi konularda, hangi başlıklarda kullanılacağına seçiminde veri hassasiyetleri ve maliyetler önemli kriterlerdir. Çünkü faydalarının yanında yüksek yatırım ve işletim maliyetleri nedeniyle karmaşık bir süreç gerektiren her işlemde blokzincirlerin kullanılması uygun değildir. Öte yandan veriler farklı kaynaklarda tutulduğu için her bir veri merkezinin enerji tüketimi dolayısıyla yüksek enerji tüketimi, her bir merkez için gerekli teçhizatlar nedeniyle yüksek kaynak gereksinimi, daha fazla somut depolama alanı ihtiyacı gibi hususlar önemli sorun alanlarındadır. İkinci nesil çalışmalarda enerji tüketimleri düşürülse ve bulut gibi depolama teknolojileriyle etkileşim çabaları artsa da halihazırda bu sorunlar göz ardı edilemeyecek başlıklardandır. Ayrıca kamusal ve şahsi blokzincirler arasındaki veri paylaşım protokol farklılıkları dolayısıyla kurucuların ve kodların akıbeti ve sonrasında verilerin güvenliği meselesi de kuruluş aşamasında dikkate alınması gereken önceliklerdendir (Berryhill et al., 2018: 31; Sert, 2019: 51-52).

Blokzincirin halihazırdaki en büyük kullanım alanı kripto paralardır. Bitcoin öncülüğünde gelişen bu yeni piyasa 2017'de 800 milyon dolarlık bir hacme, 2021 yılında ise yaklaşık iki buçuk trilyon dolarlık bir hacme erişmiştir (CoinMarketCap, 2021; Cong & He, 2018). Bu piyasadaki en önemli sorun devletin ya da devletlerin müdahil ol(a)maması nedeniyle kara para trafiğinin ve yasadışı işlemlerin gerçekleştirilmesidir. Blokzincirlerin üçüncü tarafların onayına ihtiyaç duymaması nedeniyle bu işlemler kontrolden ve izlemeden uzak biçimde yürütülebilmektedir. Kripto paraların da dayanağı olan bu teknolojilerin en yaygın kullanımı alanı devletler açısından henüz yarı kapalı bir alan olan uluslararası para transferleridir.

Blokzincir teknolojisinin vatandaşlar (hatta işletmeler ve kamu kurumları) için dijital kimlikler oluşturulması amacıyla kullanılacağı öngörülmektedir. Dijital kimlik oluşturmanın yanı sıra, dijital kimlikle işlemler yapmak (örneğin, doğum ve ölüm belgeleri, evlilik cüzdanları, pasaport ve vize bilgileri) için blokzincir teknolojisi kullanılabilir (Berryhill et al., 2018: 25). Özellikle kamu kurumları için dijital kimliklerin oluşturulması ve bunların güvenliği önem arz etmektedir. Çünkü kamu hizmetini kullanan vatandaşların hepsi, kötü niyetli kişilerin devletin veritabanına ulaşabilecekleri ve mevcut kayıtların değiştirilebileceği veya çalınabileceği endişesini taşımaktadır. Örneğin, 2015 yılında bilgisayar korsanları, ABD Hükümeti'nin sabıka kaydına tabi tuttuğu yaklaşık yirmi milyon kişinin kişisel verilerini, sosyal güvenlik numaralarını, parmak izlerini, istihdam geçmişini ve finansal bilgilerini ele geçirmişlerdir. Şifreleme yöntemleri hiçbir zaman tam koruma sağlamasa da blokzincir teknolojisi günümüzün mevcut şifreleme yöntemlerinde gerçekleşen ihlalleri daha zor hale getirmektedir (Cheng et al., 2017).

Vatandaşlar için kimlik bilgilerinin çalınması veya değiştirilmesi endişesi medikal veriler için de geçerlidir. Örneğin, 2015 yılında bir bilgisayar korsanı, on milyon Amerikalının sağlık bilgilerini içeren verileri bir milyon ABD dolarından satışa çıkarmıştır (Whittaker, 2016). Dolayısıyla verilerin bir arada tutulduğu merkezi yapılar güvenlik açığını da beraberinde getirmektedir. Günümüzde sağlık kurumlarının hastaya ilişkin tuttukları bilgilerin diğer sağlık kurumları ile paylaşımında da sıkıntılar olduğu ifade edilmektedir. Bu kapsamda sağlık kurumlarının kullandıkları sistemler farklı olduğundan dolayı birbiri ile iletişime geçememekte ve gecikmeler yaşanmaktadır. Bu bilginin hastanın kontrolünde olması durumunda ise acil müdahale gerektiren durumlarda hasta veya yakınları tarafından sağlık kurumlarına bu bilgilere erişim izni verilebileceği ve gerekli müdahalenin zamanında yapılabileceği belirtilmektedir (Sert, 2019: 16-17). Sağlık alanındaki kişisel kayıtlar da blokzincir teknolojisi ile yönetilebilir. Örneğin sağlık kayıtları, bir ağıdaki veya bir ülkedeki tüm hastaneler için erişilebilir ve birlikte çalışabilir hale getirilebilir (Berryhill et al., 2018: 25). Bu kayıtlara ancak hasta izin verdiği ölçüde ilgili kuruluşlar ulaşabileceklerdir. Ayrıca, tıbbi verilerin korunmasında kullanılan merkezi bilgisayar sisteminin güvenlik açıkları ortadan kaldırılabilir. Sağlık, ilaç ve sigorta şirketlerinin ortak bir blokzincir veri tabanına geçmesi, hizmet sunumunda maliyetleri azaltacak ve zamandan tasarruf sağlanabilecektir. Yine oluşturulacak ortak veritabanı sayesinde bireyin belirli işleri yapıp yapamayacağını tespiti daha güvenli hale gelebilecek, sağlık testlerinde sahtekârlığın önüne geçilebilecek ve şeffaflığı artıracak sağlık kartesi-pasaportu uygulamaları gerçekleştirilebilecektir (TBV, 2020).

Blokzincir aynı zamanda sahtecilikle ve dolandırıcılıkla mücadelede önemli bir araç olma potansiyeline sahiptir. Bir kısmı yukarıda da belirtilen kimlik bilgilerin, tapu kayıtlarının, vergilerin denetlenmesi veya tedarik zincirinin güvenliği konularında blokzincir sahtecilik ve hile risklerinin azaltılmasında veya daha önce gerçekleşmiş hileli işlemlerin belirlenmesinde yönetimlere yardımcı olabilecektir. Bu kapsamda bir diğer konu telif hakları meselesidir. Blokzincir, işlemlerde zaman damgalı olması özelliği sayesinde telif hakkı konusu olan esere zaman damgası vurulması, eserin kalıcı bir kaydının oluşturulması ve bu alanda müşterilere (telif hakkı sahiplerine) telif hakkının bir sahiplik ve

varoluşunun ispatı olarak telif hakkı sertifikası verilmesi gibi alanlarda kullanılabilir (Berryhill et al., 2018: 27). Sıralanan örnek kullanım alanlarından bazıları halihazırda uygulama şansı bulmaktadır. Farklı coğrafyalarda ve merkezi, bölgesel ya da yerel farklı düzeylerde kamu yönetimleri blokzincir temelli dijital uygulamalardan faydalanmaktadır. Sonraki başlıkta bu örneklerle değinilecektir.

4. Blokzincir Temelli Örnek Uygulamalar

Blokzincir teknolojisi, hızla gelişmekte olan bir teknolojidir. Bu bağlamda farklı ülkelerde farklı uygulamalarda bu teknolojinin kullanım alanları da yaygınlaşmaktadır. 2018 yılında gerçekleştirilen bir araştırmaya göre Afrika'dan Asya'ya, Avrupa'dan Amerika'ya farklı bölgelerde ve gelişmişlik düzeyi değişen ülkelerde bu teknoloji kullanıma geçmiş durumdadır. Aşağıda yer alan Şekil 4'te bu araştırmaya göre blokzincir temelli olarak yürütülen projeler ve ev sahibi ülkeler gösterilmiştir:

Şekil 4
Blokzincir Temelli Projelerin Küresel Görünümü



OECD'nin üye ülkelerde yaptığı gayrimenkul işlemlerine ilişkin araştırmaya göre alıcılar gayrimenkul işlemlerinin kaydı için yılda 3,5 milyar dolar ücret ödemektedirler.

Gayrimenkul alım satım işlerinin dijital ortama aktarılması ile bu hizmetlerin hükümete ve vatandaşlara olan maliyetlerinin önemli ölçüde azaltılabileceği ve maliyetlerde sağlanan tasarrufların vatandaşlara aktarılabileceği öngörülmektedir. Gayrimenkul işlemlerinin dijital ortamda yapılmasını bu gibi avantajlarına binaen Gürcistan Hükümeti, blokzincir teknolojisini kullanarak mülkiyet işlemlerinin sınırlı bir maliyetle alımı ve devrine imkân veren bir akıllı telefon uygulamasını kullanıma sokmayı planlamaktadır (Cheng et al., 2017). Estonya'da anahtarsız e-imza süreçleri için blokzincir teknolojisi kullanılmıştır ve vatandaşlar kendilerine özgü işlemleri gerçekleştirmek için sistemi kullanabilmektedirler. Gürcistan'da tapu kayıtları ve konut satışları için bir blokzincir veri sistemi kurma çalışmaları devam etmektedir. Aslında yalnızca elektronik seçimler için değil hem kamu sektörünün hizmet sunumunda hem de vatandaşların devletle ilişkisinde bu teknoloji den faydalanmak mümkündür. Vergi takibinden vasiyet, dilekçe ve sözleşme gibi ikili işlemlere; patent işlemlerinden, tapu, nüfus, sosyal güvenlik ve sağlık bilgileri gibi kayıt işlemlerine; lojistik faaliyetlerinden, uluslararası ticarete; kimlik doğrulama sistemlerinden finans işlemlerine, elektronik belge yönetim sistemlerinden, gıda kontrol sistemlerine; tedarik zincirlerinden tüm hukuki sözleşmelere ya da tüm arşiv kayıtlarına kadar pek çok alanda blokzincir teknolojilerinden faydalanılmaktadır.

Hollanda, blokzincir ödemeleri ve emeklilik yönetimi arasındaki büyük benzerlikler fikrinden yola çıkarak Emeklilik Altyapısı adlı bir proje üzerinde çalışmaktadır. Projenin amacı, vatandaşlar için daha esnek ve şeffaf bir yönetim sistemi geliştirmek ve aynı zamanda emeklilik yönetimi maliyetlerini önemli ölçüde düşürmektir. Proje, emeklilik planlarının (tümünün) tarihsel ve güncel bakiyesine erişimi olan vatandaşlardan, işverenlerden gelen bordro verilerine dayanan otomatik vergi beyannamelerine kadar emeklilik sistemi yönetiminin tüm yönlerine odaklanmaktadır. Proje, emeklilik sistemine dâhil olan tüm aktörler için özelleştirilmiş ve güncel veriler sağlayacak ortak yeni bir veritabanı oluşturmayı amaçlamaktadır. Yeni blokzincir tabanlı uygulamanın, emeklilik yönetim sisteminin verimliliğini ve sistemin denetlenebilirliğini artırarak ve ayrıca vatandaşlar için işlem maliyetlerini düşürerek miktarı milyonlara varan oranda tasarruf sağlaması beklenmektedir (Allessie et al., 2019: 38-41).

Danimarka'da araçların sicil, kaza ve bakım gibi tüm kayıtlarının tutulduğu ve araç hırsızlığını ve usulsüzlüklerini önlemeye yönelik blokzincir tabanlı bir sistem geliştirilmiştir. Gana'da kadastro işlemleri, Singapur'da lojistik ve ticaret faaliyetleri için blokzincir kullanıma sunulmuştur. İngiltere sosyal yardım sistemindeki kaçakların önlenmesi için yardım alanlara yönelik blokzincir temelli bir kimlikleme sistemi oluşturulmuş ve yardım programı bu sistem üzerinden işletilir hale gelmiştir (Cheng et al., 2017; Tüfekçi & Karahan, 2019: 171; Walport, 2016: 67). Amerika Birleşik Devletleri İç Güvenlik Teşkilatı tarafından hazırlanan bir projede ise sınır güvenliğinde kimlik kontrollerinin sağlanması ve verilerin saklanması için blokzincirden faydalanılmıştır. Güney Kore'de ise daha bütüncül bir yaklaşım göstererek Samsung firmasıyla iş birliği içerisinde gümrük kontrolleri, toplu taşıma ve sosyal güvenlik gibi alanlarda blokzincir üzerinde hazırlanmış kayıt sistemleri kullanılması amaçlanmıştır; ilk uygulamalar 2018 yılında başlatılmıştır (Tüfekçi & Karahan, 2019: 176; USDHS, 2016).

Yeni Zelanda'da Hükümetin desteğiyle blokzincir ve dağıtık defter teknolojilerini değerlendirmek amacıyla Yeni Zelanda Blokzincir Birliği kurulmuştur. Bu kuruluş sadece Yeni Zelanda doları ile alınabilen "Dasset" isimli dijital bir para birimi üretmiştir. Bu para biriminin üretilmesindeki amaç, Yeni Zelanda devletinin öncelikleri doğrultusunda "dijital ulus" bilincini geliştirmektir. Ayrıca tarımsal üretimle de ön plana çıkan Yeni Zelanda'da Hükümet, blokzincir teknolojisini kullanarak gıda güvenliğini sağlamaya yönelik çalışmalar yapmayı planlamaktadır. Proje hayata geçtiğinde tüketiciler, ilgili gıda maddesinin nerede üretildiği, nasıl nakliye edildiği, tazeliği, güvenliği ve ürünün kalitesi hakkında bilgilere erişebileceklerdir (Özaltın & Ersoy, 2020: 755).

Yerel ölçekte de farklı uygulamalar gözlenebilmektedir: Örneğin, Belçika'nın Antwerp ve İspanya'nın Aragon kentlerinde yerel yönetimlerin tedarik süreçlerini takip etmek için blokzincir teknolojileri kullanılmaktadır. Hollanda'nın Gröningen şehrinde yerel yönetimin belediyenin sunduğu hizmetlerden faydalanmak için vatandaşlara verdiği şehir kimlikleri blokzincir eliyle tasarlanmış ve kullanıma sunulmuştur. Kanada'da yerel ve bölgesel düzeyde, firmaların kayıt ve izin işlemleri için blokzincir sistemlerinden yararlanılmaktadır. Viyana'da kurulan yerel açık veri portalı da blokzincir teknolojisiyle tasarlanarak bir yerel veri paylaşım sistemi oluşturulmuştur (Lindman et al., 2020: 57-58).

5. Blokzincir Teknolojisi ve Türkiye

Blokzincir teknolojisi ve beraberinde getirdiği yenilikçi, güvenli ve hızlı hizmet anlayışı tüm dünyada olduğu gibi Türkiye'de de yakından takip edilmektedir. On Birinci Kalkınma Planında (2019-2023), blokzincir tabanlı dijital merkez bankası parasının uygulamaya konulacağı (249.5), blokzincir uygulamalarının yaygınlaştırılmasını teminen ulaştırma ve gümrük hizmetlerinde gerekli hukuki ve fiziki altyapı çalışmalarının tamamlanacağı (508.3) ifade edilmiştir. Ayrıca, kamu hizmetlerinin iyileştirilmesinde büyük veri, bulut bilişim, mobil platformlar, nesnelerin interneti, yapay zekâ, blokzincir gibi yeni teknolojilerden faydalanılabilmesi için süreç ve teknolojik altyapı iyileştirmeleri yapılacağı belirtilmiştir (809.2).

Türkiye Bilimsel ve Teknolojik Araştırma Kurumunun Bilişim ve Bilgi Güvenliği İleri Teknolojiler Araştırma Merkezi (TÜBİTAK BİLGEM) de blokzincir teknolojisi üzerine çalışmaları sürdürmektedir. TÜBİTAK BİLGEM ayrıca blokzincir teknolojisi üzerinde sistemin teknik altyapısı, kurulumu, güvenlik ve mahremiyet analizi, iş modelleri, kitle fonlama yaklaşımları ve muhtelif teknik detayları üzerinde Ar-Ge faaliyetleri gerçekleştiren Blokzincir Araştırma Laboratuvarı kurmuştur. Blokzincir teknolojisinin altyapısını kurmak amacıyla TÜBİTAK BİLGEM, kamu sektörü, özel sektör ve akademisyenlerle de ortak çalışmalar gerçekleştirmektedir (Yıldırım, 2019). Türkiye'de kamu ve özel sektörden temsilciler, profesyoneller, akademisyenler ve araştırmacılar, blokzincir teknolojisinde yaşanan gelişmeleri değerlendirmek amacıyla iki defa Ulusal Blokzincir Çalıştayı gerçekleştirmişleridir. Bunlardan ilki, 2-3 Nisan 2018, ikincisi ise, 25-26 Eylül 2019 tarihlerinde gerçekleştirilmiştir.

2020 Yılı Cumhurbaşkanlığı Yıllık Programı'nda Merkez Bankası'nın blokzincir tabanlı dijital parasının uygulamaya konulacağı ve Anlık Ödeme Sistemi'nin tasarım ve yazılım geliştirme aşamalarının tamamlanacağı, test çalışmalarına başlanacağı bilgisine yer verilmiştir. Ayrıca Hazine ve Maliye Bakanlığı, Merkez Bankası ve Bankacılık Düzenleme ve Denetleme Kurumu'nun iş birliğini yürüteceği Ödeme Hizmetleri ve Elektronik Para Kuruluşları Birliği'nin kurulacağını duyurmuştur. Cumhurbaşkanlığı Programı'nda, bu örgütün kurulabilmesi için 6493 sayılı Ödeme ve Menkul Kıymet Mutabakat Sistemleri, Ödeme Hizmetleri ve Elektronik Para Kuruluşları Hakkında Kanun'da değişiklik yapılması çalışmalarının yürütüleceği belirtilmiştir (Ekinci, 2019).

Türkiye'nin blokzincir politikalarının merkezinde Blokzincir teknolojisinin ortaya çıkma amacı olan dijital para ve transferi olduğu görülmektedir. Nitekim 27 Mayıs 2020'de Türkiye İş Bankası, dış ticarete blokzincir teknolojisi kullanmaya başlayan ilk Türk Bankası olduğunu duyurmuştur (Özaltın, 2021: 78). Türkiye'de blokzincir teknolojisi ile ilgili test çalışmaları yürüten kurumların başında Bankalararası Kart Merkezi (BKM) gelmektedir. Blokzincir teknolojisi ile yakından ilgilenen BKM, BBN olarak kısaltılan "Bye Bye Nakit" mottosu altında "Keklik" adını verdikleri bir blokzincir uygulaması ile sistemi kendi merkezlerinde test etmektedirler (Tüfekçi & Kaplan, 2019: 182). 2020 yılı Cumhurbaşkanlığı Yıllık Programı'nda Hazine ve Maliye Bakanlığı, Merkez Bankası ve Bankacılık Düzenleme ve Denetleme Kurumu iş birliğinde Ödeme Hizmetleri ve Elektronik Para Kuruluşları Birliği kurulacağı beyan edilmiş ve 2020 yılı içerisinde birlik faaliyetine geçirilmiştir (Ekinci, 2019; TÖDEB, 2020).

6. Kamu Yönetiminde Blokzincir Teknolojisi ve Gelecek Tartışmalar

Kamu yönetiminde teknolojiyi merkeze alan "dijital devlet" yaklaşımı kamu yönetiminin modernizasyonunda dijitalleşmeyi bir girdi olarak kabul ederek; kullanıcı merkezli, hızlı ve yenilikçi kamu hizmetlerinin verilmesine odaklanmaktadır. Blokzincir, kamu hizmetlerinin dijitalleştirilmesinde ve yenilikçi hizmet sunumunda dikkate alınması gereken en yenilikçi teknolojilerden biri olarak ön plana çıkmaktadır. Yalnızca tekil teknoloji olarak değil aynı zamanda blokzincir teknolojisi, hâlihazırda birçok yenilikçi uygulamayı bünyesinde barındıran ve ileride daha yenilikçi uygulamalara da kapı açabilecek bir teknolojidir. Blokzincirin kamu sektöründe kullanımının yaygınlaşması ile bürokrasinin dijital olarak sunduğu hizmetlerin sayısının daha da artacağı öngörülmektedir. Örneğin, Deloitte (2018) tarafından yapılan bir araştırmada, blokzincir uygulamalarının Türkiye'de - 2018 yılı baz alınarak- beş yıl içinde etkili olabileceği ifade edilmiştir. Yine aynı araştırmada, yöneticilerin %71'inin blokzincir teknolojisini etkileyebilecek yasal düzenlemeler hakkında yeterli bilgileri olmadığı sonucuna ulaşılmıştır. Bu nedenle genel anlamda blokzincir teknolojisinin, özel anlamda ise kripto paraların yasal dayanağa kavuşturulması çok önemli bir konudur. Çünkü kripto paralar devletler için kara para aklanması ve terörün finansmanı gibi birtakım riskleri de beraberinde getirmektedir (Özkan, 2019: 38). Buna engel olmak amacıyla, örneğin Japonya'da, kara para aklamayla mücadele konusunda kripto para ticareti üzerinde oldukça sıkı denetimler yürütmektedir. Aynı şekilde İsviçre'de de kriptopara faaliyetleri kara para aklama regülasyonuna tabi tutulmaktadır

(Özkan, 2019: 19, 23; Ünalın, 2019: 150). Kripto paralar hakkında düzenleme yapma fikri gittikçe yaygınlaşmaktadır. ABD ve Çin'de yakın zamanda konuya ilişkin yeni düzenlemelerin geleceğine dair söylentiler hız kazanmıştır.

Bakıldığında kripto paralar başta olmak üzere, blokzincirlerle ilgili devletlerin izleyici değil, düzenleyici olarak yer alması devletlerin hakimiyeti açısından önemlidir. Blokzincir mantığının arkasında merkezi bir otorite olmadan işlem yapabilme imkânı yer almaktadır, öte yandan devletlerin müdahale alanı dışında kalan bölgenin genişlemesi devletlerin meşruiyet sorunları yaşamasına neden olabilecektir. Öte yandan bu alanlara yönelik yalnızca kısıtlayıcı tedbirler değil, bu alanın kontrollü gelişimine yönelik tedbirler de alınmalıdır. Bunları yapabilmek için de alanın işleyişini ve mantığını bilen nitelikli personele ihtiyaç vardır. Yalnızca teknik bilgi değil, bu tekniklerin yönetimde ve politika yapımında nasıl kullanılacağı konusunda çalışma yapabilecek kamu görevlileri yetiştirilmelidir. Bu konuda salt eğitimlerinden ziyade, farkındalık ve birlikte çalışma ortamı sağlayacak iş birliklerine ihtiyaç vardır. Böylece uygun hizmet alanlarında blokzincir eliyle hizmet sunum kaliteleri geliştirilebilecektir. Ayrıca veri-temelli politika yapım süreçlerinin gelişmesinde, gizliliğin ve güvenliğin sağlanmasında da bu teknoloji kullanılabilir. Yapının karar modelleri iş birliklerine ve yönetişimci mekanizmalara uygundur. Dolayısıyla zengin karar alma süreçleri ve birlikte yönetim uygulamaları geliştirilebilecek bir alan olarak blokzincir üzerinde dikkatle durulması gereken bir teknolojidir.

Blokzincir teknolojisini öncelikli olarak sanal paralar ekseninde kullanmak isteyen Türkiye'de de bu alandaki güvenliğin temini adına yasal dayanak oluşturulmalıdır. Blokzincir konusunda Türkiye açısından ilk önceliğin kalkınma planlarına, eylem planlarına, strateji belgelerine girmiş bu teknolojiye dair öncelikli ve müstakil bir strateji belgesi hazırlanmasıdır. Farklı kurumlarda ve kuruluşlarda yürütülen çalışmaların desteklenmesi ve diğer kurumlara yönelik transfer imkanları araştırılmalıdır. Bu konuda ön alıcı düzenlemelerin yapılması, Merkez Bankası'nın yürüttüğü dijital para gibi uygulamaların hızlandırılması öncelikli çalışmalarındandır.

Yasal altyapının yanında teknolojik altyapının tesisi de blokzincirden etkili olarak yararlanabilmek için gerekli olan bir unsurdur. Blokzincir teknolojisi zamandan ve işlem maliyetlerinden önemli ölçüde tasarruf sağlamaya imkân verse de bu teknolojinin kurulum aşamasındaki yüksek yatırım maliyetleri caydırıcı olabilmektedir. Türkiye açısından değerlendirildiğinde bu alanda yeterli insan kaynağının olmaması, öğrenme sürecinin uzunluğu ve öngörülmeden yazılım risklerinin var olması gibi etkenler blokzincir teknolojisinin yerleşmesini geciktirebilecek ve bu teknolojiye sahip olma maliyetini arttırabilecektir (Usta & Doğanekin, 2021: 99). Blokzincir teknolojisinden verim almak için Türkiye, bu teknoloji için gereken altyapı ve insan kaynağı yetiştirme konularında çalışmalar yapmalıdır.

Blokzincir teknolojisinin ortaya çıkardığı (potansiyel) yeniliklerin, devletler için yeni aracılık rolleri geliştirmesi ya da aracılığın ortadan kaldırılması sonucunu doğurma ihtimalini de barındırmaktadır. Yani blokzincir teknolojisi ikili anlaşmaları onay

mekanizması olmadan yerine getirmesi hasebiyle, merkezi yapıları sarsabilecektir. Öte yandan devletin düzenlemesiyle meşruiyet kazanabilecek bir alandan da söz etmek mümkündür. Avrupa Birliği ülkelerinde yapılan bir araştırmada, devletlerin doğrudan katılımı olmaksızın sivil yönetişimi mümkün kılan blokzincirin potansiyel dönüştürücü gücünü belirginleştiren hizmetlere rastlanmamıştır (Özaltın, 2021: 81). Bu savdan hareketle devlet, blokzincir teknolojisinin gelişmesi ile doğru orantılı biçimde düzenleyici rolünü sürdürmeye özen göstermelidir. Özellikle kamu yöneticilerine veri okuryazarlığı becerisi kazandırılmalıdır (Şat, 2019: 140). Blokzincir teknolojisi sayesinde gelen akıllı sözleşmeler, merkezi olmayan otonom örgütler ve piyasa kuralları ile yönetilen ve tamamen merkezi olmayan bir toplumda teknoloji okuryazarlığı olan bireyler teknoloji okuryazarlığı olmayan bireylere göre daha avantajlı konuma yükselebileceklerdir (Artzori, 2015: 27). Bu amaçla dijital okuryazarlık eğitimlerinin yaygınlaştırılması, olası yeni sayısal uçurumların önüne geçebilecektir.

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Türk Bankacılık Sektöründe Piyasa Yapısının Panzar ve Rosse H İstatistiği ile Tahmini: 2010-2019 Dönemi Dinamik Panel (GMM) Uygulaması

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Estimating The Market Structure of Turkish Banking Sector by The Panzar and Rosse H Statistic: Dynamic Panel Estimation (GMM) in 2010-2019 Period

Abstract

As a result of the decreasing inflation rates beginning by the year 2003 in the Turkish Economy, interest rates have decreased, thereby making bank loans favourable. How banks that desire to get a share from the expanding loan market affect the level of competition has become a subject to be curious about. This paper aims to estimate the Panzar and Rosse H Statistic to determine the market structure of the Turkish banking sector in the 2010-2019 period. Dynamic panel estimation (GMM) indicates that the market structure is monopolistic in the analysis period.

Keywords : Turkish Banking Sector, Panzar and Rosse Model, Dynamic Panel (GMM) Analysis.

JEL Classification Codes : L11, L22.

Öz

Türkiye ekonomisinde 2003 yılından itibaren düşmeye başlayan enflasyona bağlı olarak faiz oranları da gerilemiş, bu süreç bankalardan kredi kullanımını cazip hale getirmiştir. Genişleyen kredi piyasasından pay almak isteyen bankaların, piyasada rekabet düzeyini nasıl etkiledikleri merak edilen bir konu haline gelmiştir. Bu çalışmada, 2010-2019 döneminde Türk bankacılık sektörü piyasa yapısını belirlemek için Panzar ve Rosse H istatistiğini tahmin etmek amaçlanmıştır. Dinamik panel yöntemiyle (GMM) yapılan tahmin, söz konusu dönemde piyasa yapısının monopol olduğunu göstermiştir.

Anahtar Sözcükler : Türk Bankacılık Sektörü, Panzar ve Rosse Modeli, Dinamik Panel (GMM) Analizi.

1. Giriş

Türkiye ekonomisinde 1980'lerden sonra üç haneli rakamlara kadar yükselen enflasyon oranlarının ardından, 2003 yılında uygulamaya konulan "Güçlü Ekonomiye Geçiş" programı ile enflasyon tek haneli oranlara gerilemiştir. Son 10 yılda özellikle azalan enflasyon oranına bağlı olarak düşen faiz oranları, hane halkının şimdiye dek olmadığı kadar bankalardan kredi kullanmalarına neden olmuştur. Kredi piyasasında oluşan yoğun kredi talebinden pay almak isteyen ticari bankalar, birbirleriyle büyük bir yarışa girmişlerdir. Ortaya çıkan bu durum, doğal olarak Türk bankacılık sektöründe son dönemde piyasa yapısının ne olabileceği merakını doğurmuş ve literatürde bu konuyu farklı yöntemler kullanarak araştıran çalışmalar da artmaya başlamıştır.

Geleneksel yapı-davranış-performans yaklaşımı, firmalar arasındaki rekabetin fiyatları aşağıya çekerek toplumsal faydayı artıracaklarını bununla birlikte firmaların kendi aralarında anlaşmaları ve rekabeti engellemeleri halinde ise fiyatların yükseleceği ve toplumsal faydanın azalacağını ileri sürer. Bain (1951: 323)'in "işbirliği hipotezi", piyasada çok sayıda firma olması halinde piyasadaki yoğunlaşma oranının azalacağı ve bunun da rekabeti artıracaklarını ileri sürmektedir. Demsetz (1973: 2-6) ise "etkin yapı hipotezi"nde piyasada bulunan firmalardan bazılarının maliyetlerinin diğerlerine göre daha düşük yani bu firmaların daha etkin üretim yapması durumunda piyasa yoğunlaşma oranının yüksek olabileceğini, ortaya çıkan bu yüksek yoğunlaşmanın piyasada rekabet olmadığı anlamına gelmeyeceği aksine etkin firmaların çokluğunun rekabetçi yapıyı işaret ettiğini ileri sürmektedir. Her iki yaklaşımda piyasada firmalar arasındaki rekabetin belirlenmesi için yoğunlaşma oranı ve firmaların etkinlik düzeylerinin bilinmesine ve yorumlanmasına gerek duyulmaktadır. Ayrıca yoğunlaşma oranı ve piyasa ortalama etkinlik düzeyi sadece piyasadaki rekabet düzeyi hakkında bize ortalama bir bilgi verecektir. 1980'lerden sonra ortaya çıkan yeni ampirik endüstri iktisadı kapsamında geliştirilen yöntemler bugün bize herhangi bir sektörde firmalar arasındaki rekabet düzeyinin daha doğrusu bu piyasadaki yapının ne olduğu konusunda daha net bilgi verebilmektedir.

Türkiye'de finansal sistemin yaklaşık %85'ini bankalar oluşturmaktadır. Reel sektörü ucuz kredi imkanlarıyla fonlama görevi olan bankaların rekabetçi bir piyasada faaliyet göstermeleri, düşük maliyetli kredi imkanlarının artması anlamına gelmektedir. Ülkemizde özellikle bankacılık sektörü üzerine yapılan regülasyonlar bu sektördeki rekabet ortamının artması ve işlem maliyetlerinin düşürülmesine yöneliktir. Bu açıdan bakıldığında Türk bankacılık sektöründe rekabet düzeyinin belirlenmesi önemli bir konu haline geldiği gibi, politika yapıcılara da uygulanacak regülasyonlar ve politikalar konusunda yol gösterici bilgi sağlamaktadır.

Literatürde bankacılık sektöründe piyasa yapısını yeni ampirik endüstri iktisadı kapsamında geliştirilmiş olan Panzar ve Rosse H istatistiği tahmini ile belirlemeye yönelik çalışmaların önemli bir kısmının ekonometrik tahminlerde standart panel veri yöntemi kullandığı görülmüştür. Son dönemde yapılan çalışmalarda H istatistiği tahmininde standart panel veri yönteminin yanlı (biased) sonuçlar verdiği, dinamik panel veri yöntemi

kullanımının daha doğru (unbiased) sonuçlar vereceği ileri sürülmektedir. Bu çalışmada Türkiye’de düşen faiz oranları ve yoğun kredi kullanımının yaşandığı son 10 yılda sektörde kesintisiz faaliyet gösteren 26 ticari bankaya ait bilanço verileri kullanılarak, piyasa yapısını daha doğru tahmin ettiği ileri sürülen dinamik panel veri yöntemi ile Panzar ve Rosse (1987) *H* istatistiği tahmin etmek ve literatürde Türk bankacılık sektörü üzerine yapılmış olan az sayıda çalışmaya da katkı sunmak amaçlanmıştır. Çalışmanın 2. bölümünde araştırma döneminde Türk bankacılık sektöründeki gelişmeler özetlenmiş, 3. bölümde Panzar ve Rosse modeli anlatılmış, 4. bölümde ilgili literatür özetlenmiş, 5. bölümde de ekonometrik tahmin ve sonuçlar verilmiştir. Genel bir değerlendirmenin yapıldığı sonuç bölümüyle çalışma tamamlanmıştır.

2. Türk Bankacılık Sektörü: Son 10 Yıldaki Gelişmeler

Türk bankacılık sektörü 2010 yılına, Dünya ekonomisinde yaşanan 2008 Global Krizinin etkilerini atlattığı bir şekilde giriş yapmıştır. Dünya ekonomisi 2010 yılında %4,5 oranında büyüme gösterirken, Türkiye ekonomisi de iç talep destekli olarak %8,9 oranında büyüme kaydetmiştir. Hem Dünya hem de Türkiye ekonomisindeki olumlu gelişmeler, Türk bankacılık sektöründe de kendisini göstermiş ve düşen faiz oranlarına paralel olarak bankacılık sektörü toplam kredi stoku yıllık %36 oranında büyürken sektörün aktifleri de reel olarak %6 oranında büyümüştür. 2010 yılında üçü kamu bankası olmak üzere 14 yerli, 17 tane de yabancı mevduat bankası sektörde faaliyette bulunmuştur (Bankalarımız, 2010: 15).

Bankacılık sektöründeki olumlu gelişme devam etmiş sektör toplam aktiflerinin Gayri Safi Milli Hasılaya (GSMH) oranı 2010 yılında %84’ten 2011’de %90’a ve 2012’de de %94’e yükselmiştir. Bununla birlikte Avrupa Birliğinde (27 üye) bankacılık sektörü toplam aktiflerinin 2010 yılında GSMH oranı %357 ile Türk bankacılığı ile aradaki fark net görülmektedir. Sektör 2012 yılına Basel II Kriterlerinin uygulanmasıyla girmiş ve bu yılda bankaların sermaye yeterlilik oranları ortalama %18 civarında gerçekleşmiştir. Kredi genişlemesi düşen faiz oranlarına bağlı olarak devam etmiştir (Bankalarımız, 2012: 23).

Küresel ekonomide yaşanan gelişmelere de bağlı olarak uygulanan sıkı para politikası 2014 yılında kredi faiz oranlarında kısmi artışa neden olmuşsa da bankalardan kredi kullanımı artarak, kredilerin GSMH’ya oranı %72’ye yükselmiştir (Bankalarımız, 2014: 8). 2016 yılı Temmuz ayında yaşanan şoku üzerinden atmaya çalışan Türkiye ekonomisi, bankacılık sektörünün güçlü bilanço yapısı ve yüksek sermaye yeterlilik oranıyla toparlanmaya destek vermiştir. Bu dönemde faiz oranları dalgalı bir seyir izlese de son çeyrekte kredi kullanımı artarak kredilerin GSMH’a oranı %67 oranında gerçekleşmiştir (Bankalarımız, 2016: 10). Piyasalar bir şokun etkisini üzerinden atmışken Ağustos 2018’de yaşanan kur atağı piyasalarda yeni bir şok dalgası yaratmıştır. Ortaya çıkan kur artışı maliyetler üzerinde baskı yaratarak enflasyon artışına neden olmuş, doğal olarak faiz oranlarında da artış yaşanmıştır. Enflasyon oranı uzun bir aradan sonra yeniden çift haneye yükselerek yıl sonu %16,3 olarak gerçekleşmiş, mevduat faiz oranı %25’e yükselirken tüketici kredi faiz oranı ise %30’ları bulmuştur. Kredilerin GSMH’a oranı %65’e gerilerken

bankacılık sektörü toplam aktiflerinin GSMH'a oranı %104'e yükselmiştir (Bankalarımız, 2018: 12).

Türkiye ekonomisi 2019 yılının ikinci yarısında toparlanmaya başlamış ve TCMB'nin kademeli olarak faiz indirimleriyle yıllık faiz %12 seviyesine gerilemiştir. Türk lirasında yaşanan değer kaybı bankacılık sektöründe yabancı para mevduatların artmasına neden olmuştur. TCMB bu dönemden sonra kuru dengelemek için uluslararası swap işlemleri yapmaya başlamıştır. Yaşanan gelişmeler, toplam kredilerin GSMH'a oranının %62'ye gerilemesine neden olurken, yabancı para cinsinden kredilere talep olmamıştır. Bankaların yaşanan bu süreçte sermaye yeterlilik oranları %18 oranında gerçekleşmişse de sektörün tahsili gecikmiş alacakları artarak kredilere oranı %5,3 olmuştur (Bankalarımız, 2019: 20).

Görüldüğü gibi son yılın ikinci yarısında Türkiye ekonomisinde dalgalanmalar yaşanmış fakat bankacılık sektörü bu süreçte güçlü duruşunu sürdürmüştür. Sektörde rekabetçi yapıdaki gelişmeleri görmek adına ilk 5 banka yoğunlaşma oranları aşağıda verilmiştir.

Tablo: 1
İlk 5 Banka Yoğunlaşma Oranları (2010-2019)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Aktifler	63	61	60	58	58	58	57	57	56	56
Mevduat	66	62	61	59	59	60	60	60	61	61
Krediler	57	58	56	56	56	56	56	55	56	58

Kaynak: TBB, Bankalarımız Kitabı, çeşitli yıllar.

Geleneksel yapı-davranış-performans yaklaşımı, piyasadaki yoğunlaşma oranının artmasının rekabetin azaldığı azalmasının ise rekabetin arttığı anlamına geldiğini ileri sürmektedir. Bu yaklaşıma göre yoğunlaşma oranlarındaki değişim rekabet yapısındaki değişimi gösterdiği halde piyasa yapısının ne olduğunu tam olarak göstermemektedir. Bununla birlikte Tablo 2'de görüldüğü gibi son 10 yıllık dönemde Türk bankacılık sektöründe toplam aktiflere göre ilk 5 banka yoğunlaşma oranı sürekli azalma göstermektedir. Benzer yapı son iki yıl hariç kredilere göre ilk 5 banka yoğunlaşma oranı için de geçerlidir. Bu açıdan bakıldığında son 10 yıllık dönemde geleneksel yaklaşım dikkate alındığında Türk bankacılık sektöründe bankalar arası rekabet artmıştır. Mevduatlara göre ilk 5 banka yoğunlaşma oranı ise dönem ortasına doğru azalmışsa da daha sonra yeniden artmıştır.

3. Panzar ve Rosse (1987) Modeli

1980'li yıllardan sonra endüstri iktisadında geleneksel yaklaşımlardan farklı olarak piyasa yapısı ya da aynı anlamda piyasadaki rekabet düzeyini ölçmek ve piyasa yapısı hakkında kesin bir bilgiye ulaşmak üzere ekonometrik tahminlere dayanan Yeni Ampirik Endüstri İktisadı gelişme göstermiştir. Bu yaklaşım kapsamında Panzar ve Rosse (1987: 446) tarafından geliştirilmiş olan model, spesifik bir firmaya ait indirgenmiş formda gelir denklemi tahminine dayanmaktadır. İndirgenmiş formda gelir denklemi;

$$\ln R = j_0 + \sum_{k=1}^m h_k \ln W_{k_i} + j_1 \ln A_i + j_2 \ln K_i \quad i = 1, \dots, n \quad (1)$$

logaritmik formda olup bağımlı değişkenin ($\ln R$) bu çalışmada banka geliri olduğu (1) numaralı denklemde h_k ($k = 1, \dots, m$) katsayılarının ekonometrik olarak tahmin edilmesiyle piyasa yapısının ne olduğu belirlenebilmektedir. Bu denklemde W_k bankacılık sektörü girdilerini temsil etmekte olup girdi fiyatlarına göre gelir esnekliği toplamı olan Panzar ve Rosse H istatistiği $H \equiv \sum_{k=1}^m h_k$ esneklik katsayıları toplamından oluşmaktadır. (1) numaralı denklemde yer alan A vektörü firma gelirini etkilediği düşünülen talep değişkenini, K vektörü de firma kapasitesini temsil eden ve geliri etkileyen diğer açıklayıcı değişkenleri temsil etmektedir.

Yukarıda verilen denklemde banka girdi fiyatlarına göre gelir esneklik değerleri toplamını veren H istatistiği, alacağı farklı değerlere göre farklı piyasa yapılarını göstermektedir. Faktör fiyatları gelir esnekliği toplamı olan $H \leq 0$ olduğunda piyasa yapısı monopol, $0 < H < 1$ olduğunda piyasa yapısı monopolcü rekabet, $H = 1$ olduğunda da piyasa yapısı tam rekabet olmaktadır. Ekonometrik tahminlerde Wald sınırlandırılmış katsayı testi ile yapılan analiz sonuçlarına göre $H \leq 0$ hipotez testinin reddedilmesi monopolcü yapıyı dışlarken, $H \leq 1$ hipotezinin reddedilmesi de her üç piyasa yapısının da desteklenmediği anlamına gelmektedir. Ayrıca hem $H \leq 0$ hem de $H = 1$ hipotezinin reddedilmesi durumunda $H \leq 1$ hipotezinin kabul edilmesi ise piyasa yapısının monopolcü rekabet olduğunu göstermektedir. Vesala (1995: 59) yaptığı çalışmada Panzar ve Rosse H istatistiği değerleri ve karşılık gelen piyasa yapılarını aşağıdaki şekilde özetlemiştir.

Tablo: 2
PR H İstatistiği ve Piyasa Yapıları

Tahmin Edilen H değeri	Piyasa Yapısı
$H \leq 0$	Tekel piyasası, işbirlikçi yapı. Her firma kendi talep eğrisi üzerinde bağımsız hareket etmektedir.
$0 < H < 1$	Piyasaya girişlerin serbest olduğu monopolcü rekabet. Chamberlin modeli, fazla kapasite söz konusudur
$H = 1$	Tam rekabet piyasası

Kaynak: Vesala, 1995: 59.

H istatistiği değerinin daha anlaşılır olması için tam rekabet piyasası koşulları dikkate alındığında, bu piyasada girdi fiyatlarında meydana gelen oransal bir artış yine aynı oranda ortalama ve marjinal maliyetlerde artışa neden olur. Böyle bir durumda tam rekabet piyasasında firmanın denge üretim miktarı değişmediği gibi, sonsuz esnek talep eğrisi maliyet artışına bağlı olarak yukarı kayar ve fiyatın artmasına neden olur. Ortaya çıkan yeni fiyat, firma gelir düzeyinin de girdi fiyatlarında meydana gelen artış oranına eşit oranda artmasına neden olur. Sonuç olarak girdi fiyatlarına göre gelir esnekliği toplamından oluşan H istatistiği tam rekabet piyasasında "1" değerine eşit olacaktır. Diğer taraftan piyasaya girişlerin serbest olduğu monopolcü rekabet piyasası koşullarında girdi fiyatlarında meydana gelecek oransal bir artış, marjinal ve ortalama maliyetin artmasına neden olur. Maliyet artışları uzun dönemde piyasadan firma çıkışlarına sebep olur ve piyasada kalan firmaların mallarına olan talep giderek artmaya başlar. Ortaya çıkan bu talep artışı,

piyasadaki firmaların gelirlerinin artmasına dolayısıyla da H istatistiği değerinin pozitif olmasına neden olur. Son olarak piyasaya girişlerin olmadığı monopol piyasasında ise girdi fiyat artışları ortalama ve marjinal maliyetlerin artmasına neden olurken firmanın üretim miktarı azalır. Tek firmanın fiyatları kendisinin kontrol etmesine bağlı olarak maliyet artışları firma gelirini ya hiç etkilemez ya da azaltır. Piyasada birden fazla firma olması durumunda da firmalar işbirliği içinde yine monopol (tek firma) gibi davranmaktadırlar (işbirlikçi yapı). Sonuç olarak monopol piyasasında H istatistiği "0" ya da "negatif" bir değer alır (Çelik & Kaplan, 2007: 55-56).

4. Literatür

Shaffer (1982: 225), Panzar ve Rosse modelini ilk kez 1979 yılı verilerini kullanarak ABD'de New York bankacılık sektörüne uygulamış ve piyasa yapısının monopolcü rekabet olduğunu tespit etmiştir. Bu çalışmadan sonra literatürde Panzar ve Rosse modelini kullanarak farklı ülkelerde bankacılık sektörü piyasa yapısını tespit etmek üzere yapılan çalışmalar hızla artmaya başlamıştır.

Nathan ve Neave (1989: 576), Kanada bankacılık sektörü üzerine yaptıkları Panzar ve Rosse H istatistiği tahminine yönelik çalışmada 1982 yılında sektördeki yapının tam rekabet, 1983 ve 1984 yıllarında ise monopolcü rekabet olduğunu bulmuşlardır. Molyneux vd. (1994: 445), 5 Avrupa Birliği üyesi ülke bankacılık sektörü 1986-1989 dönemi için yaptıkları çalışmada Panzar ve Rosse H istatistiği değerinin sıfır ile bir arasında olduğunu ve bunun da söz konusu dönemde monopolcü rekabet yapısını temsil ettiğini belirtmişlerdir. Vesala (1995: 146-147), benzer bir çalışmayı 1985-1992 dönemi Finlandiya bankacılık sektörüne uyguladığında 1989-1990 yıllarında piyasa yapısının tam rekabet, diğer yıllarda ise monopolcü rekabet olduğunu bulmuştur.

Bikker ve Haaf (2002: 53), 1988-1998 dönemi 23 ülke bankacılık sektörü piyasa yapısını belirlemek üzere yaptıkları çalışmada Panzar ve Rosse H istatistiğinin bu ülkelerin çoğunda piyasa yapısının monopolcü rekabet tarafından karakterize edildiğini bulmuşlardır. Benzer şekilde Classens ve Leaven (2004: 563), 1994-2001 döneminde 50 ülke bankacılık sektörünü kapsayan çalışmalarında ülkelerin çoğunda piyasa yapısının monopolcü rekabet olduğunu tespit etmişlerdir. Casu ve Girardone (2006: 441), 1997-2003 dönemi Avrupa Birliği üyesi 15 ülke bankacılık sektörü üzerine tahmin ettikleri Panzar ve Rosse H istatistiği değerinin 1'e yakın yani piyasa yapısının tam rekabetçi olduğunu belirtmişlerdir. Bununla birlikte rekabet görelisi olarak Danimarka ve Avusturya'da daha zayıfken Lüksemburg ve Belçika'da daha yüksektir.

Günalp ve Çelik (2006: 1335), 1990-2000 dönemi Türk bankacılık sektörü için yaptıkları çalışmada dönem boyunca piyasa yapısının monopolcü rekabet olduğunu tespit etmişlerdir. Türk bankacılık sektörü üzerine yapılan diğer bir çalışmada Macit (2012: 19), 2005-2010 dönemi için yaptığı piyasa yapısı tahmininde 2005-2007 döneminde yapının monopolcü rekabet, 2008-2010 döneminde ise monopol olduğunu belirlemiştir. Repkova ve Stavarek (2014: 625), yine Türk bankacılık sektörü için yaptıkları 2002-2010 dönemini

kapsayan çalışmalarında 2002-2006 döneminde piyasa yapısının monopolcü rekabet, 2007-2010 döneminde ise monopol olduğunu belirlemişlerdir.

Yukarıda özetlenen çalışmalar, Panzar ve Rosse *H* istatistiği tahmini spesifik banka verisi kullanımı gerektirdiği için statik panel veri ya da havuzlanmış (pooled) regresyon kullanmışlardır. Son dönemde ise literatürde Panzar ve Rosse *H* istatistiği tahmininde statik panel veriye göre daha üstün yönleri olan ve daha tutarlı sonuçlar veren dinamik panel veri kullanımı artmıştır.

Bikker vd. (2012: 1025), 63 ülke ve 17 bin bankadan oluşan geniş katımlı çalışmalarında piyasa yapısı tahmini için statik panel veri ile dinamik panel yöntemi de kullanmışlardır. Switala vd. (2013: 3), Polonya bankacılık sektörü 2010-2012 dönemi için yaptıkları ve dinamik panel veri yöntemi kullandıkları çalışmada piyasa yapısının monopolcü rekabet olduğunu bulmuşlardır. Mustafa ve Toçi (2017: 459), 1999-2009 dönemi 17 merkezi ve doğu Avrupa ülkesi bankacılık sektörü için yaptıkları çalışmada piyasa yapısının monopol olduğunu belirlemişlerdir. Ildırar ve Başaran (2021: 289), Türk bankacılık sektöründe piyasa yapısını iki alt dönem için belirledikleri ve dinamik panel veri yöntemi kullandıkları çalışmada 2003-2018 arasını kapsayan tüm dönemde piyasa yapısının monopolcü rekabet olduğunu, 2008 Global Krizi sonrasında ise piyasadaki rekabetçi yapının azaldığını tespit etmişlerdir. Meta vd. (2021), piyasada uygulanan regülasyonların Türk bankacılık sektöründe rekabet düzeyini ne yönde etkilediğini tespiti yönelik genişletilmiş ortalama grup yöntemi kullanarak yaptıkları çalışmada, yapılan regülasyonların rekabeti olumlu etkilediğini fakat *H* istatistiği değerinin monopolcü yapıyı gösterecek şekilde "0" a yakın olduğunu bulmuşlardır.

5. Ekonometrik Tahmin ve Sonuçlar

Çalışmada Türk bankacılık sektörü piyasa yapısının belirlenmesi amacıyla Panzar ve Rosse *H* istatistiği tahmini için, Bankacılık Denetleme ve Düzenleme Kurumu tarafından sunulan 2010-2019 döneminde sürekli faaliyet gösteren 26 mevduat bankasına ait spesifik bilanço verileri kullanılmıştır. Literatürde yer alan ve standart panel veri yöntemi ile *H* istatistiği tahmin eden çalışmalarda genellikle zaman boyutu *T*'nin banka sayısı *N*'den küçük olduğu dikkati çekmektedir. Ayrıca standart panel veri (özellikle sabit etki metodu) Panzar ve Rosse *H* istatistiği değerini sifıra yakın şekilde yanlı (biased) tahmin etmektedir. Zaman boyutunun banka sayısından küçük olduğu bu durumda dinamik panel veri (GMM) tahmini daha doğru (unbiased) sonuçlar vermektedir (Goddard vd., 2007). Bu nedenle çalışmada Türk bankacılık sektörü piyasa yapısını Panzar ve Rosse *H* istatistiği tahmini ile belirlemek için dinamik panel veri yöntemi tercih edilmiştir.

Öncelikli olarak aşağıda statik model tahmini yapan çalışmalarda sıkça kullanılan Panzar ve Rosse *H* istatistiği tahminini veren (1) numaralı denklemin ekonometrik tahmine yönelik hali aşağıda verilmiştir.

$$\ln R_{it} = \alpha_0 + \alpha_1 \ln PRG_{it} + \alpha_2 \ln SBTG_{it} + \alpha_3 \ln FDG_{it} + \alpha_4 \ln MVAKT_{it} + \alpha_5 \ln TAKT_{it} + \alpha_6 \ln KRAKT_{it} + u_{it} \quad (2)$$

$i = 1, \dots, 26$ $t = 2010, \dots, 2019$

Bağımlı değişken:

$\ln R_{it}$: i . banka toplam geliri (faiz + faiz dışı gelir toplamı)

Bağımsız değişkenler:

$\ln PRG_{it}$: i . banka birim personel gideri (toplam ücretler/toplam personel sayısı)

$\ln SBTG_{it}$: i . banka birim sabit gideri (toplam sabit giderler/toplam aktifler)

$\ln FDG_{it}$: i . banka birim faiz dışı gideri (faiz dışı giderler/toplam aktifler)

$\ln MVAKT_{it}$: i . banka toplam mevduatları/toplam aktifler

$\ln TAKT_{it}$: i . banka toplam aktifleri

$\ln KRAKT_{it}$: i . banka toplam kredileri/toplam aktifler

u_{it} : hata terimi

Yukarıda verilen (2) numaralı denklemin ekonometrik olarak tahmininden elde edilen bankacılık girdi fiyatlarına göre gelir esnekliği değerleri ($\alpha_1 + \alpha_2 + \alpha_3$) katsayılarının toplamı Panzar ve Rosse H istatistiği değeri olup, (1) numaralı denklemde toplam h_k şeklinde gösterilmiştir. H istatistiği, Tablo 2'de görüldüğü gibi alacağı farklı değerlere göre farklı piyasa yapılarını temsil etmektedir.

Panzar ve Rosse H istatistiği, esneklik hesabına dayandığı için (2) numaralı denklem logaritmik formdadır. Bu denklemde bağımlı değişken, i . bankanın faiz ve diğer gelirler toplamından oluşmaktadır. Modeldeki ilk üç bağımsız değişken, bankacılık sektörü birim girdi fiyatlarını oluşturduğu gibi, daha önce de belirttiğimiz gibi bu değişkenlerin katsayılarının toplamı bize piyasa yapısını temsil eden H istatistiği değerini verecektir. Teorik olarak girdi fiyatlarında bir artış, toplam gelir üzerinde azalışa neden olacağı için bu değişkenlerin katsayı işaretlerinin negatif olması beklenmektedir.

Modeldeki 4. bağımsız değişken ise bankacılık sektörü toplam mevduatlarının aktiflere oranı olup, modelde bankanın sunduğu hizmete olan talebi temsil etmek üzere modele dahil edilmiştir. Bu değişken, (1) numaralı denklemde A vektörü elemanına karşılık gelmektedir. (2) numaralı modelde 5. bağımsız değişken bankacılık toplam aktifleri, banka kapasitesini temsil etmek üzere modele dahil edilmiştir. Yapılan çalışmalarda (Bikker vd. (2006: 3); Bikker vd. (2012: 1025)) bu değişkenin modelde diğer bağımsız değişkenlerle çoklu bağlantıya ve katsayıların olması gerekenden daha yüksek değerde (over estimated) olmasına sebep olduğu, bunun da hatalı sonuçlar verdiği ileri sürülmüştür. Bu nedenle, asıl tahmin yöntemimiz olan dinamik panel modelinde bu değişken dışlanmıştır. (2) numaralı modeldeki son bağımsız değişken ise bankanın kullandığı kredilerin toplam aktiflere oranıdır. Bu değişken hem banka hizmetlerine olan talebi hem de banka kapasitesini temsil etmekte olup, (1) numaralı denklemde K_1 vektörü elemanına karşılık gelmektedir. Bankaların, daha çok mevduat toplamaları durumunda daha çok kredi kullanılabilecekleri

ve bunun da daha çok gelir anlamına gelmesi nedeniyle mevduatların aktiflere oranı ve kredilerin aktiflere oranı değişkenlerinin beklenen katsayı işaretleri pozitifdir.

Dinamik panel veri analizi yönteminde açıklayıcı değişkenlerdeki içsellik dikkate alınarak, bağımlı değişkenin gecikmeli değerleri bağımlı değişkeni etkileyen faktörlerin arasına açıklayıcı değişken olarak dahil edilmekte, böylece model dinamik hale dönüşmektedir (Tatoğlu, 2020: 136). Bağımlı değişkenin gecikmeli değerinin açıklayıcı değişken olarak modele dahil edilmesi sonucu diğer açıklayıcı değişkenler ile hata terimleri arasında ilişki oluşmaktadır. Bu durumda en küçük kareler tahmincileri tutarsız ve sapmalıdır (Roodman, 2009: 92). Çalışmada dinamik panel veri modeli uygulanmasının temel nedeni, modelin bağımlı değişkeni olan banka toplam gelirinin gecikmeli değerinin, modelin açıklayıcı değişkenlerinden biri olmasıdır.

Dinamik panel veri analizlerinde GMM yöntemi değişik varsayımlar altında fark-GMM ve sistem-GMM olarak iki farklı versiyonda uygulanmaktadır. Arellano ve Bond (1991: 277) dinamik panel verileri içeren model tahmini için değişkenlerin birinci dereceden farklarını alıp bağımlı değişkenin önceki dönem değerini araç değişkeni olarak modele dahil ederek fark-GMM yöntemini önermiştir. Daha sonra Arellano ve Bover (1995: 44-48) ile Blundell ve Bond (1998: 115) araç değişkenlerin birinci farklarının sabit etkiler ile korelasyonsuz olduğunu varsayarak sistem-GMM modelini oluşturmuşlardır (Roodman, 2009: 86). Sistem-GMM modelinde kesit boyutunun zaman boyutundan fazla olması gerekir (Roodman, 2009: 128). Sistem-GMM modelinde fark ve düzey denklemleri birleştirilerek modele daha fazla araç değişkeni dahil edilebilir, böylece modelin verimliliği artar (Roodman, 2009: 86). Fark-GMM yaklaşımına göre Sistem-GMM yaklaşımının tahmin gücü daha yüksektir (Baltagi vd., 2001: 38). Bu çalışmada da bağımlı değişkenin gecikmeli değerini modele dahil eden Sistem-GMM tahmin yöntemi kullanılmıştır.

Çalışmada Panzar ve Rosse *H* istatistiğinin tahmin edildiği dinamik model aşağıda verilmiştir¹:

$$\ln R_{it} = \alpha_0 + \alpha_1 \ln R_{it-1} + \alpha_2 \ln PRG_{it} + \alpha_3 \ln SBTG_{it} + \alpha_4 \ln FDG_{it} + \alpha_5 \ln MVAKT_{it} + \alpha_6 \ln KRAKT_{it} + u_{it} \quad (3)$$

Tablo 3'te tüm bağımsız değişkenlerin ve bağımlı değişkenin gecikmeli değerlerinin bağımlı değişkenin cari değeri üzerindeki etkisine yönelik yapılan sistem-GMM test sonuçları görülmektedir.

¹ Analizler için Stata16 programı kullanılmıştır.

Tablo: 3
Sistem-GMM Tahmin Sonuçları

Değişkenler	Sistem-GMM
LnR_{it-1}	0.2053475 (0.000)***
$lnPRG_{it}$	-0.2384915 (0.000)***
$lnSBTG_{it}$	0.164255 (0.000)***
$lnFDG_{it}$	-1.319164 (0.000)***
$lnMVAKT_{it}$	1.014196 (0.000)***
$lnKRAKT_{it}$	-1.063949 (0.000)***
Gözlem Sayısı	208
Wald χ^2 (6)	1.60e+06 (0.000)***
Araç Değişken Sayısı	20
Grup Sayısı	26
AR (2)	-0.099381 (0.3203)
Sargan Testi χ^2 (14)	21.40176 (0.0918)

Not: Parantez içindeki değerler olasılık değerleridir. *** %1 anlamlılık düzeylerinde boş hipotezlerin reddedildiğini ya da ilgili değişkenlerin anlamlı olduğunu gösterir.

Sistem GMM'nin sonuçlarının geçerliliği 2 farklı test ile (Sargan ve otokorelasyon testleri) sınanabilir. Tablo 3'ün alt kısmında sistem GMM tahmininde araç değişkenlerin geçerliliği ve otokorelasyon yönünden AR (2) birinci farkı alınmış hata terimlerinin ikinci dereceden otokorelasyon testleri verilmiştir. Sargan testi ise araç değişkenlerinin asıl değişkenleri tam olarak yansıtıp yansıtmadığını gösteren, aşırı tanımlama kısıtları için bir test olup bu testin reddedilmesi model veya araç değişkenlerin yanlış belirlendiğini gösterir (Kocakuşak & Berke, 2021: 347). Hem otokorelasyon hem de Sargan testinin sonuçlarına bakıldığında "otokorelasyon yoktur" şeklindeki boş hipotez kabul edildiğinden modelde otokorelasyon sorununun olmadığı görülmektedir. Burada önemli olan 2. dereceden otokorelasyonun varlığı için hesaplanan test istatistiğidir. Genelleştirilmiş momentler tahmincisinin etkin olması için ikinci dereceden otokorelasyon olmaması $[E[\Delta u_{it}\Delta u_{it-2}]=0]$ önemlidir (Yerdelen-Tatoğlu, 2020: 151-152). Sargan testi sonucu da boş hipotezin reddedilemeyeceğini gösterdiğinden model doğru tanımlanmıştır ve araç değişkenler geçerlidir. Wald testi sonucuna göre de modelin bütünsel olarak doğru tanımlandığı görülmektedir. AR (2) testi de modelde otokorelasyon sorununun ve sipesifikasyon hatalarının olmadığını göstermektedir.

Modelde banka toplam gelirlerinin gecikmeli değeri ile cari değeri arasında pozitif ve anlamlı bir ilişki ortaya çıkmıştır. Bir önceki dönemdeki banka toplam gelirlerinde oluşan %1'lik bir artış cari dönemde toplam geliri %0,20 oranında artırmaktadır. Banka birim personel giderleri ve faiz dışı giderlerdeki artış, istatistiki olarak %1 anlamlılık düzeyinde banka toplam gelirini azaltmaktadır. Bununla birlikte banka sabit giderlerindeki artışın ise, yine %1 anlamlılık düzeyinde banka toplam gelirini artırdığı ortaya çıkmıştır. Özellikle son yıllarda internet bankacılığı ve teknolojik yeniliklere yapılan alt yapı harcamalarının banka gelirine olumlu katkı yapmış olabileceği ortaya çıkmıştır. Bu açıdan bakıldığında, sabit giderlerin toplam gelir ile ilişkisini gösteren katsayı işaretinin pozitif çıkması olası bir sonuç

olarak değerlendirilebilir. Teorik olarak banka mevduatlarındaki bir artış, istatistiki olarak %1 anlamlılık düzeyinde banka toplam geliri üzerinde pozitif bir etki meydana getirmektedir. Bununla birlikte kredilerdeki artışın, bankacılık toplam geliri üzerinde azaltıcı bir etki meydana getirdiği görülmektedir. Özellikle söz konusu dönemde Türk bankacılık sektörü açısından düşünüldüğünde, yurt içi tasarrufların yetersizliği nedeniyle bankaların kredi kullandırma kaynağı olarak yurt dışı borçlanma yollarına gitmelerinin, artan kurlara da bağlı olarak kredi kullandırma maliyetlerini artırdığı için geliri düşürücü etki yapmış olması da muhtemeldir.

Araştırmanın odak noktasını oluşturan Panzar ve Rosse H istatistiği tahmini, bankacılık sektörü girdilerine ait katsayıların toplam değerinden oluşmaktadır. Bu nedenle Tablo 3’de yer alan tahmin sonuçları dikkate alındığında, 2010-2019 dönemi Türk bankacılık sektörü Panzar ve Rosse H istatistiği değeri -1.39’dur.

Tablo: 4
Wald Kısıtlama Testi Sonuçları

Katsayı Toplamları	F İstatistiği
$\ln PRG_{it} + \ln SBTG_{it} + \ln FDG_{it} = 0$	0.66 (0.2217)
$\ln PRG_{it} + \ln SBTG_{it} + \ln FDG_{it} = 1$	0.96 (0.3280)

Bankacılık sektörü girdi değişkenleri katsayıları toplam değerinin pozitifken istatistiki olarak sıfır ve birden farklı olması piyasa yapısının monopolcü rekabet, yine katsayılar toplam değeri negatifken istatistiki olarak sıfırdan farklı olması durumunda da piyasa yapısı monopolü göstermektedir. Tablo 4’te verilen Wald katsayı testi sonuçları, araştırma konusu dönemde Türk bankacılık sektöründe hâkim olan piyasa yapısının monopol (işbirlikçi yapı) olduğunu ortaya koymuştur. Araştırmaya konu olan dönemde Türk bankacılık sektöründe yer alan firmaların kendi aralarında işbirliği yaparak monopolcü karı elde ettikleri ve piyasadaki rekabeti azalttıkları ortaya çıkmıştır. Çalışmanın literatür kısmında özetlediğimiz Türk bankacılık sektörü üzerine yapılan diğer çalışmaların araştırma dönemleri uyuşmadığı için sonuçları karşılaştırma imkânı olmasa da Türk bankacılık sektörü üzerine yapılan benzer bir çalışmada İldırar ve Başaran (2021), 2008 Global Krizi sonrasında sektörde rekabetin azalttığını belirtmişlerdir. Meta vd. (2021)’nin yaptığı diğer bir çalışmada, uygulanan regülasyonların sektörde rekabete olumlu katkı sağladığı bulunmuşsa da tahmin edilen H istatistiği değerinin “0” a yakın olması 2000-2018 döneminde piyasa yapısının monopolcü eğilim gösterdiğini işaret etmektedir. Araştırmadan edilen sonuçlar son dönemde yapılan bu iki çalışma sonucuyla paralellik göstermektedir. Türk ekonomisinin son 10 yılında ortaya çıkan yavaşlama ve buna bağlı ticaret hacmindeki daralmaya bağlı olarak, kamu bankalarının son dönemde piyasayı kredilerle finanse ettikleri görülmüştür. Türk Bankalar Birliği verilerine göre 2015 yılında kredilerin %78’i piyasadaki ilk 7 banka tarafından kullanılmışken bu oran 2019’da %83’e, 2020’de de %87’ye ulaşmıştır. Bankacılık sektörü kredi piyasasındaki görünüm, çalışmadan elde edilen Türk bankacılık sektörünün eksik rekabetçi bir yapı gösterdiği sonucunun nedenini kısmen de olsa açıklar mahiyettedir.

6. Sonuç

Geleneksel endüstri iktisadi yaklaşımları, bir piyasaya az sayıda firmanın hâkim olması durumunda o piyasada yoğunlaşma oranının yüksek ve dolayısıyla da rekabetin düşük olduğunu varsayar. Literatürdeki gelişmelere bağlı olarak özellikle 1980'lerden sonra gelişen yeni ampirik endüstri iktisadi yaklaşımları, yoğunlaşmanın yüksek olduğu piyasaların da rekabetçi olabileceğini ortaya koymuşlardır. Ayrıca bu yeni yaklaşımlar, geleneksel yaklaşımların yoğunlaşma oranlarındaki değişmeye bağlı olarak piyasadaki yapı değişmelerini gözlemlemeyi bertaraf ederek, piyasa yapısının tam olarak ne olduğunu ortaya koymuşlardır. İşte bu çalışmada yeni ampirik endüstri iktisadi yaklaşımlarından biri olan Panzar ve Rosse H istatistiği tahmini ile, 2010 yılı sonrasını kapsayan 10 yıllık dönemde Türk bankacılık sektörü piyasa yapısı dinamik panel (GMM) ile tahmin edilmiştir. Elde edilen Panzar ve Rosse H istatistiği, ele alınan söz konusu dönemde Türk bankacılık sektöründe hâkim yapının monopol olduğunu ortaya koymuştur. Ele alınan dönemin büyük bir bölümünde düşen faiz oranlarıyla genişleyen kredi piyasasında bazı bankaların iş birliği yaparak piyasayı belirlediklerini ortaya çıkaran bu sonuç, özellikle son yıllarda kamu bankaları eliyle finanse edilen kredi piyasası dikkate alındığında çok da şaşırtıcı olmamıştır. Bankacılık sektöründe rekabetin artırılması yönünde alınacak önlem ve düzenlemelerle birlikte, kamu bankalarının sektörde piyasa yapıcı rol oynamaları da önlenmelidir. Dünya ve Türkiye ekonomisinde son dönemde yaşanan gelişmeler her ne kadar piyasaların ve reel sektörün kamu bankaları eliyle finansmanını gerektirmiş olsa da rekabetin tüm sektöre yayılması için denetleyici ve düzenleyici kuruluşlar, regülayonlarla sektördeki yoğunlaşmanın azalması ve böylece de rekabet düzeyinin artmasını sağlamalıdır. Bankacılık sektöründe rekabet düzeyinin yüksek olması, düşük maliyetle finansman imkanlarının artması ve ekonomik büyümenin de canlanması anlamına gelmektedir. Son iki yıldır hızla artan enflasyon baskısının yarattığı yüksek faiz oranı şu günlerde ucuz finansman imkanlarını sınırlamıştır. Finans piyasasında rekabeti artıracak iyileştirme ve düzenlemelerin Merkez Bankası ve BDDK işbirliği ile kararlı bir şekilde hayata geçirilmesi kadar son dönemde yaşanan gelişmelere bağlı olarak enflasyonla mücadele de son derece önemli bir politika hedefi olarak karşımıza çıkmaktadır.

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Türkiye Ekonomisinde Döviz Kuru ve Dış Ticaret Dengesi İlişkisi: Fourier Eşbütünleşme Testinden Yeni Bulgular

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The Relationship between Exchange Rate and Trade Balance in Turkish Economy: New Evidence from Fourier Cointegration Analysis

Abstract

This study aims to analyse the short and long-run effects of exchange rate changes on the trade balance in the Turkish economy by using the quarterly observations for the period from 1998:1 to 2019:3. Fourier KPSS cointegration analysis was applied to investigate the existence of a cointegration relationship between the series. The cointegration test results reveal a long-run relationship between trade balance and real effective exchange rate, national income, and foreign income in Turkey. The findings show that the real effective exchange rate and the foreign income level have positive and statistically significant effects on the trade balance in Turkey. In contrast, the national income level negatively and statistically significantly impacts the trade balance. Finally, Error Correction Model (ECM) was applied to investigate short-run effects between the series in the study. Like the long-run findings, the short-run test results also show positive outcomes for real effective exchange rate and foreign income, whereas negative effects for foreign income.

Keywords : Exchange Rate, Foreign Trade, Fourier Cointegration, Turkey.

JEL Classification Codes : F31, F14, C32.

Öz

Bu çalışma, Türkiye ekonomisindeki döviz kuru değişimlerinin dış ticaret dengesi üzerindeki kısa ve uzun dönemli etkilerini 1998:1-2019:3 çeyreklik gözlemler doğrultusunda incelemeyi amaçlamaktadır. Seriler arasında eşbütünleşme ilişkisinin varlığını araştırmak amacıyla Fourier KPSS eşbütünleşme testi uygulanmıştır. Eşbütünleşme analizi sonuçları Türkiye için uzun dönemde dış ticaret dengesi ile reel efektif döviz kuru, ulusal gelir ve yabancı gelir arasında eşbütünleşme ilişkisinin varlığına işaret etmektedir. Elde edilen bulgular, reel efektif döviz kuru ve yabancı gelir düzeyinin dış ticaret dengesi üzerinde pozitif ve istatistiksel olarak anlamlı, buna karşın ulusal gelir düzeyinin ise negatif ve istatistiksel olarak anlamlı katsayılarla sahip olduğunu ortaya koymaktadır. Son olarak çalışmada kısa dönem etkileri araştırmak amacıyla Hata Düzeltme Modeli oluşturulmuştur. Kısa dönem tahmin sonuçları, uzun dönem bulgularına benzer şekilde, reel efektif döviz kuru ve yabancı gelir düzeyi için pozitif, ulusal gelir düzeyi için ise pozitif ve istatistiksel olarak anlamlı bulgulara işaret etmektedir.

Anahtar Sözcükler : Döviz Kuru, Dış Ticaret, Fourier Eşbütünleşme, Türkiye.

1. Giriş

Döviz kurlarının çeşitli makroekonomik büyüklükler üzerindeki etkilerini araştırmaya yönelik olarak uluslararası literatürde oldukça yoğun bir tartışma alanı bulunmaktadır. Bu anlamda ele alınan konuların başında kuşkusuz döviz kurlarındaki değişimlerin dış ticaret dengesi üzerindeki etkileri gelmektedir. Reel döviz kurları, uluslararası rekabet gücünün en önemli göstergesi olarak kabul edilmektedir. Dış ticaret üzerindeki etkileri, ülkelerin makroekonomik performanslarına bağlı olarak değişkenlik göstermekle birlikte, ekonomistler ve politika yapımcılar için oldukça önemli ve yakından takip edilmesi gereken bir süreci ifade etmektedir.

Döviz kuru, en genel ifadeyle bir birim ulusal para birimi karşılığında elde edilecek yabancı para miktarı olarak açıklanabilmektedir. Teorik olarak, sabit kur sistemlerinde hükümetlerin dış ticaret politikalarındaki hedefleri doğrultusunda döviz kurlarının değerini yükseltmelerine devalüasyon, düşürmelerine ise revalüasyon adı verilmektedir. Esnek kur sistemlerinde ise döviz kurları ulusal ve uluslararası piyasalardaki arz ve talep koşullarına bağlı olarak değişmekte ve bu değişiklikler para birimlerinin değerlendirilmesi veya değer kaybetmesi kavramları ile açıklanmaktadır.

Döviz kuru değişimlerinin dış ticaret dengesi üzerindeki etkilerini açıklamaya yönelik olarak ortaya atılan ilk yaklaşımın “Marshall-Lerner (M-L) Koşulu” hipotezi olduğu bilinmektedir. Bu yaklaşıma göre, döviz kurlarında yaşanacak bir artış, bir yandan ithal mallarının pahalılaşmasına ve bu sayede iç talebin yerli mallara doğru yönelmesine, diğer yandan ise ihracat mallarının ucuzlaşmasına ve beraberinde bu mallara yönelik dış talebin artmasına katkı sağlamaktadır (Lal & Lowinger, 2002: 400-1). Böylece, söz konusu kur artışlarının dış ticaret dengesi üzerinde bir iyileşme sağlayacağı beklenmektedir. Marshall-Lerner koşulu, devalüasyon sonrası dış ticaret dengesi üzerinde bir iyileşmenin ancak ihracat ve ithalat talep esneklikleri toplamının birden büyük olması durumunda gerçekleşeceğini ortaya koymaktadır (Hacker & Hatemi-J, 2004: 780; Rose, 1990: 272). Devalüasyonun dış ticaret dengesi üzerindeki etkisine yönelik ortaya atılan bir diğer yaklaşım ise Bickerdike (1920), Robinson (1947) ve Metzler (1948)’in geliştirdiği “BRM Modeli”dir. Sadece ithalat ve ihracat talep esnekliklerini dikkate alan Marshall-Lerner koşulundan (Marshall, 1923; Lerner, 1944) farklı olarak bu modelde hem arz hem de talep koşullarının ihracat/ithalat esneklikleri de hesaplamalara dahil edilmektedir.

Diğer taraftan, literatürde kritik esneklikler yaklaşımının sadece malların fiyat ve miktarlarındaki değişimleri dikkate almasından dolayı yetersiz kaldığını ve gelir etkisinin de modele dahil edilmesi gerektiğini savunan çalışmalar da bulunmaktadır (Harberger, 1950; Sen & Turnovsky, 1989; Laursen & Metzler, 1950). Bu doğrultuda Alexander (1959), malların fiyat ve miktar elastisitetlerine ek olarak, gelir seviyelerindeki değişimlerin de dış ticaret dengesi üzerinde yaratacağı etkileri dikkate alan “Emme Kapasitesi Yaklaşımını” ortaya atmıştır. Bu yaklaşım ile toplam yurtiçi üretimin toplam yurtiçi harcamaları aşması durumunda ortaya çıkacak arz fazlası kadar ihracat yapılacağı ve böylece dış ticaret dengesi üzerinde olumlu bir etkinin meydana geleceği ifade edilmektedir. Tersine bir durumun

yaşanması halinde, yani yurtiçi harcamaların yurtiçi üretim miktarını aşması durumunda ortaya çıkacak talep fazlası ise yurtdışından yapılacak ithalat ile karşılanacaktır. Burada kritik nokta, ülkelerin tam istihdam durumunda olup olmadığı ile ilgilidir. Buna göre tam istihdam düzeyine ulaşmayan ülkelerde uygulanacak bir devalüasyon politikası, ihrac mallarına olan talebin esnek olduğu varsayımı altında, net ihracatta bir artışın meydana gelmesine katkı sağlayacaktır. Ancak söz konusu ülkelerin tam istihdam düzeyinde bulunması durumunda, daha fazla üretim artışı mümkün olmayacağı için yurtdışından yabancıların yurtiçi mallara olan talep artışları sadece enflasyona neden olacaktır (Husted & Melvin, 1990: 427-28).

Döviz kurlarının dış ticarete etkisi üzerine yukarıda açıklanan yaklaşımlar çoğunlukla uzun dönemli analizler üzerine odaklanmaktadır. Ancak bu yaklaşımların yanı sıra kısa ve uzun dönemli etkileri birlikte inceleyen önemli bir hipotez daha literatürde yer almaktadır: “J-Eğrisi Hipotezi”. Bu hipotez, ulusal para biriminde yaşanan bir değişiklik ile dış ticaret dengesi arasında, kısa dönemde aynı yönlü, uzun dönemde ise ters yönlü ilişkinin var olduğunu ifade etmektedir. Bunun nedeni esnekliklerin kısa dönemde katı, uzun dönemde ise artma eğiliminde olmasıdır. Diğer bir ifadeyle, meydana gelen fiyat değişikliklerine karşı tüketicilerin ve üreticilerin tepkisinin zaman almasıdır. Ancak bu durum kısa dönemde etkili olan gelir etkisinin yerini uzun dönemde ise daha baskın olan fiyat etkisine bırakması şeklinde de değerlendirilebilir (Meade, 1988: 635-40). Bazı ülke ekonomilerinde ise yapılan bir devalüasyon, dış ticaret dengesinde önce iyileşme, ardından kötüleşme ve en sonunda tekrar iyileşme sağlayabilmektedir. Bu durumda da uzun dönemde dış ticaret dengesinin değişim eğrisi “J” değil de “S” şeklini aldığı için “S Eğrisi Hipotezi” geçerli olabilmektedir (Backus vd., 1994: 84).

Bu çalışma, söz konusu teorik tartışmalar doğrultusunda, Türkiye için döviz kuru değişimlerinin dış ticaret dengesi üzerindeki kısa ve uzun dönemli etkilerini 1998:I-2019:III çeyreklik gözlemler doğrultusunda incelemeyi amaçlamaktadır. Çalışmada ilk olarak serilerin durağanlık düzeyleri KPSS ve Fourier KPSS (FKPSS) testleri kullanılarak belirlenmektedir. Durağanlık analizinden sonra değişkenler arasındaki eşbütnleşme ilişkisinin varlığı Fourier SHIN (FSHIN) eşbütnleşme testi kullanılarak incelenmektedir. Modelin uzun dönem katsayıları Dinamik En Küçük Kareler (DOLS) yöntemi kullanılarak tahmin edilmektedir. Son olarak modelin kısa dönem dinamiklerini araştırmak amacıyla hata düzeltme modeli (ECM) kullanılmaktadır. Bu doğrultuda söz konusu çalışmanın literatürde Türkiye ekonomisi için döviz kurlarının ticaret dengesi üzerindeki uzun dönemli etkisini Fourier yaklaşımıyla inceleyen ilk çalışma olduğu düşünülmektedir.

Ekonomik verilerin genellikle yapısal kırılmalardan etkilendiği kabul edilmektedir. Bu nedenle, birim kök ve eşbütnleşme analizlerinde yapısal kırılmaları dikkate almak oldukça önemlidir. Kukla değişkenler kullanılarak yapılan analizler kesin kırılma tarihlerinin tahmin edilmesini gerektirmektedir. Bu nedenle bu testler yalnızca ani değişikliklerin dinamiklerini yakalayabilmektedir. Bu çalışmada yapısal kırılmaların varlığını dikkate almak amacıyla Fourier temelli ekonometrik testler kullanılmıştır. Fourier yaklaşımı kırılma tarihleri ve kırılma sayısını doğrudan tahmin etmek yerine, bilinmeyen

yapı ve bilinmeyen sayıdaki muhtemel yapısal kırılmaları yakalayabilmek için kullanılmaktadır. Yapısal kırılmalar, Fourier yaklaşımı ile pürüzsüz ve kademeli süreçler olarak dikkate alınmaktadır.

Bu doğrultuda çalışmanın planlaması sırasında şu şekilde gerçekleştirilecektir: İkinci bölümde Türkiye dışında yer alan ülke örnekleri için mevcut literatür özetine yer verilecektir. Üçüncü bölümde Türkiye’de uygulanan döviz kuru sistemleri ve politikalarından bahsedilecek ve ayrıca Türkiye üzerine yapılan ampirik çalışmalar ayrıntılı bir şekilde ele alınacaktır. Dördüncü bölüm çalışmada kullanılacak veri seti ve dış ticaret dengesi modelini belirleyen analitik çerçeveden oluşmaktadır. Beşinci bölümde Tsong vd. (2016) tarafından geliştirilen Fourier eşbütünleşme analizine yönelik ekonometrik metodoloji tanıtılacaktır. Analiz sonuçlarının tartışılacağı altıncı bölümün ardından, çalışma sonuç ve değerlendirme bölümü ile tamamlanacaktır.

2. Literatür

Bu bölümde döviz kuru sistemleri ile dış ticaret ilişkisini belirlemeye yönelik olarak Türkiye dışındaki ülke örneklerini ele alan çalışmaların incelenmesi ve böylece benzer çalışmaların, bu çalışmada ulaşılan sonucu destekler nitelikte olup olmadığının belirlenmesi hedeflenmektedir. Türkiye üzerine yapılan ampirik çalışmalara ise, bir sonraki bölümde yer verilecektir. Geniş bir literatüre sahip döviz kuru-dış ticaret dengesi çalışmalarından seçilmiş bir özet Tablo 1’de sunulmaktadır.

Tablo: 1
Seçili Ampirik Literatür

Yazar	Ülke-Dönem	Yöntem	Sonuç
Bahmani-Oskooee, (1985)	Yunanistan, Kore, Hindistan ve Tayland 1973-1980	Regresyon Analizi	Yurtiçi ve yurtdışı gelir seviyeleri ve para arzını kontrol ederek, devalüasyonun ticaret dengesi üzerindeki etkisi analiz edilmiş ve J-eğrisi teorisini destekleyen sonuçlara ulaşılmıştır.
Arize, (1994)	Kore, Filipinler, Hindistan, Singapur, Sri Lanka, Malezya, Endonezya, Pakistan ve Tayland 1971-1991	Engle-Granger ve Johansen Eşbütünleşme Testleri	Devalüasyon bu ülkelerde (Sri Lanka ve Hindistan hariç) uzun dönemde dış ticaret dengesini iyileştirmektedir.
Bahmani-Oskooee & Alse, (1994)	19 gelişmiş, 22 gelişmekte olan ülke 1971-1990	Hata Düzeltme Modeli (VECM)	Sadece altı ülkede ticaret dengesi ve döviz kurunda uzun dönemli ilişki tespit edilmiştir.
Bahmani-Oskooee & Niroomand, (1998)	28 seçilmiş ülke 1960-1992	En Küçük Kareler Yöntemi (OLS) ve Johansen Eşbütünleşme Testleri	Ülkelerin tamamına yakınında kritik elastikiyetler şartı geçerlidir.
Wilson, (2001)	Singapur, Kore, Malezya ile Japonya-ABD 1970-1996	Engle-Granger ve Johansen Eşbütünleşme Testleri	Kore ve ABD arasındaki ticaret dışında, döviz kuru ile dış ticaret arasında herhangi bir ilişki tespit edilememiştir.
Onafowora, (2003)	Tayland, Endonezya, Malezya ile Japonya/ABD 1980:1-2001:4	VECM ve Etki-Tepki Analizi	Uygulanacak devalüasyon ancak üç veya dört dönem sonra etkisini göstermektedir. Kısa dönemde J eğrisi hipotezi, uzun dönemde ise M-L koşulu geçerlidir.
Anoke vd., (2016)	Nijerya 1986-2014	Johansen Eşbütünleşme Testi, VECM, Granger Nedensellik	Döviz kurunun değer kaybı ile dış ticaret dengesi için uzun dönemde bir ilişki söz konusu olup, döviz kurundan dış ticaret dengesine nedensellik ilişkisine rastlanmıştır.
Hunegnaw & Kim, (2017)	10 Doğu Afrika ülkesi 1970-2013	Gecikmesi Dağıtılmış Otoregresif Sınır Testi (ARDL)	Döviz kurundaki değer kaybı, dört ülke için ticaret dengesini önemli ölçüde iyileştirmektedir. Ayrıca ticaret dengesinin döviz kuru esnekliği yoktur ve bu ülkeler için J eğrisi geçerli değildir.
Rashidin vd., (2017)	Pakistan, Hindistan, Bangladeş 1978-2008	Çoklu Regresyon Modeli	Dış ticaret dengesi, döviz kuru arasındaki ilişki Bangladeş için güçlü ve pozitif iken, diğer ülkeler için zayıftır.

Iyke & Ho, (2017)	Gana 1986:1-2016:3	Doğrusal ve doğrusal olmayan ARDL	Döviz kurundaki değer kaybı uzun dönemde ticaret dengesini iyileştirmekte iken, değer artışlarının hiçbir etkisi bulunmamaktadır. Dolayısıyla, döviz kuru değişimlerinin ticaret dengesi üzerinde doğrusal olmayan etkileri bulunmaktadır.
Xuan, (2018)	Vietnam 2001-2015	ARDL, VECM, Granger Nedensellik	Vietnam dongunda yaşanacak değer kaybının, uzun dönemde dış ticaret dengesini kötüleştirceğine dair kanıtlar bulunmuştur. Kısa vadede ise döviz kuru ile dış ticaret ilişkili değildir.
Dongfack & Ouyang, (2019)	Kamerun 1980-2016	Johansen Eşbütünlüşme Testi ve VECM	M-L koşulu geçerli değildir. Kısa vadede yaşanan bozulmalar uzun vadede düzleme eğilimindedir. Bu sonuç J eğrisi hipotezinin geçerliliğini destekler niteliktedir.
Onakoya vd., (2019)	Nijerya 1981-2016	Granger Nedensellik ve Etki-Tepki Analizi	Kısa dönemde devalüasyon ticaret dengesini iyileştirmektedir, ancak ticaret dengesi ve döviz kuru uzun dönemde ilişkili değildir.
Doğru vd., (2019)	ABD, Kanada, Meksika ve İngiltere 1996-2017	Doğrusal ve doğrusal olmayan ARDL	ABD'de, doların değer kaybı turizm ticaret dengesini iyileştirmektedir. Ancak doların değer kazanması ABD'nin Kanada ve İngiltere ile olan ticaret dengesini bozarken, Meksika ile olan ticaretini uzun vadede etkilememektedir. Sonuçlar J eğrisi ile çelişirken, M-L koşulunu desteklemektedir.
Badinger & Fichet de Clairfontaine, (2019)	47 seçilmiş ülke 2010:1-2017:2	Pedroni Panel Eşbütünlüşme Testi	97 emtia grubunu ele alan çalışmanın sonuçları, J eğrisi hipotezini destekler niteliktedir.
Aslan, Çepni & Gül, (2021)	21 gelişmekte olan ülke 2005:Q1-2018:Q4	Panel SVAR Modeli	Reel döviz kuru şoklarının ihracat hacimlerini etkilediğine dair kesin bir kanıt bulunamasa da ihracat hacminin reel döviz kuru şoklarına tepkilerinin heterojen olduğu görülmüştür. Mal ihraç eden ülkelerin, reel döviz kuru hareketlerine karşı ihracat tepkisinin daha düşük olduğu söylenebilir.
Iqbal vd., (2021)	Pakistan ve sekiz ticaret ortağı ülke 1980-2017	Doğrusal olmayan ARDL	Doğrusal ARDL ile ikili düzeyde J-eğrisi kanıtına rastlanmazken, doğrusal olmayan ARDL ile Malezya, Çin ve ABD örneğinde J-eğrisini destekleyen sonuçlar bulunmuştur.
Bahmai-Oskooee & Noura, (2021)	İtalya ve ABD arasında ticaret yapan 58 sektör 1999-2018	Doğrusal ve doğrusal olmayan ARDL	12 sektörde J eğrisi hipotezi geçerlidir. 48 sektörde kısa vadeli asimetric etkiler söz konusu iken, 29 sektörde uzun vadeli asimetric etkiler vardır.
Usman vd., (2021)	Pakistan ve Çin arasında ticaret yapan 21 sektör 1980-2018	Doğrusal ve doğrusal olmayan ARDL	Sadece altı sektörde simetrik J eğrisi için desteklenirken, 13 sektörde asimetric J eğrisi desteklenmektedir.

Tablo 1'de yer alan farklı ülke örneklerine ait çalışmalara bakılacak olursa, döviz kuru değişimlerinin dış ticaret dengesi üzerine etkisine kısa dönem-uzun dönem farkı ile yaklaşan çalışmalar olduğu kadar, sadece M-L koşulunu inceleyen çalışmalar da mevcuttur. Ayrıca çalışma sonuçları genellikle ülke örneklerine göre değişmekte, ancak aynı ülke üzerine yapılan farklı çalışmalarda dahi farklı bulgular elde edilebilmektedir. Bunun nedeninin ise kullanılan yöntem ve çalışmanın ele alındığı dönem farklılığından kaynaklandığı düşünülmektedir.

3. Türkiye'de 1980 Sonrası Döviz Kuru Politikaları

Hükümetlerin ulusal paralarının yabancı paralar cinsinden fiyatını belirleyerek dış ödeme dengesini sağlamaya çalışması döviz kuru politikası olarak adlandırılmaktadır. İthal ikamesine dayalı kapalı bir ekonomiyi 1980'li yıllarda geride bırakan Türkiye, ihracata dayalı dışa açık ekonomiyi benimsemiş ve böylece piyasa ekonomisini destekleyen çeşitli döviz kuru politikalarını uygulamaya koymuştur. 1980-1989 yılları arasında ise ihracatı artırmaya yönelik politikalar izlenen Türkiye ekonomisinde, sık sık devalüasyonlar uygulanmıştır. Hatta bu uygulamalar uzun bir süre döviz kurunun önemli para birimlerine karşı günlük ayarlamaları şeklinde devam etmiştir.

1989 yılında "Türk Parasının Kıymetini Koruma" kararı ile kambiyo rejiminin daha serbest ve Türk lirasının (TL) konvertibl olması amaçlanmıştır (Parasız, 2004: 288). Bu karar ile döviz kurlarının önemi daha da artmış, ancak döviz kuru daha esnek hale gelen

Türkiye’ye yapısal bir bozulmayı da beraberinde getirmiştir (Boratav, 2016: 186-88). 1989-1999 döneminde uygulanan kontrollü serbest kur sisteminin ardından, 2000 yılının ilk günü itibariyle “Enflasyonu Düşürme Programı” ile enflasyon hedeflemesi temel alınan kur sistemine geçilmiştir. Türkiye Cumhuriyeti Merkez Bankası (TCMB) 2001 yılının ikinci yarısında dalgalı kur sistemini uygulayarak, aşırı dalgalanmalar haricinde müdahaleleri azaltmıştır.

Kısacası 1980-2001 yılları arasında döviz kurlarındaki değişimler ile dış ticarete avantaj sağlamaya çalışılmış, kısmen başarılı olunmuş, ancak temel olarak 2001 yılı itibariyle ihracata dayalı büyüme stratejisi benimsenmiştir (Barışık & Demircioğlu, 2006: 72). Her ne kadar ülke bu süreçte ihracatta reel anlamda artış eğiliminde olsa da ithalatta ihracattan daha fazla artış yaşanmıştır. Bu durumu açıklamaya yönelik yaklaşımlar ise genellikle ihraç mal ve hizmet üretiminde, ucuz ithal ara malının yoğun olarak kullanılması şeklinde olmuştur (Demir & Kula, 2008: 86). Bu nedenle Türkiye’de döviz kuru değişimlerinin dış ticaret dengesine etkisi önemini koruyan bir konu olmaya devam etmektedir.

Konu ile ilgili olarak Türkiye üzerine yapılan ampirik çalışmalardan Brada vd. (1997), Johansen eşbütünlüşme testi kullanarak araştırdığı 1969-1993 dönemleri için döviz kurunda meydana gelen dalgalanmaların dış ticaret dengesini önemli ölçüde etkilediği bulgularına ulaşmıştır. Benzer şekilde Akbostancı (2004), VECM ve Etki-Tepki analizlerini kullanarak yaptığı çalışmasında döviz kurunun dış ticaret dengesi üzerinde kısa ve uzun dönemde tek belirleyici olduğunu vurgulamıştır. Aydın vd. (2004), Esneklik yaklaşımı ve VAR analizi yöntemi ile 1987-2003 yılları arasını kapsayan çalışmasında, döviz kuru değişimlerinin sadece ithalat oranları üzerinde etkili olduğunu ve ihracatın önemli bir belirleyicisi olmadığı sonucunu ortaya koymuştur. Doğanlar vd. (2004), koentegrasyon yöntemini kullanarak 1981:1-1994:4 dönemi için yaptıkları çalışmada ülkenin döviz arz eğrisinin pozitif eğimli ve fiyat esnekliğinin yüksek olmasından dolayı, kur ayarlamaları ile ihracatın artırılabilceğini göstermişlerdir. Yamak ve Korkmaz (2005) farklı mal gruplarını dikkate aldığı çalışmasında, 1995:1-2004:4 dönemi için döviz kuru ve dış ticaret arasında uzun dönemli ilişkiye rastlamazken, Granger nedensellik testi aracılığıyla yaptığı incelemede kısa dönemde değişkenler arasındaki ilişkinin, sermaye malları ticareti için olduğunu tespit etmiştir. Vergil ve Erdoğan (2009), ARDL sınır testlerini kullanarak 1989-2005 dönemini kapsayan çalışmasında uzun dönemde M-L koşulunun, Almon modeli kullanılarak yapılan tahmin sonucunda ise kısa dönemde J eğrisi hipotezinin geçerli olduğunu göstermiştir. Gül ve İkinci (2015), Granger nedensellik testini kullanarak döviz kurları ile ihracat ve ithalat arasında anlamlı ancak tek yönlü bir ilişki saptamıştır. Karaş ve Karaş (2017), Johansen eşbütünlüşme testi ve Granger nedensellik testi kullanarak 2003:1-2017:6 dönemlerini kapsayan çalışmalarında, değişkenler arasında eşbütünlüşme ilişkisinin bulunduğunu ve reel efektif döviz kuru ile ithalat arasında iki yönlü nedensellik ilişkisinin geçerli olduğunu ortaya koymuştur. Şimşek (2017) ise Johansen eşbütünlüşme testi ve Granger nedensellik testi kullanarak 1980-2015 dönemlerini ele aldığı çalışmasında döviz kuru ile tarımsal ürün ihracat ve ithalatı arasındaki ilişkiyi incelemiş ve seriler arasında uzun dönemli bir ilişkinin varlığını ortaya koymuşlardır. Uslu (2018), 1989:1-2018:6 dönemini

kapsayan çalışmasında yapısal kırılmalı zaman serisi analizi yöntemiyle uzun dönemde kur artışlarının ithalat üzerinde azaltıcı, ihracat üzerinde artırıcı bir etki meydana getirdiği; kısa dönemde ise kur artışlarının ihracatı hemen hemen hiç etkilemediği, buna karşın ithalatı azaltıcı bir etkiye sahip olduğu bulgularına ulaşmıştır. Yılmaz ve Tekgül (2019), ARDL sınırlı testi yaklaşımı ile incelediği 1995-2015 dönemi için dış ticaret dengesi ile döviz kuru arasında uzun dönemli bir ilişkinin var olduğu, ancak döviz kuruna ait katsayımın istatistiksel olarak anlamsız olduğu bulgularına yer vermiştir. Son olarak Ramzan (2021) reel döviz kurunun Türkiye'nin ticaret dengesi üzerindeki etkilerini 1989-2017 yılları arasında 23 sektör için toplam ve ayrı ayrı düzeyde incelemektedir. Doğrusal ARDL sonuçları, toplam düzeyde J-eğrisinin geçersiz olduğunu, bununla birlikte ulaştırma, tekstil ve giyim ve cevherler ve metal endüstrilerinde J eğrisinin geçerli olduğunu göstermektedir. Ayrıca Türk lirasındaki değer kaybı, uzun vadede birçok sektör üzerinde olumlu etki yaratmaktadır.

Yukarıda yer verilen çalışmalar ve sonuçları incelenecek olursa, ortak bir özelliklerinin döviz kuru değişikliklerinin ticaret dengesi üzerinde simetrik etkileri olduğunu varsaydıkları söylenebilir. Asimetrik etkilerini inceleyen çalışmalardan Güler (2021), NARDL yaklaşımını kullandığı çalışmasında 2013:01-2020:05 döneminde reel efektif döviz kurunun ihracat ve dış ticaret dengesi üzerindeki asimetrik kısa ve uzun dönem etkilerini incelemiştir. Sonucunda TL'nin değer kazancının çok kısa dönemde ihracatı artırdığını, sonraki dönemlerde ise azalttığını ve dış ticaret dengesinde bozulmaya neden olduğunu bulmuşlardır. TL'nin değer kaybı ise ihracatı kademeli bir şekilde artırmakta ve dış ticaret dengesinde iyileşmeye yol açmaktadır. Bahmani-Oskooee ve Durmaz (2019) döviz kuru değişimlerinin Türkiye ile AB arasında ticaret yapan 57 sektörün ticaret dengesi üzerindeki asimetrik etkilerini incelediği çalışmasında para biriminin değer kaybetmesine, değer artışından farklı tepki verilebileceğini belirtmektedir. Buna göre 32 sektörde TL'nin değer kaybetmesinin veya değer kazanmasının uzun vadeli etkilerinin farklı olduğu ve bulguların ele alınan sektöre özgü olduğu sonucuna ulaşılmıştır. Benzer bir çalışmada Bahmani-Oskooee ve Karamelikli (2021), Türkiye ile ABD arasında ticaret yapan 45 sektörden 28'inde kur değişimlerinin etkisinin kısa vadeli asimetrik etkilere sahip olduğunu göstermişlerdir. Bu kısa vadeli asimetrik etkiler ise yalnızca 13 sektörde uzun vadeli asimetrik etkilere dönüşmektedir. Ceyhan ve Gürsoy (2021) ise 1996-2019 aylık verilerine Toda Yamamoto nedensellik testi ve Hatemi-J Asimetrik nedensellik testi uygulamış ve Toda Yamamoto nedensellik testi sonucunda reel döviz kurundan ithalata doğru tek yönlü bir nedensellik ilişkisinin olduğunu ortaya koymuştur. Ancak Hatemi-J Asimetrik nedensellik testi sonuçlarına göre reel döviz kurundaki şokların ihracatı etkilemediği, ithalatı azalttığı ve böylece J-eğrisi hipotezinin geçersiz olduğu belirlenmiştir. Yıldırım ve Saraç (2022) ise döviz kuru değişikliğinin Türkiye'nin Almanya ile 2002:1-2020:2 arası dönemde ikili ticaretine asimetrik etkisini Markov Rejim Değiştirme modeli ile araştırmış, sonucunda da reel döviz kurundaki değişimlerin genişleme döneminde ikili ticaret dengesini olumlu etkilediğine ve J eğrisinin geçerli olduğuna dair kanıtlar bulmuştur.

Döviz kuru ve dış ticaret dengesi ilişkisine yönelik literatürde bu sonuçların aksini elde eden çalışmalar da yer almaktadır. Bunlardan Şimşek ve Kadılar (2004), Pesaran vd. (2001)'in ARDL sınırlı testi yöntemi ile 1970-2002 dönemi için yaptığı çalışmasında,

devalüasyonun dengesizlikleri azaltmada ancak bir yardımcı politika görevi görebileceğini ve üretim artışının söz konusu dengenin sağlanmasında daha etkin olacağını belirtmişlerdir. Benzer şekilde Sivri ve Usta (2001), Yılmaz ve Kaya (2007), Kızıltan ve Çiğirlioğlu (2008) ve Aktaş (2010) da yaptıkları araştırmalarda ticaret dengesi için reel döviz kurunun etkili bir araç olamayacağına vurgu yapmıştır. Peker (2008) Eşbütünleşme testi ve Hata Düzeltme modelini kullandığı çalışmasında 1992:1-2006:4 dönemini ele almış ve uygulanacak bir devalüasyon politikasının dış ticaret üzerinde uzun dönemde olumlu etkiler meydana getireceğine yönelik herhangi bir bulguya rastlanılamamıştır. Ersungur vd. (2017), 1998-2014 yılları arasında VAR Modeline dayalı nedensellik testi sonucunda döviz kurları ve cari denge arasında bir nedensellik ilişkisine rastlamamıştır. Altın ve Süslü (2017), Toda-Yamamoto nedensellik testi aracılığıyla 1989-2016 dönemi için döviz kuru ile ihracat veya ithalat arasında herhangi bir nedensellik ilişkisinin bulunmadığını belirtmektedir.

Yukarıda konu ile ilgili olarak Türkiye üzerine yapılan ampirik çalışmalara bakılacak olursa; döviz kuru değişimlerinin ithalat ve ihracatı etkileyerek dış ticaret dengesi üzerinde olumlu etki yarattığı görüşünde olan çalışmalar kadar, olumsuz etki yarattığı veya etkisiz olduğu görüşünde olan pek çok çalışmanın da literatürde yer aldığı söylenebilir.

4. Veri Seti ve Analitik Çerçeve

Bu çalışma Türkiye'deki döviz kuru değişimlerinin dış ticaret dengesi üzerindeki etkilerini 1998:I-2019:III dönemi için çeyreklik gözlemler doğrultusunda incelemeyi amaçlamaktadır. Dış ticaret dengesi, temel olarak toplam ihracat gelirleri ile toplam ithalat giderleri arasındaki farktan oluşmaktadır ve 1 numaralı denklemdeki gibi gösterilmektedir:

$$TB = P_x X - E P_m M \quad (1)$$

Denklem 1'de yer alan TB ticaret dengesini, P_x ihracat mallarının fiyatını, X ihracat miktarını, E döviz kurunu, P_m ithal malların fiyatını ve M ise ithalat miktarını ifade etmektedir. Ticaret dengesinin temel belirleyicilerini fonksiyonel olarak ifade ettiğimizde ise 2 numaralı denklemde yer alan eşitliği elde ederiz:

$$TB = X(Y^f, E) - M(Y^d, E) \quad (2)$$

Denklem 2'de yer alan Y^f ve Y^d değerleri sırasıyla ulusal gelir ve yabancı gelir düzeylerini ifade etmektedir. Buna göre ihracata yönelik talebin temel belirleyicileri döviz kurları ve yabancı gelir düzeyindeki değişikliklerden; ithalata yönelik talebin temel belirleyicileri ise döviz kuru ve yabancı gelir düzeyindeki değişikliklerden oluşmaktadır. Bu doğrultuda Hunegnaw ve Kim (2017)'in çalışmasından hareketle belirlenen ticaret dengesi modeli 3 numaralı denklemde ifade edilmektedir:

$$\ln \left(\frac{X}{M} \right)_t = \alpha_t + \beta_1 \ln RER_t + \beta_2 \ln Y_t^d + \beta_3 \ln Y_t^f + \varepsilon_t \quad (3)$$

Denklem 3'te yer alan $\ln(X/M)$ parametresi, toplam ihracat değerinin (X) toplam ithalat değerine (M) oranının logaritmasını ifade etmektedir ve söz konusu veriler Ticaret Bakanlığı veri tabanından temin edilmiştir. $\ln RER$ parametresi, reel efektif döviz kurunun logaritmasını ifade etmektedir ve TCMB veri tabanından (EVDS) elde edilmiştir. $\ln RER$ serisinin 2003=100 olan baz yılı, 2015=100 olarak tarafımızdan yeniden düzenlenmiştir. Y^d ve Y^f parametreleri ise sırasıyla Türkiye ve G-20 ülkeleri için harcama yaklaşımına göre hesaplanan reel gayrisafi yurtiçi hasıla (GSYİH) (sabit PPP\$, 2015=100) değerlerini ifade etmektedir ve bu seriler OECD veri tabanından temin edilmiştir. Yabancı gelir düzeyi için G-20 ülkelerinin GSYİH değerinin kullanılmasının temel nedeni, Türkiye'nin dış ticaretinden en büyük pay sahibi olan ülkelerin (Almanya, ABD, Çin, Rusya ve Fransa) bu gruba dahil olmasıdır. Ayrıca Y^f serisinin, veri tabanında 1998 yılından itibaren mevcut olması nedeniyle çalışma tarihi 1998-2019 yılları arası olarak belirlenmiştir.

Teorik olarak döviz kurlarının dış ticaret dengesi üzerindeki uzun dönemli etkileri Marshall-Lerner Koşulu hipotezi ile test edilmektedir. Bu hipotezin geçerli olabilmesi için $\ln RER$ değerinin uzun dönemde pozitif bir değer alması beklenmektedir. Buna göre döviz kurundan meydana gelecek bir artış (veya ulusal para biriminin değer kaybetmesi) ihracat mallarının ucuzlamasına, buna karşın ithal mallarının pahalılaşmasına neden olacak ve beraberinde ticaret dengesinin olumlu yönde etkilenmesine katkı sağlayacaktır. Ancak diğer taraftan TCMB'nin reel efektif döviz kuru ile Türk lirası arasındaki ilişkiye dair yorumu uluslararası literatürden farklılık göstermektedir. TCMB'ye göre RER değerinde meydana gelecek artışlar Türk lirasının reel olarak değer kazanmasına ve dolayısıyla Türk mallarının yabancı mallar cinsinden fiyatının artmasına neden olacaktır. Bu durum ise nihai olarak dış ticaret dengesi üzerinde olumsuz yönde etki etmesi anlamına gelmektedir. Dolayısıyla reel efektif döviz kurunun ticaret dengesi üzerinde olumlu etki meydana getirebilmesi için negatif bir değer alması gerekmektedir.

Hipotez 1: $\beta_1 < 0$

Denklem 3'te yer alan β_2 tahmini ise pozitif veya negatif değer alabilmektedir. Ülkenin ulusal gelirinde meydana gelecek bir artış ithalat oranlarını artırıyorsa, bu durum dış ticaret dengesinin bozulmasına neden olabileceği gibi; ulusal gelirindeki söz konusu artış ikame mal üretiminden kaynaklanıyorsa ise bu durum ülkenin ithal mallarına olan talebi azaltarak, dış ticaret dengesinde olumlu bir etki de yaratabilecektir. Aynı şekilde, β_3 'ün işareti de pozitif veya negatif olabilmektedir (Sivrikaya & Ongan, 2019: 232). Bu çalışma ise ulusal gelirden meydana gelecek artışların, ithal mallarına olan talebi artıracığı, buna karşın ihracat mallarının talebinin azalmasına yol açacağı ve dolayısıyla dış ticaret dengesinin bozulmasına neden olacağı hipotezini dikkate almaktadır.

Hipotez 2: $\beta_2 < 0$

Çalışmanın bir diğer hipotezi ise yabancı gelir düzeyinde meydana gelecek artışların, ters etki göstererek, ihracat mallarına olan talebin artmasına katkı sağlayacağı ve bu durumun ticaret dengesi üzerinde olumlu bir etki sağlayacağı şeklindedir.

Hipotez 3: $\beta_3 > 0$

Son olarak, döviz kurlarının dış ticaret dengesi üzerindeki kısa dönemli etkileri J-eğrisi hipotezinin test edilmesi ile ortaya koyulmaktadır. Bu hipotezin geçerli olabilmesi için, Merkez Bankası hesaplamaları dikkate alınarak, lnRER değerinin kısa dönemde pozitif bir değer alması beklenmektedir. Buna göre kısa dönemde döviz kurunda meydana gelecek artışlar, ticaret dengesini olumsuz yönde etkilemektedir.

Hipotez 4: $\beta_1(k) > 0$

Çalışmada, söz konusu hipotezler doğrultusunda, Türkiye için döviz kuru ve dış ticaret dengesi arasındaki kısa ve uzun dönemli ilişkiyi ortaya koymaya yönelik olarak Fourier eşbütünleşme analizine yer verilecektir.

5. Tsong vd. (2016) Fourier Eşbütünleşme Testi

Ekonometrik analizlerde, yapısal kırılmaları ihmal etmek, doğru bir boş hipotezin yanlış bir şekilde reddedilmesine neden olabilmektedir. Fourier temelli testler, bilinmeyen çoklu yapısal kırılmaları ele alabilmektedir. Kukla değişkenler kullanılarak yapılan geleneksel eşbütünleşme testleri kesin kırılma tarihlerinin tahmin edilmesini gerektirirken, Fourier yaklaşımı kırılma tarihlerini tahmin etmenin zorlu prosedürünü önleyerek, seride bilinmeyen yapıda ve bilinmeyen sayıda kırılmaların varlığında oldukça güçlü bir performans göstermektedir. Fourier yaklaşımı az sayıda düşük frekanslı bileşen kullanarak bir veya daha fazla yapısal kırılma ile birlikte bir serinin temel özelliklerini yakalayabilmektedir (Enders & Lee, 2012: 592).

Tsong vd. (2016), Fourier yaklaşımını kullanarak, bilinmeyen formdaki ve sayıdaki yapısal kırılmalara izin veren bir eşbütünleşme testi geliştirmişlerdir. Bu test, Shin (1994) testinin uzun dönem ilişkide yapısal kırılmaları dikkate alarak genişletilmiş bir hali olarak kabul edilebilir (Tsong vd., 2016: 1108). Ayrıca KPSS testinin çok değişkenli bir uzantısı olan Shin (1994) testine benzer şekilde, Tsong vd. (2016) tarafından geliştirilen bu testin de Becker vd. (2006) durağanlık testinin çok değişkenli bir uzantısı olduğu kabul edilmektedir. Tsong vd. (2016), Denklem 4 ile verilen eşbütünleşme regresyonunu dikkate almaktadır:

$$y_t = d_t + x_t' \beta + \eta_t, t = 1, 2, \dots, T, \quad (4)$$

Burada $\eta_t = \gamma_t + v_{1t}$, $\gamma_t = \gamma_{t-1} + u_t$ ve $x_t = x_{t-1} + v_{2t}$ 'dir. Ayrıca u_t , sıfır ortalama ve σ_u^2 varyans ile bir *iid* (bağımsız ve özdeş dağılan) süreçtir. Bundan dolayı γ_t , sıfır ortalama ile bir rassal yürüyüş sürecini ifade etmektedir. Deterministik bileşen d_t ise $m = 0$ veya $m = 1$ ile 5 numaralı denklemdeki gibi tanımlanabilmektedir.

$$d_t = \sum_{i=0}^m \delta_i t^i + f_t \quad (5)$$

Burada f_t , 6 numaralı denklemdeki gibi tanımlanan Fourier fonksiyonudur:

$$f_t = \alpha_k \sin\left(\frac{2\pi kt}{T}\right) + \beta_k \cos\left(\frac{2\pi kt}{T}\right) \quad (6)$$

Skaler v_{1t} ve p-boyutlu v_{2t} durağandır, bu nedenle y_t ve x_t $I(1)$ süreçleridir ($y_t \sim I(1)$ ve $x_t \sim I(1)$). Eğer $\sigma_u^2 = 0$, $\eta_t = v_{1t}$ durağan bir süreç ise y_t ve x_t eşbütünlüştür. Alternatif hipoteze karşı eşbütünlüşmenin varlığını ifade eden boş hipotez Denklem 7 ile ifade edilmektedir:

$$H_0 = \sigma_u^2 = 0 \text{ ve } H_1 = \sigma_u^2 > 0 \quad (7)$$

4 ve 6 numaralı denklemler boş hipotez altında 8 numaralı denklemdeki gibi yeniden yazılabilir:

$$y_t = \sum_{i=0}^m \delta_i t^i + \alpha_k \sin\left(\frac{2\pi kt}{T}\right) + \beta_k \cos\left(\frac{2\pi kt}{T}\right) + x_t' \beta + v_{1t} \quad (8)$$

FSHIN eşbütünlüşme test istatistiği Denklem 9 ile elde edilmektedir:

$$CI_f^m = T^{-2} \hat{\omega}_1^{-2} \sum_{t=1}^T S_t^2 \quad (9)$$

Burada $S_t = \sum_{t=1}^T \hat{v}_{1t}$, Denklem 8'den elde edilen En Küçük Kareler (EKK) kalıntılarının kısmi toplamlarını, $\hat{\omega}_1^2$ ise v_{1t} 'nin uzun dönem varyansının tutarlı tahmincisini göstermektedir. Son olarak Tsong vd. (2016), eşbütünlüşme test prosedüründe Fourier bileşenlerinin anlamlılığını test etmek için F-testinin kullanılmasını önermişlerdir ($H_0: \alpha_k = \beta_k = 0$). Belirli bir k frekansı ile F-test istatistiği Denklem 10 kullanılarak hesaplanmaktadır:

$$F^m(k) = \frac{(SSE_0^m - SSE_1^m(k))/2}{SSE_1^m(k)/(T-q)} \quad (10)$$

Burada SSE_0^m ve $SSE_1^m(k)$, sırasıyla boş ve alternatif hipotezler altında Denklem 8'den elde edilen Kalıntı Kareler Toplamını (KKT) belirtirken, q ise alternatif hipotez altında parametrelerin sayısını ifade etmektedir.

6. Ampirik Sonuçlar

Çalışmada öncelikle analizlerde yer alan değişkenlerin durağanlık özelliklerini ortaya koymak adına KPSS ve Fourier KPSS (FKPSS) durağanlık testlerine yer verilmiştir. Buna göre, serilerde doğrusal olmayan trendin yokluğu F testi ile sınanmış ve serilerin birinci farklarında ($\Delta \ln Y^t$ hariç) doğrusallığı ifade eden boş hipotezin reddedilemediği görülmüştür. Becker vd. (2006), veri üretme sürecinde doğrusal olmayan trendin olmaması durumunda, standart KPSS testi ile daha güçlü sonuçların elde edileceğini ifade etmektedir.

Tablo: 2
KPSS ve FKPSS Durağanlık Testi Sonuçları

Değişken	Min KKT	Frekans (k)	FKPSS	F-İstatistiği	KPSS
lnTB	1,102	4	0,376*	6,42**	1,465*
lnRER	0,674	1	0,270*	57,75*	5,778*
lnY ^d	3,107	1	0,470*	73,95*	1,163*
lnY ^f	1,685	1	0,553*	64,42*	1,192*
ΔlnTB	0,670	4	0,138	0,69	0,019
ΔlnRER	0,466	5	0,273	0,69	0,141
ΔlnY ^d	0,043	2	0,117	2,38	0,129
ΔlnY ^f	0,001	4	0,043	5,25**	0,046

Not: *, ** ve *** işaretleri sırasıyla katsayıların %1, %5 ve %10 düzeylerinde istatistiksel olarak anlamlılığını ifade etmektedir.

Tablo 2’de yer alan FKPSS birim kök testi sonuçları serilerin düzey değerlerinde durağan olmadıklarını ortaya koymaktadır. Bu sonuçlar şokların seriler üzerinde kalıcı etkilere sahip olduğuna işaret etmektedir. Ayrıca serilerin birinci farkları alındığı zaman durağan hale geldikleri anlaşılmaktadır. Bu durum seriler arasında eşbütünleşme ilişkisinin araştırılmasına olanak sağlamaktadır. Fourier KPSS eşbütünleşme testi sonuçları Tablo 3’te yer almaktadır.

Tablo: 3
SHIN ve FSHIN Eşbütünleşme Testi Sonuçları

Min KKT	Frekans (k)	FSHIN	F-İstatistiği	SHIN
0,513	2	0,108**	24,29*	0,129**

Not: (1) *, ** ve *** işaretleri sırasıyla katsayıların %1, %5 ve %10 düzeylerinde istatistiksel olarak anlamlılığını ifade etmektedir.

(2) FSHIN testi için %1, %5 ve %10 anlamlılık düzeyinde kritik değerler sırasıyla 0,215, 0,132 ve 0,098’dir.

(3) F testi için %1, %5 ve %10 anlamlılık düzeyinde kritik değerler sırasıyla 5,774, 4,066 ve 3,352’dir.

(4) SHIN testi için %1, %5 ve %10 anlamlılık düzeyinde kritik değerler sırasıyla 0,271, 0,159 ve 0,121’dir.

Tablo 3’te yer alan F istatistiği değeri, Tsong vd. (2016: 1091)’nin çalışmasında verilen kritik değerlerden büyük olduğu için trigonometrik terimlerin anlamlı olduğu anlaşılmaktadır. SHIN ve FSHIN eşbütünleşme testi sonuçlarına göre hesaplanan test istatistikleri %5’lik kritik değerlerden küçük olduğu için eşbütünleşmenin varlığını ifade eden boş hipotez reddedilememektedir. Bu durum değişkenler arasında eşbütünleşme ilişkisinin varlığını ortaya koymaktadır. Seriler, uzun dönemde birlikte hareket etmektedir ve bu serilerin düzey değerleriyle yapılacak uzun dönem analizi sahte regresyon içermeyecektir. Bu durumda seriler arasındaki uzun dönem eşbütünleşme katsayılarının tahminine geçilebileceğine karar verilmiştir. Çalışmada uzun dönem eşbütünleşme katsayıları, Stock-Watson (1993) tarafından önerilen Dinamik En Küçük Kareler (DOLS) yöntemiyle tahmin edilmiştir. Elde edilen sonuçlara Tablo 4’te yer verilmektedir.

Tablo: 4
Uzun Dönem Eşbütünleşme Katsayıları

Değişken	Katsayı	Standart Hata	t-İstatistiği	Prob
lnRER	-0,50*	0,056	-8,89	0,000
lnY ^d	-1,37*	0,305	-4,49	0,000
lnY ^f	2,00*	0,451	4,44	0,000
Sin	-0,05*	0,013	-4,03	0,000
Cos	-0,01	0,012	-1,19	0,236
C	14,97*	3,907	-3,83	0,000

Not: *, ** ve *** işaretleri sırasıyla katsayıların %1, %5 ve %10 düzeylerinde istatistiksel olarak anlamlılığını ifade etmektedir. Cos kosinüs, Sin ise sinüs Fourier fonksiyonlarını göstermektedir.

DOLS yöntemi ile elde edilen sonuçlara göre ulusal gelir ($\ln Y^d$), yabancı gelir ($\ln Y^f$) ve reel efektif döviz kuru ($\ln RER$) değişkenlerine ait katsayıların istatistiksel olarak anlamlı olduğu görülmektedir. Elde edilen bulgular ilk olarak Türkiye'nin en önemli ticaret ortaklarının para birimlerini dikkate alarak oluşturulan reel efektif döviz kuru parametresi ($\ln RER$) için -0,50 katsayısına işaret etmektedir. Buna göre uzun dönemde reel efektif döviz kurunda meydana gelecek %1'lik bir azalma, dış ticaret dengesi üzerinde %0,50'lik bir pozitif etki meydana getirecektir. Bu durum 1 numaralı hipotezin geçerliliğini doğrulamaktadır. Burada dikkat edilmesi gereken temel husus, daha önce de belirtildiği üzere, reel efektif döviz kuru serilerinin TCMB'den alınmış olmasıdır. Bu nedenle uluslararası literatürden farklı olarak reel efektif döviz kurunun dış ticaret dengesi üzerindeki etkisi ters yönde yorumlanmaktadır. İkinci olarak çalışmada Türkiye'nin reel GSYİH düzeyini ifade eden " $\ln Y^d$ " değişkenin katsayısı -1,37 olarak elde edilmiştir. Buna göre uzun dönemde Türkiye'nin reel GSYİH düzeyinde meydana gelecek %1'lik bir artış, dış ticaret dengesi üzerinde %1,37'lik bir azalmaya neden olacaktır. Bu durum ulusal gelir artışlarının ithalat mallarına yönelik talebi artıracakını ifade eden 2 numaralı hipotezi geçerli kılmaktadır. Son olarak, Türkiye'nin en önemli ticaret partnerleri içerisinde bulunan G-20 ülkelerinin milli gelir değişkeni ($\ln Y^f$) için elde edilen katsayı 2,00 olarak elde edilmiştir. Buna göre, uzun dönemde yabancı milli gelir düzeyinde meydana gelecek %1'lik bir artış, dış ticaret dengesini %2,00 oranında artırmaktadır. Bu durum yabancı gelirde yaşanan artışların, Türkiye'nin ihrac mallarına yönelik talebi artıracakını ifade eden 3 numaralı denklemi de geçerli kılmaktadır.

Diğer taraftan, çalışmada modelin kısa dönem parametrelerini ve hata düzeltme terimini (ECT) elde etmek için Hata Düzeltme Modeli (ECM) oluşturulmuştur. Elde edilen hata düzeltme modeli sonuçları Tablo 5'te yer almaktadır.

Tablo: 5
Hata Düzeltme Modeli

Değişken	Katsayı	Standart Hata	t-istatistiği	Prob
$\Delta \ln RER$	-0,25**	0,048	-5,15	0,000
$\Delta \ln Y^d$	-1,62*	0,399	-4,07	0,000
$\Delta \ln Y^f$	0,93***	0,485	1,91	0,059
ECT_{t-1}	-0,40	0,099	-4,05	0,000

Not: *, ** ve *** işaretleri sırasıyla katsayıların %1, %5 ve %10 düzeylerinde istatistiksel olarak anlamlılığını ifade etmektedir.

Tablo 5, kısa dönem tahmin sonuçlarını göstermektedir. Tablo 5 incelendiğinde hata düzeltme terimi (ECT_{t-1}) katsayısının negatif ve istatistiksel olarak anlamlı olduğu anlaşılmaktadır. Bu durum; uzun dönemde birlikte hareket eden seriler arasında, kısa dönemde ortaya çıkan sapmaların ortadan kalktığını ve hata düzeltme mekanizmasının çalıştığını göstermektedir. Sapmaların 0,40'lık kısmının 1 dönem içerisinde düzeldiği ve yaklaşık 2,5 dönem sonra sistemin dengeye geleceği görülmektedir. Tablo 4'ten görülebileceği üzere reel efektif döviz kuru serisinin kısa dönem katsayısı negatif (-0,25) ve istatistiksel olarak anlamlıdır. Buna göre kısa dönemde reel efektif döviz kurunda meydana gelecek %1'lik bir artış, dış ticaret dengesi üzerinde %0,25'lik bir iyileşmeye neden olacaktır. Bu durum Türkiye için J-Eğrisi hipotezinin (4 numaralı hipotez) geçerli

olmadığını ortaya koymaktadır. Diğer taraftan, kısa dönemde ulusal milli gelir düzeyinin dış ticaret dengesi üzerinde negatif ve istatistiksel olarak anlamlı, yabancı milli gelir düzeyinin ise pozitif ve istatistiksel olarak anlamlı katsayılarla sahip olduğu görülmektedir. Türkiye için elde edilen kısa dönem ve uzun dönem katsayılar birbirlerine benzerlik göstermektedir.

7. Sonuç ve Değerlendirme

Bu çalışma Türkiye ekonomisindeki döviz kuru değişimlerinin dış ticaret dengesi üzerinde meydana getirdiği kısa ve uzun dönemli etkileri, geleneksel test yöntemlerinden farklı olarak, sırasıyla Hata Düzeltme modeli ve Tsong vd. (2016) tarafından geliştirilen Fourier eşbütünleşme analizi ile incelemeyi amaçlamıştır. 1998:1-2019:3 çeyreklik gözlemlerin dahil edildiği çalışmada ilk olarak serilerin durağanlık derecelerini belirlemek amacıyla KPSS ve Fourier KPSS birim kök testleri uygulanmıştır. Birim kök testlerinden elde edilen bulgular, tüm serilerin düzey değerlerinde durağan olmadıklarını ve birinci fark değerlerinde durağan hale geldiklerini ortaya koymaktadır. Çalışmada serilerin uzun dönem analizlere imkân tanıyacak durağanlık derecelerine sahip olduklarının tespit edilmesinin ardından, ikinci olarak Fourier KPSS eşbütünleşme testi uygulanmıştır. Eşbütünleşme analizinden elde edilen bulgular ise Türkiye için uzun dönemde dış ticaret dengesi ile reel efektif döviz kuru, ulusal gelir ve yabancı gelir arasında eşbütünleşme ilişkisinin varlığına işaret etmektedir. Bu doğrultuda uygulanan Dinamik En Küçük Kareler (DOLS) yöntemi, reel efektif döviz kuru ve yabancı gelir düzeyinin dış ticaret dengesi üzerinde pozitif, ulusal gelir düzeyinin ise negatif etkilere sahip olduğunu ortaya koymaktadır. Son olarak kısa dönem etkilerin tespit edilmesi amacıyla uygulanan hata düzeltme modeli tahmin sonuçları ise, uzun dönem bulgularına benzer sonuçlara işaret etmektedir. Elde edilen sonuçlardan döviz kurunda yaşanacak bir düşüşün, dış ticaret dengesinde iyileşmeye yol açtığı bulgusu Arize (1994), Anoke vd. (2016) ve Iyke ve Ho (2017)'nin çalışma bulguları ile uyumludur.

Teorik olarak, uzun dönemde döviz kurları ile dış ticaret dengesi arasında pozitif ilişkinin varlığını ifade eden Marshall-Lerner Koşulu hipotezinin Türkiye için geçerli olduğu tespit edilmiştir. Daha spesifik olarak ifade edilirse, Türkiye'de reel döviz kurlarında meydana gelecek azalmalar, teorik açıklamalara uygun olarak, dış ticaret dengesinin iyileşmesine katkı sağlamaktadır. Buna göre Türkiye'de reel efektif döviz kurunda yaşanacak azalmalar, ulusal para birimi olan Türk lirasının değer kaybetmesine, ihracata konu olan mal ve hizmetlerin ucuzlaşmasına ve beraberinde ihracat gelirlerinin artmasına yol açmaktadır. Bu durum dış ticaret dengesinin pozitif yönde etkilenesine katkı sağlamaktadır. Reel efektif döviz kurunun dış ticaret dengesi üzerindeki etkisini açıklarken, literatürün aksi yönünde yorumlanmasının, Merkez Bankasının kur hesaplamalarındaki farklılıklarından kaynaklandığı unutulmamalıdır. Bu bilgiler ışığında ilgili yazın incelenecek olursa, farklı ülke grupları ele alınmış olsa da benzer sonuçlar elde eden çalışmalardan Onafowora (2003), Hunegnaw ve Kim (2017) ve Doğru vd. (2019) da Marshall-Lerner Koşulu hipotezinin geçerli olduğu sonucuna ulaşmıştır. Türkiye üzerine çalışmalar incelenecek olursa Brada vd. (1997), Akbostancı (2004), Doğanlar vd. (2004), Vergil ve Erdoğan (2009), Gül ve Ekinci (2015), Karaş ve Karaş (2017) ve Ramzan (2021) da çalışmanın bulgularına uyumlu sonuçlar elde etmişlerdir.

Türkiye ekonomisi, uluslararası rekabet gücünü artırabilmek adına gerek teknolojik gerekse de altyapı yatırımlarını gerçekleştirebilmek için döviz girdisine ihtiyaç duyan ve bu nedenle gelişmekte olan ülkeler kategorisinde yer alan bir ülke konumundadır. Sürdürülebilir bir ekonomik büyüme ve kalkınma stratejisi için ihracat gelirlerinden elde edilecek döviz gelirleri, diğer tüm ekonomilerde olduğu gibi, Türkiye içinde önemli bir yere sahiptir. Bu doğrultuda döviz kurlarında yaşanacak değişimlerin yaratacağı ticaret avantajları, döviz geliri elde etme anlamında önemli bir politika aracı olarak da kabul edilmektedir.

Normal koşullar altında (pandemi vb. olmadığı durumlar) Türk lirasında yaşanan değer kaybının yurtiçinde üretilen mal ve hizmetlerin fiyatlarının ucuzlaşmasına ve beraberinde dış talebin artmasına olanak sağladığı bir gerçektir. Bu nedenle politika yapıcıların, yurtiçi talep ve üretim koşullarını olumsuz etkilemeyecek düzeyde bir döviz kuru politikası izlemesinin faydalı olacağı düşünülmektedir. Özellikle döviz kurlarının denge değerlerinde yaşanacak ani değişimler, ithalata dayalı bir ihracat yapısına sahip olan Türkiye için maliyet enflasyonunun oluşmasına ve makroekonomik dengelerin bozulmasına neden olabilmektedir. Bu doğrultuda sağlıksız fiyat hareketlerinin oluşmasını engelleyecek istikrarlı bir döviz politikasının, Türkiye için dış ticaret dengesinin sağlanması anlamında oldukça önemli bir yere sahip olduğu düşünülmektedir.

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Kadın İstihdamı ile Doğum Oranı Arasındaki İlişki Üzerine Eşbütünleşme Analizi: İsveç ve ABD Örneği

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Cointegration Analysis on the Relationship between Women's Employment and Birth Rate: The Case of Sweden and the USA

Abstract

This study examines the long-term relationship between female employment and birth rate. The study used the time series analysis method based on 1991-2020 for Sweden and the USA. As a result of the analysis, a cointegration relationship between female employment and birth rate was determined for both the USA and Sweden. When the long-term coefficient estimation results for the USA are examined, it is determined that the birth rate increases the female employment rate by 0.80 in the FMOLS model, 0.91 in the DOLS model, and 0.64 units in the CCR model. In the long-term estimation results for Sweden, it was determined that the birth rate increased the female employment rate by 1.41 units in the FMOLS model and 0.71 units in the CCR model. Therefore, according to the long-term coefficient estimation results, it is seen that there is a positive relationship between the female employment rate and the birth rate in both countries.

Keywords : Birth Rate, Female Employment, Time Series Analysis.

JEL Classification Codes : C22, E24, J13.

Öz

Çalışmada kadın istihdamı ve doğum oranı arasındaki uzun dönemli ilişki incelenmektedir. Doğum oranının kadın istihdamına etkisi İsveç ve ABD için 1991-2020 yılları verilerinden hareketle zaman seri analizi araştırma yöntemi olarak kullanılmıştır. Analizlerle hem ABD hem İsveç için kadın istihdamı ve doğum oranı arasında eşbütünleşme ilişkisi tespit edilmiştir. ABD için uzun dönemli katsayı tahmin sonuçları incelendiğinde, doğum oranının kadın istihdam oranını FMOLS modelinde 0.80, DOLS modelinde 0.91 ve CCR modelinde ise 0.64 birim artırdığı tespit edilmiştir. İsveç için uzun dönem tahmin sonuçlarında doğum oranının kadın istihdam oranını FMOLS modelinde 1.41 ve CCR modelinde ise 0.71 birim artırdığı tespit edilmiştir. Dolayısıyla, uzun dönemli katsayı tahmin sonuçlarına göre iki ülke için de kadın istihdam oranı ile doğum oranı arasında pozitif yönlü bir ilişki olduğu görülmektedir.

Anahtar Sözcükler : Doğum Oranı, Kadın İstihdamı, Zaman Serisi Analizi.

1. Giriş

Sanayi devriminin ilk yıllarından itibaren kadınlar işgücü piyasasının bir parçasıdır. Kadınların işgücü piyasasının bir parçası olmasının yanında piyasanın dışında da hane içi sorumluluklar çerçevesinde çalıştıkları tartışılmaz bir gerçektir. Hane içinde gerçekleştirdikleri çalışmalar karşılığında ücret geliri elde edememeleri sorunu kadar işgücü piyasasına dahil oldukları noktada da düşük ücretlerle ve düşük nitelikteki işlerde çalıştırılmaları sorunu söz konusudur. Bu eğilimin arka planında kadınların patriarkal sistem tarafından belirlenmiş cinsiyet rolleri sonucunda ikincil işgücü olarak konumlandırılması yer almaktadır. Bu roller kadınlara öncelikle ev içindeki işlerle, çocuklarla ve varsa bakıma muhtaç aile bireyleriyle ilgilenme sorumluluğu yüklemektedir. Bundan kaynaklanmaktadır ki kadınlar işgücü piyasasının önemli bir bileşeni olmalarına rağmen çocuk sahibi oldukları ya da olmaya karar verdikleri noktada iş ve aile yaşamı arasında dengeyi sağlamalarına izin vermeyen piyasa yapısı söz konusu olduğunda bir seçim yapmak zorunda kalmaktadırlar. İşgücü piyasasının ve toplumun önemli aktörlerinden olan kadınların, çalışan ve annelik gibi birbirinden bağımsız olmakla birlikte patriarkal sistemin belirlediği cinsiyet rolleri dolayısıyla birinin diğerini etkilediği iki olgu arasında seçim yapmak zorunda kalmaları toplumsal rollerin yarattığı bir eşitsizlik olarak nitelendirilebilmektedir. Bu sebeple kadının anne olma ve çalışan olma ikilemi özellikle sanayileşmeyle beraber çalışma biçimleri ve çalışmanın anlamında yaşana değişimler ve toplumsal cinsiyet araştırmalarının yaygınlaşmasıyla birlikte uzun yıllardır sıklıkla tartışılan bir konu haline gelmiştir.

Annelik ve çalışan olma kariyerlerinin pek çok sanayileşmiş ülkede yaşayan kadınlar için çelişkili durumda olması çeşitli hukuki müdahalelerin varlığını gerektirmektedir. Araştırmalara göre; çalışan ebeveynlere yönelik sağlanan kurumsal desteklerle işgücü piyasası kadın istihdamına uyumlu hale getirildiğinde kadınlar için annelik-çalışma durumu bir çatışma olmaktan çıkar hale gelebilmektedir. Bu noktada önemli bir unsur da ülkelerin kültürel, sosyal ve ekonomik durumlarıdır. Yani yalnızca iş yaşam dengesini sağlayıcı müdahaleler annelik ile kadın istihdamı arasındaki ilişkiyi pozitif yönde etkilememektedir. Kadının da temel gelir sağlayıcı olarak kabul edildiği ülkelerde kadınların işgücü piyasasına katılım geçmişleri daha eskiye dayanabilmekte ve aynı zamanda anne oldukları durumda da piyasaya dahil olmaları gerekmektedir. Esping-Andersen'in gerçekleştirdiği refah rejimleri sınıflandırmasında piyasa odaklı liberal rejimin temel model ülkesi olan ABD'de kadınların çocuk sahibi olmalarından sonra temel refah sağlayıcı kurum olan piyasaya dönebilmeleri için gerçekleştirilen düzenlemeler ile evrensellik ve vatandaşlık odaklı sosyal demokrat rejiminin model ülkesi olan İsveç'te çocuk sahibi olan kadınların piyasaya dönmelerini sağlayacak düzenlemelerin hayata geçirilmesinin itici güçlerinin ve uygulamalarının farklı olduğu bilinmektedir. İşgücü piyasalarının ve toplumsal yapılarının getirdikleri farklılıklar, işgücü piyasasını düzenleme amacıyla oluşturulan politikalar ve hukuki düzenlemelerin piyasayı etkileyiş biçimlerinin farklı olacağı ve doğum oranları ile kadın istihdamı arasındaki ilişki boyutunda da farklı sonuçlara ulaşılacağı varsayılmaktadır. Bu bilgiler ışığında çalışmada kadın istihdamı ile doğum oranı arasındaki ilişki, yani doğum oranlarının kadın istihdamına etkisi, her bireyin refahı piyasadan sağlaması gerektiği ve kadının da temel gelir sağlayıcı kabul edildiği ABD ve iş-yaşam dengesinin ve toplumsal ve aile

düzeyinde kadın-erkek eşitliğinin yüksek düzeyde uygulamaya geçirilmeye çalışıldığı İsveç için incelenmektedir.

2. Kavramsal Çerçeve

Cinsiyet rolleri, bireylerin içinde bulunduğu çevre ile etkileşimlerinin bir sonucu olarak karşılaşılan bir olgudur. Bu noktada çevrenin hangi birey için hangi davranış biçimini kabul ettiğinin bir ürünü olan toplumsal cinsiyet rolleri yalnız bir ifade ile toplumların cinsiyete ilişkin değer ve inançları doğrultusunda şekillenen davranış biçimleri şeklinde tanımlanabilmektedir (Blackstone, 2003: 336). Cinsiyet rolleri tanımlanmasıyla beraber cinsiyet ve toplumsal cinsiyet terimlerinin taşıdıkları anlama ve bu ifadelerin birbirleri yerine kullanılmasının hatalı olduğuna değinildiğinde; cinsiyet terimi ile bireylerin erkek ya da kadın olmalarını belirleyen biyolojik cinsiyet ifade edilmekte (Oakley, 1972: 23) iken toplumsal cinsiyet, kadın ve erkekler içinde yaşanan toplumda atfedilen rolleri ifade etmekte ve dolayısıyla erillik ve dişlilik üzerinden gerçekleşen kültürel bir sınıflandırmayı yansıtmaktadır (Oakley, 1985: 16).

Kadın ve erkekler atfedilen geleneksel rollere bakıldığında; cinsiyetlerden kaynaklı olarak kadınlara besleyici bir rol atfedildiği ve hane dışında çalışmaktansa tam zamanlı olarak bu besleyici rolüne devam etmesinin beklendiği görülmektedir. Bu geleneksel bakışa göre; fiziksel yapıdan kaynaklı olarak erkekler lider kabul edilmekte ve hem maddi destek sağlamada hem de haneyi ilgilendiren önemli kararları alma konusunda yetkilendirilmektedir. Yirmi birinci yüzyıla gelindiğinde geleneksel bu inançlara alternatif bakış açıları destek kazanmakla birlikte yine de geleneksel görüşlerin toplumun pek çok alanında baskın bir yapıda olduğu da görülmektedir (Blackstone, 2003: 337).

Toplumsal rol bölüşümüyle eviyle sınırlandırılmaya çalışılan kadınların üretimde payının artmasının yanında toplumsal yapının geleneksel olduğu ve işgücü piyasasında kadınların ikincil konumlandırıldığı ülkelerde çocuk sahibi olan kadınların istihdamdan çekilme eğiliminde oldukları fakat istihdamdan çekilen bu kadınların bir kısmının ileri yaşlarda (çocukların bakıma ihtiyaç duydukları yaşları geçmelerinin akabinde) işgücü piyasasına tekrar dönme arzusunda oldukları belirtilmektedir. Bazı ülkelerde ise kısmi çalışma biçimlerinin yaygınlaştırılmasıyla kadının çocuk sahibi olması piyasadan tamamen çekilmesini gerektirmemekte ve fakat bu kapsama giren işler düşük nitelikli ve güvencesiz işler olduğu için kadının piyasada birincil konumda yer almasını engellemektedir. Dolayısıyla çocuk sahibi olan kadınların uygun nitelikte, güvenceli ve tam zamanlı çalışabilmeleri için devletlerin yaygın ve ucuz çocuk bakım merkezleri (Koray, 2018: 341-345), kreşler ve annelik/ebeveyn izni (Galtry, 2003) gibi çalışan kadının anneliğinin istihdamının önüne geçmesini engelleyecek önlemler alması yani iş yaşam dengesini sağlayacak politika uygulamalarında bulunması gerekmektedir.

İş yaşam dengesine ilişkin bir tanımlama yapılması gerekirse kısaca, kadın ve erkekler için işten kaynaklanan ve kişisel sorumlulukların yerine getirilebilmesi için yeterli zaman ve desteğe sahip olmayı ifade eden bir kavram olarak tanımlanabilmektedir. Bu

tanımlamadan görüldüğü üzere esasen iş yaşam dengesi kadınların yanında erkekler ve hatta kurum ve kuruluşlar açısından önem taşıyan bir sorun alanı olarak karşımıza çıkmaktadır. İş yaşam dengesi kavramı iş aile dengesi, iş aile çatışması, iş aile kültürü, iş yaşam inisiyatifleri ya da programları şeklinde farklı terimlerle de adlandırılmaktadır (Lockwood, 2003: 2-3).

İş yaşam dengesi konusuna eğilimin artmasında işgücündeki kadın sayısında ve çift ebeveynin de çalıştığı hane sayısında yaşanan artışlar yol açmış ve bu çalışanların işte başarılı olmasını sağlayacak uygulamaların hayata geçirilmesi gerekliliği artmıştır. Çünkü iş ve özel yaşamları arasındaki dengeyi kurmaya çalışan bu bireylere yüklenen birden fazla rolün üstlenilmesi baskısı ya organizasyon ya da hane içerisinde fedakarlıkta bulunmalarını zorunlu hale getirmektedir (Rothbard & Dumas, 2006: 71). Bu doğrultuda hem uluslararası hem de ulusal düzeyde iş ve yaşam dengesini sağlamaya yönelik müdahaleler söz konusu hale gelmiştir. İş yaşam dengesi noktasında çalışanların önceliklerinin; çalışma süreleri, bakım sorumlulukları ve çocuk bakımı için ebeveyn izin hakları kapsamında üç genel kategoride toplandığı düşünülmektedir. Dolayısıyla erkek ve kadın çalışanların eve katılımının artırılması hem birey hem organizasyon anlamında refah sağlayıcı bir durum olarak kabul edilmektedir (Gregory & Milner, 2009). Bu noktada pek çok ülke iş yaşam dengesini sağlamaya yönelik politika önlemlerini kendi kültürel perspektifleri ve işgücü piyasası yapıları doğrultusunda almaktadırlar.

Amerika'nın liberal bakış açısından kaynaklı olarak bireylerin ihtiyaçlarını piyasadan sağlamaları gerektiği anlayışı ve işgücü piyasası yapısından dolayı çalışma istekleri yüksek olan çalışanların özellikle 11 Eylül saldırılarından sonra hayatlarını yeniden değerlendirdikleri görülmüş ve aile yaşamlarını işleri uğruna bir kenara bırakma eğilimlerinde yaşanan azalma ile iş yaşam dengesine yönelik politikalara daha fazla ağırlık verilmeye başlanmıştır. Bu noktada kurumsal eğilimlerin arka planında iş yaşam dengesi girişimleri aracılığıyla çalışan bağlılığının ve üretkenliğinin artmasına imkân verilmesi yer almaktadır (Lockwood, 2003: 3-6).

Her ne kadar ulusal ve uluslararası alanda iş yaşam dengesini sağlamaya yönelik politika müdahalelerinin varlığı söz konusu olsa dahi işletme kapsamında bu uygulamaların yaygın olmadığı, yaygın olduğu durumların ise kilit eleman olarak adlandırılabilir yüksek nitelikli personeli işe almak ya da işyerinde tutmak amacıyla sadece onlara yönelik uygulandığı söylenebilmektedir. Bu noktada örgüt kapsamında iş yaşam dengesinin kariyer sonuçları, toplumsal cinsiyet algıları ve yöneticilerle iş arkadaşlarının desteğinin alınıp alınamayacağı gibi çeşitli unsurların değerlendirilmesi gibi bir süreç izlendiği için iş yaşam dengesi uygulamalarının işlerliği kuruluşlar ve kuruluşlar içerisinde personel grupları arasında farklılıklar yaşanmasına neden olmaktadır (Gregory & Milner, 2009).

İş yaşam dengesi göstergelerinin ölçüldüğü OECD (2020)'nin "How's Life" anketleri değerlendirildiğinde; OECD genelinde tam zamanlı çalışanlar için boş zaman ve kişisel bakıma günlük harcanan ortalama süre (bu süreye uyku da dahildir) 14-16,5 saat arasında değişmekle birlikte erkeklerin kadınlara göre 30 dakika daha fazla boş zaman ve kişisel bakım süresine sahip olduğu tespit edilmiştir. Bunun yanı sıra aynı ankette ücretli ve

ücretsiz çalışmalar değerlendirildiğinde; kadınların erkeklere nazaran günde ortalama 25 dakika daha fazla ücretsiz çalıştıkları da belirtilmektedir. Ücretli ve ücretsiz çalışma kapsamında ABD ve İsveç'e bakıldığında; ABD'de bu süre yaklaşık 25 dakika iken İsveç'te neredeyse 10 dakikadır. Yani ABD'de kadınlar İsveç'e kıyasla daha uzun sürelerde ücretsiz işlerde (yani rutin ev işleri, bakım işleri, ev için mal ve hizmet alışverişi gibi) fazla çalışmaya maruz kalmaktadırlar. Toplam çalışma sürelerinde cinsiyet farkı ücretli çalışma açısından incelendiğinde ise, ABD'de İsveç'e kıyasla erkekler kadınlardan daha uzun sürelerle çalışmaktadırlar. İsveç'te cinsiyete dayalı çalışma süresi farkı ABD'nin yaklaşık yarısı kadar daha az seyretmektedir.

İsveç 1990'lı yıllardan itibaren Avrupa ülkeleri içerisinde hem doğurganlık oranı hem de kadınların işgücü piyasasına katılımının birlikte yüksek olduğu ülkelerin başında gelmektedir. Bunun en önemli sebebinin kapsamlı kamu politikalarının işlerliği olduğu söylenmektedir. Özellikle 1990'lı yılların başında hem eşlerin ayrı ayrı yüksek ortalama ve marjinal vergi oranlarıyla vergilendirilmesiyle kadının işgücü piyasasına katılımı teşvik edilmekle birlikte ebeveyn izni programı, esnek çalışma saatleri ve sübvansiyonlu çocuk bakım hizmetlerinin varlığı annelik ve çalışan çatışmasının önüne geçilmesini sağlayan önlemler olarak belirtilmektedir (Sundström & Stafford, 1992). İsveç'te son yıllarda ortaya çıkan "latte papas" kavramının doğuşuyla, çocuk sahibi olduğunda ebeveyn izninde erkeklerin de sürece dahil edilmesi, dünya genelinde babaların da anneler gibi bakım hizmetleriyle ilgilenir hale geldiği görülmektedir. Yapılan araştırmalar doğum izninin babalar tarafından kullanılmasının ilerleyen aşamalarda çocuk bakımına katılım noktasında olumlu bir etkisi olduğunu göstermektedir. Bu noktada, yani çocuklarıyla geçirdikleri zamanın artmasıyla beraber iş-yaşam dengesi konusunda çatışma yaşayan babaların sayısında yaşanan artış konusunda araştırmamıza konu olan ABD ve İsveç benzerlik göstermekle birlikte İsveçli babalar ücretli ebeveyn izni kullanımında yasalarla ve iş-yaşam dengesi politikalarıyla teşvik edilirken; Amerikalı babalar için yine aynı politikalar ebeveyn izni ve esnek çalışma talebi noktasında caydırıcı nitelik taşımaktadır (Almqvist & Kaufman, 2016). Bu durumda Amerika'nın liberal yapısının etkisi olduğu söylenebilmektedir. Amerika'da doğum sonrası ebeveyn izninde çalışanların iki kısımda incelendiği görülebilmektedir. Federal çalışanlar için 2019 yılından itibaren 12 haftaya kadar ücretli izin hakkı tanınmakta iken; diğer çalışanlarda yasalarla desteklenen bir ücretli izin hakkı söz konusu değildir. Federal çalışanlar dışında kalan çalışanlar için iş güvencesi sağlanmakla birlikte doğumdan sonra 12 hafta ücretsiz ebeveyn izni söz konusudur. İsveç'te ise çalışanlara, ücretlerinin ya da maaşlarının %80'ini alabilecekleri 480 günlük ebeveyn izni sunulmaktadır. Bunun yanı sıra Amerika'da İsveç'e nazaran daha uzun sürelerle çalışıldığı da bilinmektedir. Zira İsveç'te, çalışan refahının sağlanabilmesi adına 2015 yılında günlük 6 saatlik çalışma süresi içeren bir çalışma planına geçilmiştir.

3. Literatür Taraması

Kadınların işgücü piyasasına katılımı ve doğurganlıkları arasındaki ilişki pek çok Batılı sanayileşmiş ülke için çeşitli çalışmalara konu olmaktadır. Bu araştırmalarda genel olarak iki kariyerin birbiriyle çeliştiği gözlenmektedir. Bu kapsamda doğurganlık ve kadın

istihdamı ilişkisini inceleyen ulusal ve uluslararası literatür bu başlık altında incelenmektedir.

Kutlar, Erdem ve Aydın (2012) 1988-2009 yılları için Türkiye’de evli kadınlara ilişkin işgücüne katılma, ücret endeksi, doğurganlık ve boşanma oranları arasındaki uzun dönemli ilişkiyi inceledikleri çalışmalarında, doğurganlık oranı ile ücret endeksi arasında pozitif, işgücüne katılım ile ücret endeksi arasında negatif yönlü bir ilişki tespit edilmektedir. Bunun yanı sıra işgücüne katılma oranı ile boşanma arasında pozitif yönlü uzun dönemli ilişki belirlenmekte iken; doğurganlıkla kadınların işgücüne katılımı arasında nedensellik ilişkisi olduğu sonucuna da ulaşılmaktadır.

Üçler ve Kızılkaya (2014) tarafından Türkiye’de kadın istihdamının boşanma ve doğurganlık üzerindeki etkilerinin 2004-2013 yılları için incelendiği çalışmada, kadın istihdamının doğurganlık üzerinde negatif, boşanma üzerinde pozitif etkisi olduğu sonucuna ulaşılmaktadır.

Demirtaş ve Yayla (2017), küresel entegrasyonun 113 ülkede 1995-2012 yıllarında kadın istihdamı üzerindeki etkilerini inceledikleri çalışmalarında doğurganlık oranı istihdamın bir belirleyicisi olarak seçilmiştir. OECD ülkeleri için yapılan analizler sonucunda doğurganlığın kadın istihdamını pozitif yönde etkilediği tespit edilmekte iken; gelişmekte olan ülkelerde ise doğurganlık ve kadın istihdamı arasında herhangi bir ilişki tespit edilememiştir.

Güriş, Topdağ ve Bozkurt (2019) OECD ülkelerinde kadınların işgücüne katılımını inceledikleri çalışmalarında doğurganlık oranının kadın istihdamını önemli derecede pozitif yönde etkilediği sonucuna ulaşılmaktadır.

Ahn ve Mira (2002), OECD ülkelerinde 1970-1995 yılları için toplam doğurganlık oranı ve işgücüne katılım oranı arasındaki ilişkinin incelendiği çalışmada, kadınların işgücü piyasasına katılımı ve toplam doğurganlık arasında uzun dönemli bir ilişki tespit edilmektedir. Ayrıca toplam doğurganlık ile kadınların işgücüne katılım oranı arasında 1970-1980’lerin başında negatif yönlü bir ilişki varken; 1980’lerin sonunda pozitif yönlü bir ilişki olduğu sonucuna ulaşılmaktadır.

Engelhardt, Kögel ve Prskawetz (2004)’ın çalışmalarında Fransa, Batı Almanya, İtalya, İsveç, Birleşik Krallık ve ABD için 1960-2000 verilerinden hareketle doğurganlık ve kadın istihdamı arasında uzun dönemli ilişki ve nedensellik ilişkisi incelenmektedir. Analizler sonucunda çalışmaya konu olan ülkelerde kadın istihdamı ve doğurganlık arasında çift yönlü nedensellik ilişkisi tespit edilmekte ve 1970’lerin ortalarına kadar olan negatif ve anlamlı korelasyon ilişkisinin daha sonra zayıf negatif bir ilişkiye dönüştüğü sonucuna ulaşılmaktadır.

Engelhardt ve Prskawetz (2005) tarafından 1960-2000 yıllarında 22 OECD ülkesi verilerinden hareketle toplam doğurganlık hızı ve kadınların işgücüne katılım oranı arasındaki ilişkinin incelendiği çalışmada, 1980’lerin sonlarına doğru negatif ilişkiden

pozitif ilişkiye doğru bir kayma olduğu; ilk dönemler kadın istihdamında yaşanan artışın doğurganlığı güçlü bir şekilde düşürürken; devam eden istihdam artışının doğurganlık üzerinde daha düşük negatif etkisi olduğu sonuçlarına ulaşılmaktadır.

Kenjoh (2005) tarafından gerçekleştirilen çalışmada 1980 ve 1990'larda İngiltere, Almanya, Hollanda, İsveç ve Japonya'da ilk çocuk doğumuyla kadın istihdamı arasındaki ilişki incelenmektedir. Ekonometrik analizler sonucunda annelik ve ücretli çalışma bileşimini sağlayan kamu politikalarının ve yarı zamanlı istihdamın yeni annelerin işgücü piyasasına katılımını olumlu yönde etkilediği gözlenmektedir.

Da Rocha ve Fuster (2006) tarafından OECD ülkelerinde doğurganlık ve istihdam arasındaki pozitif yönlü ilişkide işgücü piyasasındaki çatışmaların rolünün incelendiği çalışmada, işsizliğin kadınların doğum yapma isteklerini ertelediği (iş bulma oranı düşük olduğu için doğumdan dolayı kariyer kesintisi yaşamamak adına) ve dolayısıyla doğurganlık üzerinde negatif etkisi olduğu sonucuna ulaşılmaktadır. Ayrıca işgücü piyasası çatışmalarının kadın istihdamı ile doğurganlık arasında pozitif yönlü bir ilişki oluşturabileceği de tespit edilmektedir.

Hilgeman ve Butts (2009), 20 gelişmiş ülkede bireysel özellikler, kadınların işgücüne katılımı, çocuk bakım kaydı ve aile izni ile doğurganlık arasındaki ilişkiyi inceledikleri çalışmalarında, kadınların tam zamanlı istihdamının bireysel düzeydeki özellikler dikkate alındığında 1980'lerde kadınların işgücüne katılımı ve doğurganlık arasında negatif bir etki yarattığı ve dolayısıyla doğurganlığı azalttığı sonucuna ulaşmaktadırlar. Çalışmada özellikle zayıf iş-aile politikaları olan Güney Avrupa ve Asya ülkelerinde, kadın istihdamında yaşanan artışın doğurganlıkta bir azalmaya sebep olduğu belirtilmektedir.

Mishra, Nielsen ve Smyth (2010), 1960-2004 yılları için G7 ülkelerinde kadınların işgücüne katılım ve doğurganlık oranlarını inceledikleri çalışmalarında, kadınların işgücüne katılımı ve doğurganlık arasında uzun dönemli ilişki olduğu, doğurganlık oranında yaşanan artışın kadınların işgücüne katılım oranında bir azalışa sebep olduğu sonuçlarına ulaşılmaktadır. Bunun yanında toplam doğurganlık oranının kadınların işgücüne katılım oranının Granger nedeni olduğu bulunmaktadır.

Matysiak ve Vignoli (2013) tarafından İtalya ve Polonya örnekleri özelinde kadın istihdamı ile doğurganlık arasındaki ilişkinin incelendiği çalışmada, İtalya'da kadın istihdamı ile doğurganlık arasında negatif yönlü bir ilişki tespit edilirken; Polonya'da kadınların istihdam ve doğurganlık faaliyetlerini birleştirme eğiliminde oldukları belirlenmektedir.

Evan ve Vozarova (2018) çalışmalarında OECD ülkelerinde 1990-2013 verilerinden hareketle kadınların işgücüne katılımı ve emekli aylıklarının doğurganlık oranı üzerindeki etkisini incelemektedirler. Araştırma sonucunda cinsiyetler arası ücret farkının ve aile yanlısı sosyal harcamaların doğurganlık üzerinde olumlu, emekli aylıklarının olumsuz bir etkisi olduğu tespit edilmektedir. Bunun yanında 1990-1999 yılları için kadın işgücüne

katılım oranı ile toplam doğurganlık oranı arasında tespit edilen pozitif ilişkinin önceki dönemde yaşanan çöküşten sonra doğal dengeye gelmenin bir etkisi olduğu savunulmakta iken; 2000-2013 yılları için iki değişken arasında istatistiksel olarak ölçülebilir bir ilişki olmadığı belirtilmektedir.

Oshio (2019), 24 OECD ülkesinin 2017 yılına kadar olan verilerinden hareketle kadın istihdamı ile doğurganlık arasındaki 1980'lerin ortalarından itibaren negatiften pozitifte yönelen korelasyon ilişkisinin devamlılığının sınındığı çalışmada, kadın istihdamı ile doğurganlık arasında pozitif korelasyonun devam ettiği dolayısıyla sosyo-kurumsal bağlamların elverişli hale getirilmesiyle kadın işgücüne katılım ve toplam doğurganlık oranı arasında pozitif bir ilişkinin yadsınamaz olduğu sonucuna ulaşılmaktadır.

4. Metodoloji

Çalışmanın temel amacı kadın istihdamı ile doğum oranı arasındaki ilişkiyi doğum oranlarının kadın istihdamına etkisi bağlamında ABD ve İsveç kapsamında karşılaştırmalı olarak incelemektir. İnceleme kapsamında liberal ve sosyal demokrat refah rejimlerinin model ülkeleri oldukları için ABD ve İsveç belirlenmiştir. 1991-2020 yılları için Dünya Bankası veri tabanından elde edilen verilerinden hareketle çalışmada kadın istihdamı ile doğum oranı arasında uzun dönemli ilişkiler araştırılmaktadır.

Kadın istihdamı ile doğum oranı arasındaki uzun dönemli ilişkileri tespit etmek amacıyla eşbütünleşme analizi ve uzun dönem katsayı tahmini gerçekleştirilmiştir. Bu analizler öncesinde değişkenlere ait serilere ilişkin tanımlayıcı istatistiklere yer verilmiş, sonrasında serilerin durağanlıkları yani birim kök içerip içermedikleri, yapısal kırılmaları dikkate alan Lee & Strazicich (2013) tarafından geliştirilen One Break LM testi kullanılmıştır.

Değişkenlere ilişkin hesaplama biçimleri Tablo 1'de, tanımlayıcı istatistik değerleri ise Tablo 2'de gösterilmektedir.

Tablo: 1
Değişkenler ve Hesaplama Biçimleri

WER: Kadın İstihdam Oranı	İstihdam/Nüfus
BR: Doğum Oranı	Kaba doğum hızı, 1000 kişi başına yıl içinde meydana gelen canlı doğum sayısı

Tablo: 2
Tanımlayıcı İstatistikler

	USAWER	USABR	SEWER	SEBR
Ortalama	54.2367	13.7267	55.6200	11.6433
Medyan	54.1500	14.0000	55.4000	11.7000
Maksimum	56.6000	16.2000	60.6000	14.4000
Minimum	52.1000	11.6000	53.0000	10.0000
Std. Sapma	1.4026	1.1794	1.5901	1.0708
Çarpıklık	-0.0147	-0.0209	1.0537	0.7904
Baskılık	1.6664	2.3952	4.5102	3.8181
Jarque-Bera	2.2240	0.4594	8.4027	3.9606
Olasılık	0.3289	0.7948	0.0150	0.1380
Gözlem	30	30	30	30

Tabloda ABD ve İsveç için kadın istihdam oranı ile doğum oranı değişkenlerine ilişkin çeşitli bilgiler yer almaktadır. Değişkenlerin standart sapma değerlerine bakıldığında; sapma açısından değişkenliğin yüksek olmadığı söylenebilmektedir. Serilerin normal dağılıma uyup uymadığını gösteren Jarque-Bera olasılık değerleri incelendiğinde; olasılık değeri kritik değer olan 0.05'ten küçük olan İsveç kadın istihdam oranı normal dağılım göstermezken; olasılık değeri kritik değerden büyük olan diğer değişkenlerin normal dağıldığı görülmektedir. Normal dağılım sonuçlarının elde edilmesinden sonra serilerin durağanlıkları Lee & Strazicich, 2013 One Break LM birim kök testi ile gerçekleştirilmiştir. Değişkenlerin durağanlıklarını incelemek için oluşturulan denklemler aşağıda gösterilmektedir.

$$\Delta WER_t = \alpha_0 + \alpha_1 t + \delta WER_{t-1} + \sum_{i=1}^N \Psi \Delta WER_{t-i} + \varepsilon_t \quad (1)$$

$$\Delta BR_t = \alpha_0 + \alpha_1 t + \delta BR_{t-1} + \sum_{i=1}^N \Psi \Delta BR_{t-i} + \varepsilon_t \quad (2)$$

Yukarıda yer alan denklem (1) ve denklem (2)'de yer alan simgeler şunları ifade etmektedir: Δ birinci dereceden fark işlemcisi, t zaman trendi, WER_t ve BR_t değişken serileri, N gecikme sayısı ve ε_t hata terimi. Birim kök test sonuçları sabitli model ve sabit-trendli modeller için sonuçlar Tablo 3'te yer almaktadır.

Sabit modelde tek kırılmalı LM birim kök test sonuçlarına göre, her iki ülke için kadın istihdam oranı ve doğum oranı değişkenlerinin düzey değerlerinde durağan olmadıkları tespit edilmiştir. Bu değişkenlerin birinci dereceden farkları alındığında durağan I(1) oldukları belirlenmiştir. Ayrıca ABD için kadın istihdam ve doğum oranları için kırılmanın 2008 yılında gerçekleştiği de ortaya çıkarılmıştır. Bu etkinin ABD'de 2008 yılında yaşanan küresel finansal krizin olası etkilerinden kaynaklandığını söylemek mümkündür. İsveç için ise kırılma tarihi kadın istihdam oranında 2014 yılında gerçekleşirken, doğum oranında ise 2005 yılında gerçekleşmiştir. Dolayısıyla, değişkenler arasındaki uzun dönemli eşbütünlük ilişkisinin analiz edilebilmesi için tüm değişkenlere ait serilerin aynı düzeyde durağan olmaları şartı sağlanmış ve analizler gerçekleştirilmiştir.

Sabit ve trendli modelde tek kırılmalı LM birim kök test sonuçlarına göre, her iki ülke için kadın istihdam oranı ve doğum oranı değişkenlerinin düzey değerlerinde durağan olmadıkları tespit edilmiştir. Bu değişkenlerin birinci dereceden farkları alındığında durağan I(1) oldukları belirlenmiştir. ABD kadın istihdam oranı ve doğum oranlarında kırılmaların 2008 ve 2009 yılında gerçekleştiği belirlenmiştir. Sabit modelde olduğu gibi burada da kırılmanın sebebi olarak 2008'de yaşanan küresel finansal krizi göstermek mümkündür. İsveç için ise kadın istihdam oranında kırılma 2008 yılında meydana gelirken doğum oranında ise kırılma 2017 yılında gerçekleşmiştir.

Tablo: 3
ONE BREAK LM (Lee & Strazicich, 2013) Birim Kök Test Sonuçları

Seviye			
USAWER		USABR	
ADF-ista.	-2.314	ADF-ista.	-3.412
Kırılma Tarihi	2008	Kırılma Tarihi	2008
Fraksiyon	0.400	Fraksiyon	0.500
Gecikme Uzunluğu	1	Gecikme Uzunluğu	0
KD (1%, 5%, 10%)	-4.239 -3.566 -3.211	KD (1%, 5%, 10%)	-4.239 -3.566 -3.211
SEWER		SEBR	
ADF-ista.	-2.269	ADF-ista.	-2.279
Kırılma Tarihi	2014	Kırılma Tarihi	2005
Fraksiyon	0.200	Fraksiyon	0.400
Gecikme Uzunluğu	2	Gecikme Uzunluğu	2
KD (1%, 5%, 10%)	-4.239 -3.566 -3.211	KD (1%, 5%, 10%)	-4.239 -3.566 -3.211
Birinci Fark			
USAWER		USABR	
ADF-ista.	-3.375	ADF-ista.	-8.980
Kırılma Tarihi	2007	Kırılma Tarihi	2016
Fraksiyon	0.586	Fraksiyon	0.897
Gecikme Uzunluğu	0	Gecikme Uzunluğu	0
KD (1%, 5%, 10%)	-4.239 -3.566 -3.211	KD (1%, 5%, 10%)	-5.340 -4.800 -4.580
SEWER		SEBR	
ADF-ista.	-4.666	ADF-ista.	-3.937
Kırılma Tarihi	1996	Kırılma Tarihi	1996
Fraksiyon	0.207	Fraksiyon	0.207
Gecikme Uzunluğu	2	Gecikme Uzunluğu	1
KD (1%, 5%, 10%)	-4.239 -3.566 -3.211	KD (1%, 5%, 10%)	-4.239 -3.566 -3.211
Seviye			
USAWER		USABR	
ADF-ista.	-3.576	ADF-ista.	-3.885
Kırılma Tarihi	2008	Kırılma Tarihi	2009
Fraksiyon	0.533	Fraksiyon	0.300
Gecikme Uzunluğu	1	Gecikme Uzunluğu	2
KD (1%, 5%, 10%)	-5.110 -4.510 -4.170	KD (1%, 5%, 10%)	-5.150 -4.450 -4.180
SEWER		SEBR	
ADF-ista.	-4.063	ADF-ista.	-5.092
Kırılma Tarihi	2008	Kırılma Tarihi	2017
Fraksiyon	0.500	Fraksiyon	0.467
Gecikme Uzunluğu	3	Gecikme Uzunluğu	6
KD (1%, 5%, 10%)	-5.110 -4.510 -4.170	KD (1%, 5%, 10%)	-5.110 -4.510 -4.170
Birinci Fark			
USAWER		USABR	
ADF-ista.	-4.702	ADF-ista.	-7.131
Kırılma Tarihi	2007	Kırılma Tarihi	2015
Fraksiyon	0.586	Fraksiyon	0.862
Gecikme Uzunluğu	0	Gecikme Uzunluğu	1
KD (1%, 5%, 10%)	-5.050 -4.500 -4.180	KD (1%, 5%, 10%)	-5.110 -4.500 -4.210
SEWER		SEBR	
ADF-ista.	-8.054	ADF-ista.	-5.504
Kırılma Tarihi	2000	Kırılma Tarihi	2013
Fraksiyon	0.345	Fraksiyon	0.793
Gecikme Uzunluğu	2	Gecikme Uzunluğu	4
KD (1%, 5%, 10%)	-5.150 -4.450 -4.180	KD (1%, 5%, 10%)	-5.070 -4.470 -4.200

Durağanlık sınavından sonra ortak stokastik trend davranışının sergilendiği serilerin yani uzun dönemli ilişkinin tespiti için eşbütünlüşme ilişkisi test edilmektedir. Eşbütünlüşme ilişkisinde serilerin ortak eğilimler içerisinde bulunması halinde rastlantısal olmayan bir bağ olduğu ve dolayısıyla ortak stokastik trend olduğu kabul edilmektedir.

Gerçekleştirilen testler neticesinde seriler arasında ortak stokastik trend olduğunun tespit edilmesi halinde bu serilerin eşbütünleşik olduğu söylenebilmektedir. Bu bağlamda çalışmada eşbütünleşme ilişkisi Engle ve Granger (1987), Phillips ve Ouliaris (1990) ve Shin (1994) tarafından geliştirilen eşbütünleşme testleri ile sınanmıştır. Çalışma kapsamında kurgulanan eşbütünleşme denkleminin formülü aşağıda yer almaktadır.

$$WER_t = \alpha_t + \beta_{it}BR_t + u_t \quad (3)$$

Yukarıdaki denklemde yer alan u_t ibaresi hata terimini ifade etmektedir. Değişkenler arasındaki uzun dönemli eşbütünleşme ilişkisinin analiz edilebilmesi için tüm değişkenlere ait serilerin aynı düzeyde durağan olmaları şartının sağlanmasıyla gerçekleştirilen eşbütünleşme test sonuçları Tablo 4'te gösterilmektedir.

Tablo: 4
Eşbütünleşme Test Sonuçları

USA					
		Sabit			
	Test	İstatistik	%1	%5	%10
(EG, 1987 & PO, 1990) H ₀ : Eşbütünleşme yoktur	EG_ADF	-3.890	-4.363	-3.800	-3.518
	PO_Zt	-3.851	-4.363	-3.800	-3.518
	PO_Za	-18.144	-35.419	-27.087	-23.192
Shin (1994) H ₀ : Eşbütünleşme	CIols	0.061	0.184	0.121	0.097
	CIols	0.020	0.184	0.121	0.097
SE					
		Sabit ve Trend			
	Test	İstatistik	%1	%5	%10
(EG, 1987 & PO, 1990) H ₀ : Eşbütünleşme yoktur	EG_ADF	-3.811	-4.363	-3.800	-3.518
	PO_Zt	-3.292	-4.363	-3.800	-3.518
	PO_Za	-10.583	-35.419	-27.087	-23.192
Shin (1994) H ₀ : Eşbütünleşme	CIols	0.057	0.184	0.121	0.097
	CIols	0.135	0.184	0.121	0.097

ABD için eşbütünleşme analiz sonuçlarına göre, sabit-trendli modelde gerçekleştirilen Engle ve Granger (1987) ve Phillips ve Ouliaris (1990) eşbütünleşme testlerine göre EG-ADF ve PO-Zt hesaplanan test istatistik değerleri kritik değerlerin solunda yer almakta ve sıfır hipotezi reddedilmektedir. Bu bağlamda USAWER ile USABR arasında uzun dönemli eşbütünleşme ilişkisinin varlığı tespit edilmiştir. Shin (1994) eşbütünleşme testi için hesaplanan CIols ve CIols test istatistik değerleri kritik değerlerin solunda yer almaktadır ve sıfır hipotezi reddedilememektedir. Dolayısıyla, USAWER ile USABR arasında eşbütünleşme ilişkisinin varlığı ortaya çıkarılmıştır.

İsveç için eşbütünleşme analiz sonuçlarına göre, sabit-trendli modelde gerçekleştirilen Engle ve Granger (1987) eşbütünleşme testine göre EG-ADF test istatistik değeri 0.05 anlamlılık düzeyinde kritik değerlerin solunda yer almakta ve sıfır hipotezi reddedilmektedir. Bu bağlamda SEWER ile SEBR arasında uzun dönemli eşbütünleşme ilişkisinin varlığı tespit edilmiştir. Shin (1994) eşbütünleşme testi için hesaplanan CIols ve CIols test istatistik değerleri kritik değerlerin solunda yer almaktadır ve sıfır hipotezi reddedilememektedir. Dolayısıyla, SEWER ile SEBR arasında eşbütünleşme ilişkisinin varlığı ortaya çıkarılmıştır.

Değişkenler arasındaki uzun dönemli ilişkinin tespitinin akabinde bu ilişkinin yönü ve boyutunun da tespit edilmesi çalışmanın anlamını artırıcı yönde etki edebilecektir. Bu doğrultuda değişkenler arasındaki eşbütünlüşme ilişkisinin yönü ve katsayısının tespitinde Phillips ve Hansen (1990)'in FMOLS (Tam Düzeltilmiş En Küçük Kareler- Fully Modified OLS), Saikkonen (1992) ile Stock ve Watson (1993)'ün DOLS (Dinamik En Küçük Kareler- Dynamic OLS) ve Park (1992) tarafından geliştirilen CCR (Kanonik Koentegrasyon Regresyonu- Canonical Cointegrating Regression) yöntemleri kullanılmıştır.

Eşbütünlüşük denklemin ve stokastik şokların uzun dönem korelasyonlarının meydana getirdiği problemleri çözebilmek adına açıklayıcı değişkenler ile hata terimi arasında oluşan içsellik (endojenite) sorununu ve hata terimindeki otokorelasyon sorununu dikkate alan FMOLS tahmincisine yönelik formül aşağıda gösterilmektedir.

$$\hat{\theta} = \begin{bmatrix} \hat{\beta} \\ \hat{\gamma} \end{bmatrix} = (\sum_{t=1}^T BR_t BR_t')^{-1} \left(\sum_{t=1}^T BR_t WER_t' - T \begin{bmatrix} \hat{\lambda}_{12}' \\ 0 \end{bmatrix} \right) \quad (4)$$

Açıklayıcı değişkenlerin fark değerlerinin öncül ve gecikmeli değerlerini modele dahil ederek hata terimleri arasındaki uzun dönemli korelasyonunu dikkate alan DOLS tahmincisine ilişkin denklem aşağıda formüle edilmektedir.

$$WER_t = BR_t' \beta + D_{1t}' \gamma_1 + \sum_{j=-q}^q \Delta BR_{t+j}' \delta + v_{1t} \quad (5)$$

FMOLS tahmincisine benzer olan ve stokastik şoklar arasındaki uzun dönemli bağımlılığı engellemek için değişkenlerin durağan değerleri kullanılan CCR tahmincisinin denklemi aşağıda yer almaktadır.

$$\begin{bmatrix} \hat{\beta} \\ \hat{\gamma} \end{bmatrix} = (\sum_{t=1}^T BR_t^* BR_t^{*'})^{-1} \sum_{t=1}^T BR_t^* WER_t^* \quad (6)$$

Her iki ülke için de kadın istihdam oranı ve doğum oranı arasında uzun dönemli eşbütünlüşme ilişkisinin varlığı tespit edildikten sonra bu ilişkinin yönü ve katsayısına ilişkin FMOLS, DOLS ve CCR yöntemleri tahmin sonuçları Tablo 5'te gösterilmektedir.

ABD için uzun dönemli katsayı tahmin sonuçları incelendiğinde, doğum oranının kadın istihdam oranını FMOLS modelinde 0.80, DOLS modelinde 0.91 ve CCR modelinde ise 0.64 birim artırdığı tespit edilmiştir. İsveç için uzun dönem tahmin sonuçlarına göre ise kadın doğum oranının kadın istihdam oranını FMOLS modelinde 1.41 ve CCR modelinde ise 0.71 birim artırdığı tespit edilmiştir. Bu bağlamda her iki ülke için de doğum oranının kadın istihdam oranını pozitif yönde etkilediği ortaya çıkarılmıştır.

Tablo: 5
Katsayı Tahmin Sonuçları

USA		FMOLS		
<i>Değişken</i>	<i>Katsayı</i>	<i>Std. Hata</i>	<i>t-istatistik</i>	<i>Olasılık</i>
USABR	0.8026	0.3727	2.1537	0.0404
C	43.4428	5.0996	8.5189	0.0000
		DOLS		
<i>Değişken</i>	<i>Katsayı</i>	<i>Std. Hata</i>	<i>t-istatistik</i>	<i>Olasılık</i>
USABR	0.9173	0.2331	3.9348	0.0007
C	42.5336	3.1810	13.3712	0.0000
		CCR		
<i>Değişken</i>	<i>Katsayı</i>	<i>Std. Hata</i>	<i>t-istatistik</i>	<i>Olasılık</i>
USABR	0.6492	0.3179	2.0418	0.0511
C	45.4632	4.4286	10.2659	0.0000
SE		FMOLS		
<i>Değişken</i>	<i>Katsayı</i>	<i>Std. Hata</i>	<i>t-istatistik</i>	<i>Olasılık</i>
SEBR	1.4186	0.3954	3.5879	0.0013
C	39.3352	4.5810	8.5864	0.0000
		DOLS		
<i>Değişken</i>	<i>Katsayı</i>	<i>Std. Hata</i>	<i>t-istatistik</i>	<i>Olasılık</i>
SEBR	0.4912	0.5009	0.9806	0.3374
C	49.7623	5.7551	8.6467	0.0000
		CCR		
<i>Değişken</i>	<i>Katsayı</i>	<i>Std. Hata</i>	<i>t-istatistik</i>	<i>Olasılık</i>
SEBR	0.7187	0.2506	2.8681	0.0079
C	47.3042	2.9509	16.0304	0.0000

5. Sonuç

Kadın istihdam oranı ile doğum oranı arasındaki uzun dönemli ilişkinin İsveç ve ABD için 1991-2020 verilerinden hareketle incelendiği çalışmada, İsveç ve ABD’de eşbütünlük ilişkisi yani uzun dönemli bir ilişki tespit edilmiştir. Uzun dönemli katsayı tahmin sonuçları incelendiğinde; İsveç ve ABD için doğum oranı ile kadın istihdam oranı arasında pozitif yönlü bir ilişki olduğu görülmektedir. Yani doğum oranında yaşanan bir artış kadın istihdam oranını da artırmaktadır. Fakat katsayılar incelendiğinde; İsveç’te kurulan modellerin ABD’de kurulan modellere kıyasla daha yüksek etkili olduğu gözlenmektedir. Yani İsveç’te doğum oranında yaşanan artış kadın istihdam oranında ABD’den daha yüksek bir artışa sebep olmaktadır. Bu bilgiler ışığında kadın istihdamı ve doğum oranı arasında tespit edilen pozitif yönlü ilişki literatürde kadın istihdamı ve doğurganlık arasında tespit edilen ilişki ile örtüşmektedir. Bu noktada ülkelerin sosyoekonomik ve kültürel yapısı ile işgücü piyasası dinamikleri ilişkinin yönünü ve boyutunu açıklamada kullanılabilir. İsveç iş-yaşam dengesinin ve toplumsal cinsiyet eşitliğinin sağlanması noktasında ABD’ye kıyasla daha baskın bir yapıda olduğu için doğum oranında yaşanan artış ABD’de kadın istihdamında yaşanan artıştan oldukça yüksek düzeyde bir artışa sebep olmuştur denilebilmektedir. Bu durumda, iş-yaşam dengesini sağlamaya yönelik önlemlerin, İsveç’te doğum sonrası kadınların işgücü piyasasına dönüşünü ve katılımını ABD’ye kıyasla daha fazla hızlandıran ve artıran bir nitelikte olduğu yorumu yapılabilir.

Kadın istihdamı ile doğum oranı arasındaki uzun dönemli ilişkinin ABD ve İsveç kapsamında incelendiği bu çalışma, farklı ülkelerde farklı dönemler için gelir düzeyi ve/veya diğer kadın istihdamını etkileyen faktörler kullanılarak sonraki çalışmalarca geliştirilebilir.

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Kamu Konutu Fiyatlarını Belirleyen Faktörlerin Hedonik Fiyat Modeliyle Analizi

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Analysis of Factors Determining Public Housing Prices Using the Hedonic Price Model

Abstract

This study aims to research the factors that determine public houses prices. The hedonic price method, which is based on the assumption that house prices are determined by structural, locational, and neighbourhood attributes, was utilised in this research. In the models that examine the factors, the cross-sectional data of the public houses owned by the treasury were analysed, which were sold through an auction between December 2019 and October 2020 in the Çankaya District of Ankara Province. Estimates were made using the least-squares method. Independent variables were determined by the stepwise regression method. According to the results, the increase in the area of the parcel where the house is located, the increase in the size of the house, the location of the house on the mezzanine, the location of the building where the house is located at the intersection of the street(s) and/or avenue(s), the increase in age of the house, the presence of a metro stop 500 meters from the house, the presence of a car park, the increase in the number of parks in the neighbourhood where the house is located, the increase in the floor of the house, the location of the house in Bahçelievler, Emek, Yukarı Bahçelievler, Söğütözü, Konutkent, Birlik, 100. Yıl, Bayraktar, Maltepe, Harbiye, Yücepete, Esatoğlu and Fakülteler affect the housing prices positively. The house is located on the basement or ground floor; the increase in the total number of floors in the building, the increase in distance of the house to the Kızılay city centre, shopping centre, and the park, the house is located on the street, the location of the house in Güvenevler, Keklikpınarı, Aydınlar, Şehit Cevdet Özdemir, and Aşağı Öveçler affect the housing prices negatively. The originality of this study is that it is the first hedonic price model application on public housing, and real sales prices are used. The findings are important in three aspects; First, a fairly homogeneous data set was used for the houses with similar characteristics, all within the borders of the same district. Second, the demand of a certain socioeconomic group is examined. Third, there are empirical findings that some purchasing facilities, such as priority right of purchase, regulated by law in favour of a certain group, may adversely affect the competitive conditions in auctions.

Keywords : Public Housing, Housing Market, Hedonic Price Model, Ankara.

JEL Classification Codes : C13, H82, R21, R31.

Öz

Kamu konutlarının fiyatlarını belirleyen faktörlerin analiz edildiği bu çalışmada, konut fiyatlarının yapısal, konumsal ve komşuluk özelliklerince belirlendiği varsayımına dayanan hedonik fiyat modelinden yararlanılmıştır. Çalışmanın model uygulamasında, Ankara İli Çankaya İlçesinde bulunan ve Aralık 2019-Ekim 2020 tarihleri arasında ihale yoluyla satışı gerçekleşen Hazine mülkiyetindeki kamu konutlarına ilişkin yatay kesit verisi kullanılmıştır. Tahminler en küçük kareler yöntemi ile yapılmıştır. Modeller oluşturulurken bağımsız değişkenleri belirlemek için adım adım regresyon yönetimine başvurulmuştur. Elde edilen sonuçlara göre konutun bulunduğu parselin yüzölçümünün artması, konut büyüklüğünün artması, konutun ara katta bulunması, konutun

bulunduğu binanın sokak(lar) ve/veya cadde(ler) kesişiminde konumlanması, konutun yaşının artması, konutun 500 metre yakınında metro durağının bulunması, konutun otoparkının bulunması, konutun bulunduğu mahalledeki park sayısının artması, konutun bulunduğu katın artması, konutun Bahçelievler, Emek, Yukarı Bahçelievler, Söğütözü, Konutkent, Birlik, 100. Yıl, Bayraktar, Maltepe, Harbiye, Yüce-tepe, Esatoğlu ve Fakülteler Mahallelerinde bulunması konut fiyatını pozitif yönde etkilemektedir. Konutun bodrum katta veya zemin katta bulunması, konutun bulunduğu binadaki toplam kat sayısının artması, konutun Kızılay şehir merkezine, alışveriş merkezine ve parka olan uzaklığının artması, konutun bulunduğu binanın sokak üzerinde konumlanması, konutun Güvenevler, Keklikpınarı, Aydınlar, Şehit Cevdet Özdemir ve Aşağı Öveçler Mahallelerinde bulunması konut fiyatını negatif yönde etkilemektedir. Bu çalışmanın özgün yanı kamu konutları üzerine yapılmış ilk hedonik fiyat modeli uygulaması olması ve gerçek satış fiyatlarının kullanılmasıdır. Elde edilen bulgular üç açıdan önemlidir; birincisi, çalışmada tamamı aynı ilçe sınırları içerisinde bulunan benzer özelliklere sahip konutlara ilişkin oldukça homojen bir veri seti kullanılmıştır. İkincisi, belli bir sosyoekonomik kesimin talebi incelenmiştir. Üçüncüsü, öncelikli alım hakkı sahipliği gibi belirli bir kesim lehine yasayla düzenlenmiş bazı satın alma kolaylıklarının ihalelerde rekabet şartlarını olumsuz yönde etkileyebileceğine dair elde edilen ampirik bulgulardır.

Anahtar Sözcükler : Kamu Konutları, Konut Piyasası, Hedonik Fiyat Modeli, Ankara.

1. Giriş

Çin'in Wuhan şehrinden yayılarak tüm dünyayı etkisi altına alan yeni tip koronavirüs (covid-19) salgını nedeniyle durma noktasına gelen ekonomileri canlandırmak için ülkeler benzeri görülmemiş destek paketleri sunmuştur. Türkiye Cumhuriyeti Merkez Bankasının Temmuz 2019'da başlayan üst üste faiz indirimleri sonucu %8,25'e kadar düşen politika faizi ile bankaların Türk Lirasına ulaşım maliyetleri azalmış böylece kamu bankaları öncülüğünde başlatılan düşük faizli destek kredileri ile 2020 yılında konut satışlarında tüm zamanların rekoru kırılmıştır. Türkiye İstatistik Kurumunun (TÜİK) rakamlarına göre 2020 yılında konut satışları bir önceki yıla kıyasla %11,2 artarak 1.499.316'ya ulaşmıştır¹. 2020 yılının konut piyasası açısından bir diğer özelliği, Hazine mülkiyetindeki kamu konutlarının da yoğun olarak satışlarının gerçekleştiği yıl olarak ön plana çıkmasıdır. Kamu konutlarının satışına yönelik işlemler 4706 sayılı Kanunda yapılan düzenlemeler ile başlamıştır. Yapılan yasal düzenlemeye göre savunma, güvenlik, adalet ve istihbarat hizmetleri için kullanılanlar hariç olmak üzere bir çok kamu kurum ve kuruluşunun mülkiyetinde veya tasarrufunda bulunan kamu konutları satılarak ekonomiye kazandırılacaktır. 2020 yılı itibarıyla genel yönetim kapsamındaki kamu idarelerine ait kamu konutu sayısı 238.037'dir (Milli Emlak Genel Müdürlüğü, 2020). Bu konutlardan istisnai kurumlar tarafından kullanılanlar ile kampüs alanı içerisinde bulunan ve kamu hizmet binaları ile bütünleşik halde olan kamu konutları dışındakilerden genel yönetim kapsamındaki kamu idarelerine tahsisli kamu

¹ Bkz.

<https://tuikweb.tuik.gov.tr/PreHaberBultenleri.do?sessionid=5SgJgw5GJ1vZhT7Cpc1qghh2xt7bM1TvrQVB6rcXZq2TGwyRr827!-394820566?id=37464>, 17.05.2021.

konutları 2019 yılının son ayları itibariyle Milli Emlak Genel Müdürlüğüne² satışa sunulmuş, 2020 yılında hızla elden çıkarılmaya devam edilmiştir. Milli Emlak Genel Müdürlüğü'nün 2020 Yılı Faaliyet Raporuna göre, 68 ilde 2.448.243.232 TL değerinde 10.851 adet kamu konutunun satış talimatı verilmiş, bu konutlardan 7625 adetinin satışı tamamlanarak 1.284.432.229 TL tutarında tahsilat yapılmıştır. Bu çalışmanın amacı, Ankara İli, Çankaya İlçesinde bulunan mülkiyeti Hazineye ait olup genel yönetim kapsamındaki kamu idarelerine tahsisli kamu konutlarından satışı yapılanların satış fiyatlarını belirleyen faktörlerin analiz edilmesidir. Bu kapsamda, satılan kamu konutlarının fiyatları ile özellikleri arasındaki ilişki araştırılmıştır. Bu ilişkiyi belirlemek için akademik çalışmalarda yaygın şekilde kullanılan hedonik fiyat modelinden faydalanılmıştır. Hedonik fiyat modeli kısaca, bir malın değerini barındırdığı özelliklerin değeri üzerinden hesaplayan bir tür değerlendirme yöntemidir (Cingöz, 2010: 131). Bu yöntemde, konut gibi heterojen (türdeş olmayan) mallar için fiyat belirleyicileri olarak talep miktarı, gelir gibi piyasa değişkenleri yerine o ürünün özellikleri dikkate alınmaktadır. Türkiye'de taşınmaz satışlarında tapuda gösterilen satış değerlerinin gerçek işlemlerdeki satış değerlerine göre düşük olduğu bilinen bir durumdur (Yardımcıoğlu vd., 2011: 34). Konut fiyatlarını analiz eden çalışmaların ise görüşme-anket yöntemiyle veya emlakçı, internet vb. ortamlarda bulunan satış ilanlarından elde edilen verilerle ya da gayrimenkul değerlendirme raporlarından yararlanılarak yürütüldüğü görülmektedir. Bu nedenle, Türkiye'de konut fiyatlarının hedonik fiyat modeli ile analiz edildiği çalışmalara ilişkin literatür incelemesi yapan çalışmaların vurgu yaptığı ortak nokta, konut fiyatlarına ilişkin verilerin güvenilirliği sorunudur (Çetintahra & Çubukçu 2012; Gündoğmuş vd., 2019). Bu çalışmanın özgün yanı gerçek satış fiyatlarının kullanılması ve hedonik fiyat modelinin kamu konutlarına uygulandığı ilk ampirik çalışma olmasıdır. Bu yönüyle çalışma sonucu ulaşılan bulguların, kamu çalışanlarının konut tercihlerini yansıtacağı ve ikinci el konut piyasasına ışık tutarak ileride yapılacak benzer çalışmaları yürütecek araştırmacılara faydalı olacağı düşünülmektedir.

Çalışmanın ikinci bölümünde, kamu konutu uygulamaları ve kamu konutu satışlarına ilişkin yapılan yasal düzenlemeler ile satış süreçleri özet halinde sunulmuştur. Üçüncü bölümde, hedonik fiyat modelinin genel çerçevesi ortaya konulmuştur. Dördüncü bölümde, konut fiyatlarının belirleyicilerinin analizinde hedonik fiyat modelinin kullanıldığı çalışmalara ilişkin bir literatür özeti sunulmaktadır. Beşinci bölümde, çalışma kapsamında kullanılan veriler ve çalışma alanı hakkında bilgi verilmiştir. Altıncı bölümde, tahmin edilen ekonometrik model tanıtılarak model tahmini yapılmış ve elde edilen bulgular tartışılmıştır. Son bölümde ise çalışma ile ulaşılan sonuçlara değinilerek genel bir değerlendirme yapılmıştır.

² *Mülkiyeti Hazineye ait taşınmazlar ile Devletin Hüküm ve Tasarrufu Altında olan taşınmazların idaresi Milli Emlak Genel Müdürlüğü ve taşra birimlerince yürütülmektedir. Milli Emlak Genel Müdürlüğü daha önce Hazine ve Maliye Bakanlığı bünyesinde hizmet vermekte iken 10/07/2018 tarih ve 30474 sayılı Resmî Gazetede yayımlanan 1 sayılı Cumhurbaşkanlığı Teşkilatı Hakkında Cumhurbaşkanlığı Kararnamesi ile Çevre, Şehircilik ve İklim Değişikliği Bakanlığına bağlanmıştır.*

2. Kamu Konutu Satışlarına Genel Bir Bakış

Kamu konutu kavramı, kamu kurum ve kuruluşları tarafından yurt içinde ve dışında inşa ettirilerek, satın alınarak veya kiralanarak temin edilen ve kamu personelinin ikameti için tahsis edilen konutları ifade etmektedir (Bozkurt, 2014: 10-11). “Lojman”, “kurum konutu” gibi farklı isimlerle de anılan kamu konutu uygulamalarının Cumhuriyetin ilk yılları ile birlikte gündeme gelen “kamu personelinin barınma sorununa” çözüm için başlatıldığı söylenebilir. Bilgin (1996), lojman uygulamalarının ortaya çıkışını devletçi sanayileşme politikalarına dayandırmaktadır. Gerçekten de Türkiye Cumhuriyeti’nin devlet tarafından yapılan ilk tesisi olan Sümerbank Kayseri Bez Fabrikasında çalışan işçi ve memurların barınma sorununa çözüm için çok sayıda lojman inşa edilmişti (Semiz & Toplu, 2019: 48). Keleş (2020)’e göre ise Türkiye’de lojman konusu, Ankara’nın başkent olmasından sonra sayısı hızla artan memur ailelerini barındırmanın bir yöntemi olarak ele alınmıştır. Bu dönemde memur konutları sorununa yönelik çeşitli yasal düzenlemeler yapılmıştır. 1928 yılında yürürlüğe giren bir yasayla Maliye Bakanlığı, memur apartmanları yaptırmak üzere Hazine olanaklarını kullanmaya yetkili kılınmış, daha sonra bu yol terk edilerek memurlara konut kirası yardımı yapılmaya başlanmıştır. 1937 yılından itibaren ise devlet yeniden genel bütçeden memur konutları yapımı için ödenek ayırmaya başlamıştır. Daha sonra, özellikle Ankara’da büyüyen memur konutları sorununa yönelik olarak 1944 yılında çıkarılan Memur Konutları Yasası ile Bayındırlık Bakanlığı, gerekli görülen yerlerde memur konutları yaptırmak üzere yetkili kılınmıştır. Daha çok Milli Savunma, İçişleri, Maliye ve Adalet vb. Bakanlıkların üst düzeydeki görevlilerinin kira karşılığında oturduğu 450 kadar konuttan oluşan Ankara’daki Saraçoğlu (Namık Kemal) Mahallesi, Ankara’ya öncelik veren bir hükmü de barındıran bu yasanın verdiği yetkiyle yaptırılmıştır (Keleş, 2020: 478). Ankara’nın 1920-1950 yılları arasındaki dönemde ülke ortalamasının üzerinde büyüyen ve ciddi anlamda konut açığının yaşandığı tek kent olması (Türkün vd., 2013: 49) yapılan yasal düzenlemede Ankara’ya öncelik verilmesini anlaşılır kılmaktadır. Saraçoğlu Mahallesi uygulaması, başkentte devlet tarafından yaptırılan ve kamu görevlilerinin kira karşılığında oturduğu günümüz kamu konutu uygulamalarının ilk örneklerindendi. Daha sonralarda ise kalkınma planları, açıklanan çeşitli hükümet programları ve yasal düzenlemeler ile kamu konutu modelinin yaygınlaştırılması yönünde dönem dönem ciddi çabalar sarf edilmiştir.

Kamu konutu uygulamalarını artırmaya yönelik politik bakış açısı 1990’lı yıllara gelindiğinde değişmeye başlamıştır. 1980’li yılların başında tüm kamu görevlilerine yetecek kadar kamu konutu edinilmesi tasarlanırken, bu kez kamu konutlarının ne kadar yük olduğu konusu gündeme gelmiştir (Coşgun vd., 2011). Tarihsel olarak baktığımızda, kamu konutlarının satışına yönelik ilk yasal düzenlemeler 1994 yılında 5 Nisan Kararları çerçevesinde yapılmış ancak dönemin Cumhurbaşkanı tarafından veto edilmiştir. Daha sonra Refah Partisi-Doğruyol Partisi (RP-DYP) Koalisyon hükümeti döneminde kamu konutlarının satışı tekrar gündeme gelecek kanunlaştırılmıştır (Aydemir, 2001). Yapılan düzenlemeye göre kamu kurum ve kuruluşlarının mülkiyetinde bulunup herhangi bir hizmet için gerekli olmayan taşınmazlar ile özelleştirme kapsamına alınanlar dışında kamu kurum ve kuruluşlarına ait sosyal tesislerin ve kamu konutlarının satış ilke ve yöntemlerinin belirlenmesinde Bakanlar Kurulu yetkili kılınmıştır. Ancak yapılan bu yasal düzenlemenin

Anayasaya aykırılığı gerekçesiyle önce yürürlüğü durdurulmuş³ daha sonra ise iptal edilmiştir⁴.

Kamu konutlarının satılarak ekonomiye kazandırılması konusu çeşitli dönemlerde tekrar gündeme gelmiştir. Kamu konutlarının satılması gerektiğini savunanlar genellikle devlet bütçesine olan maliyetlerini ileri sürmüşlerdir. Bu çerçevede dikkat çeken bir düzenleme, 4969 sayılı Kanunun Geçici 1. maddesiyle, TBMM Milletvekili lojmanlarının satış işlemlerinin Emekli Sandığı Genel Müdürlüğü iştiraki olan Emek İnşaat ve İşletme AŞ. tarafından gerçekleştirilmesine yönelik yapılan yasal düzenlemedir⁵. Yapılan düzenleme ile toplam 607 adet satışa konu olabilecek alanın müstakil tapuları alınarak satış işlemlerine başlanmış, satışı yapılan 41 adet üniteden geriye kalan kısımların TOKİ tarafından değerlendirilmesi karara bağlanarak yapılan protokol ile TOKİ'ye devirleri sağlanmıştır (Milli Emlak Genel Müdürlüğü, 2006). 2013 yılına gelindiğinde kamu konutu satışları tekrar gündeme gelmiş, özelleştirme programında bulunan kuruluşların lojmanlarının satılmaya başlandığı ve dönemin Maliye Bakanı Mehmet Şimşek'in talimatı ile kamu kurumlarının lojman satışlarına Özelleştirme İdaresi Başkanlığı lojmanlarından başlanacağı yönünde haberler basına yansımıştır⁶. 2014 yılında bir soru önergesine verilen cevapta dönemin Maliye Bakanı 2002-2013 yılları arasında toplam 122 adet lojmanın satışının yapıldığını belirtmiştir⁷. 2018-2020 dönemi Orta Vadeli Programın, 2 Numaralı "Kamuda Mali Sürdürülebilirlik" bölümünde yer alan, "Verimsiz Kullanılan veya Atıl Kamu Varlıklarının Değerlendirilmesi" başlığı altında; kamu konutları ve sosyal tesislerin ekonomiye kazandırılacağı ifade edilmiştir (Kalkınma Bakanlığı, 2017). Bu çerçevede, 4706 sayılı Kanunun 4. maddesinin 5 ilâ 11. Fıkraları ile kamu konutlarının satılarak ekonomiye kazandırılmasına ilişkin düzenlemeler yapılmıştır. Yapılan bu düzenlemenin daha önceki yasal düzenlemelerden farkı, hangi kamu konutlarının satılacağını açıkça belirtildiği oldukça kapsamlı bir elden çıkarmaya ilişkin maddelerin hüküm altına alınmış olmasıdır. Yapılan düzenleme istisnai İdareler ve durumlar dışında, tüm kamu kurum ve kuruluşlarının mülkiyetinde veya tasarrufunda bulunan kamu konutlarının satışına imkân vermektedir. Ayrıca ilgili yasa, belirtilen istisnai kurumlar tarafından kullanılan kamu konutlarının satılmasında ilgili bakanlıkların uygun görüşünün alınması şartıyla Cumhurbaşkanını yetkili kılmaktadır. Kamu konutlarının satışına ilişkin usul ve esaslar ise 385 sıra sayılı Milli Emlak Genel Tebliği ile belirlenmiştir. Yapılan düzenlemeye göre, kamu konutlarının satış işlemleri 2886 sayılı Devlet İhale Kanunu ile Hazine Taşınmazlarının İdaresi Hakkında Yönetmelikte yer alan hükümler çerçevesinde yürütülecektir. Yapılacak satışlarda tahmin edilen bedel İdarece tespit edilecek veya ettirilecektir. İhale tarihi itibarıyla adlarına görev,

³ 14.12.1996 tarih ve 22847 sayılı Resmî Gazetede yayımlanan Anayasa Mahkemesi Kararı için bkz. <<https://www.resmigazete.gov.tr/arsiv/22847.pdf>>, 20.05.2021.

⁴ 24.04.1998 tarih ve 23322 sayılı Resmî Gazetede yayımlanan Anayasa Mahkemesi Kararı için bkz. <<https://www.resmigazete.gov.tr/arsiv/23322.pdf>>, 20.05.2021.

⁵ <<https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=4969&MevzuatTur=1&MevzuatTertip=5>>, 20.05.2021.

⁶ <<https://www.cnnturk.com/2013/ekonomi/genel/02/08/lojmanlarda.ilk.satis.oibden/695693.0/index.html>>, 20.05.2021.

⁷ <<https://www2.tbmm.gov.tr/d24/7/7-37739sgc.pdf>>, 20.05.2021.

sıra ve hizmet tahsisli kamu konutu tahsis edilen (şartlı tahsisler dahil) ve fiilen kamu konutunda oturanlar yasaya göre öncelikli alım hakkı sahibi olarak tanımlanmıştır. Kamu konutlarının satış ihalesine ilişkin bilgilerin ilan tarihinden önce kamu konutunda oturanlara ayrıca bildirileceği hüküm altına alınmıştır. İhaleler, Devlet İhale Kanununun 45. maddesine göre açık teklif usulü ile yapılacaktır. Açık teklif usulünde taşınmaz, ihaleye girme şartlarını taşıyan istekliler arasından ihale ilanında belirtilen tahmin edilen bedelden başlamak üzere en yüksek teklifi veren istekliye satılmaktadır. Ancak, kamu konutları satışlarına mahsus bir uygulama olarak eğer konutta öncelikli alım hakkı var ise ihale sonucu oluşan bedel ve ödeme koşulları ihale sonrasında öncelikli alım hakkı sahibine (oturduğu kamu konutunun ihalesine katılması ve ihalenin başkası üzerinde kalması veya oturduğu kamu konutunun ihalesine katılması ve ihalenin üzerinde kalması durumları dahil) tebligat yapılarak bildirilir. Öncelikli alım hakkı sahibinin; tebligattan itibaren 15 gün içerisinde satış bedelini peşin ödemesi veya peşinatı ödeyerek taksitli satış sözleşmesini imzalaması durumunda satış öncelikli alım hakkı sahibi adına gerçekleştirilir. Kamu konutunda öncelikli alım hakkının bulunmaması veya öncelikli alım hakkı sahibinin konutu satın almayacağını bildirmesi, 15 günlük süre içinde herhangi bir bildirimde bulunmaması veya yükümlülüklerini yerine getirmemesi durumunda, en yüksek teklif veren istekliye satış bedelini peşin veya taksitle ödeyebileceğini belirten bir tebligat gönderilerek satış işlemi onun adına gerçekleştirilir. Bu durumda, satın alma hakkını kullanmayan öncelikli alım hakkı sahibinden 2 ay içerisinde konutu tahliye etmesi istenir. Kamu konutlarının satışına ilişkin süreç özet halinde Şekil 1’de gösterilmiştir.

Şekil: 1
Kamu Konutu Satış Süreci



İhale bedeli öncelikli alım hakkı sahibi tarafından peşin olarak ödenirse bu bedele %10 indirim uygulanır. Taksitle ödenmek istenmesi durumunda ise herhangi bir indirim uygulanmaz. Bu durumda; ihale bedelinin en az %20'si peşin, kalanı 5 yılda ve 60 taksitle, en az %25'i peşin, kalanı 7 yılda ve 84 taksitle veya en az %30'u peşin, kalanı 10 yılda ve 120 taksitle ödenebilir. Öncelikli alım hakkı sahibinin kamu konutunu taksitle satın alması durumunda kalan borç faizsiz ödenmektedir. Ancak borç bakiyesi ve aylık taksitler yılda 2 kez (her yılın ocak ve temmuz aylarında), TÜİK tarafından her ay için belirlenen tüketici fiyatları endeksi (TÜFE) aylık değişim oranında artış yapılarak güncellenecektir. Yapılan hesaplamalarda aylık değişim oranları toplamının yıllık %12'yi geçmesi durumunda geçen kısım hesaba katılmayacaktır. Satışın en yüksek teklifi veren istekli adına gerçekleştirilmesi durumunda, satış bedeli peşin veya en az %25'i peşin, kalanı en fazla 2 yılda taksitler halinde yasal faizi ile birlikte ödenir. Kamu konutu ihalelerinde istekli çıkmaması, ihaleye katılan isteklilerin belgelerinin veya tekliflerinin uygun görülmemesi durumlarında kamu konutu ivedilikle tekrar ihaleye çıkarılır.

3. Hedonik Fiyat Modeli

Hedonik fiyat modeli, heterojen (türdeş olmayan) malların bünyesinde barındırdıkları her bir özelliğin tüketiciye farklı bir fayda düzeyi sağladığını ifade eden bir modeldir (Yayar & Gül, 2014: 89). Hedonik fiyat modelini eşsiz kılan şey, net olarak fiyatlandırılması mümkün olmayan özellikler için bir pazar-dışı değerlendirme tekniği işlevini görmesidir (Çiçek & Hatırlı, 2015: 101).

Yunanca "hedonikos" kelimesinden türeyen "hedonik" kelimesi "zevk" anlamına gelmektedir (Vupru & De, 2017: 78). Ekonomide ise bu terim tüketicinin mal ve hizmetlerin tüketiminden elde ettiği fayda ve tatmin anlamında kullanılmaktadır (Mousavi vd., 2018: 205). Çoğu bilim insanı hedonik fiyat modelini ilk kullananın Court (1939) olduğu konusunda hemfikir olsa da hedonik fiyat modelini ilk kimin başlattığı konusunda bir fikir birliği yoktur (Herath & Maier, 2010: 2). Goodman (1998), "hedonik" teriminin ortaya çıkışını Court'un (1939) tarihli makalesine dayandırmaktadır. Gerçekten de Court, otomobiller için geliştirdiği hedonik fiyat endeksiyle bu konudaki öncü çalışmalardan birine imza attıysa da teorinin uygulandığı ilk örneklerden birisi Haas (1922)'dir. Haas, hedonik fiyat yöntemini kullandığı bir arazi uygulamasına ilişkin çalışmasını Court'dan yıllar önce yayımlamıştır (Colwell & Dilmore, 1999: 620). Diğer erken çalışmalardan Wallace (1926) ve Waugh (1928), hedonik fiyat modelini kullanarak sırasıyla tarım arazi fiyatları ve sebze fiyatlarını incelemiştir. Hedonik fiyat modelinin ilk örnekleri ve çeşitli uygulamalarından sonra sıklıkla alıntı yapılan iki klasik çalışmadan Lancaster (1966), malların kendi başına değil, özelliklerine göre fayda sağladığını belirttiği bir mikroekonomik teori geliştirirken Rosen (1974) de Lancaster gibi malların özelliklerine odaklanan bir yaklaşım geliştirmiştir (Malpezzi, 2008: 73-74).

Lancaster (1966) tüketimi, malların tek başına veya bir arada girdi olduğu çıktının ise malların özelliklerinin toplamı olduğu bir faaliyet olarak varsaymaktadır. Buna göre, tek bir mal bile birden fazla özelliğe sahip olacak, böylece en basit tüketim faaliyeti bile ortak

çıktılar ile karakterize edilebilecektir. Yani tüketici seçimindeki kişisel unsur sadece özellikler toplamı arasındaki seçimde ortaya çıkmaktadır. Lancaster'a göre bir malın birden çok özelliği vardır ve birçok özellik birden fazla mal tarafından paylaşılır. Kombinasyon halinde olan mallar, ayrı ayrı mallara ait olanlardan farklı özelliklere sahip olabilirler. Mallar, kendi başlarına tüketiciye fayda sağlamazlar; fayda sağlayan sahip oldukları özelliklerdir (Lancaster, 1966: 133-134). Kısacası, tüketicilerin tercihlerini belirleyen malların sahip olduğu özelliklerdir.

Öte yandan, Rosen (1974) tarafından geliştirilen ikinci yaklaşım genellikle hedonik yaklaşımın paradigması olarak kabul edilmiştir (Hulten, 2003: 7). Hedonik fonksiyonu her bir malın bireysel özelliklerinin arzı ve talebi ile ilişkilendiren Rosen (1974) modeline göre hedonik yaklaşım, malların fiyatını sahip olduğu farklı özelliklerle (örtük fiyat) ilişkilendiren bir fonksiyonu tahmin eden bir yöntemdir ve iki temele dayanmaktadır: birincisi, ürünün bir fiyatının olması, ikincisi ise ürünün hedonik fiyatını veya örtük fiyatını tanımlayan ölçülebilir özelliklere sahip olmasıdır (Reydon vd., 2014: 391).

Rosen (1974) modelinde, n tane özelliğin toplamı olarak tanımlanan mallar (z) ile gösterilmektedir.

$$z = (z_1, z_2, z_3, \dots, z_n) \quad (1)$$

Fiyat ise, (p) ile gösterilir.

$$p(z) = p(z_1, z_2, z_3, \dots, z_n) \quad (2)$$

Rosen'e göre, her ürün z vektörünün sabit bir değeri ile ilişkili olan bir piyasa fiyatına sahiptir. Böylece ürün piyasaları dolaylı olarak fiyat ve özelliklerle ilgili bir fonksiyon ortaya çıkarır. Bu fonksiyon her biri farklı özelliğe sahip ürünlerin fiyatlarının karşılaştırılmasıyla elde edilen hedonik fiyat regresyonuna eşdeğerdir (Rosen, 1974: 36-37). Rosen (1974), hedonik fiyatları malların sahip olduğu her bir özelliğin örtük fiyatı olarak tanımlamaktadır. Hedonik fiyatlar, farklılaştırılmış ürünlerin (heterojen mallar) gözlemlenen fiyatlarından ve bunlarla ilişkili özellikler üzerinden açıklığa kavuşmaktadır. Mallar sahip oldukları özelliklere göre değerlendirildiğinden bir malın gözlemlenen fiyatı özelliklerinin fiyatı üzerinden ayrıştırılabilir. Mallar için gerçek bir piyasa varken malların sahip olduğu özellikler için örtük bir piyasa vardır. Bu nedenle, hedonik fiyatlar bir mala ait özelliklerin örtük piyasalardaki fiyatlarından ibarettir. Regresyon teknikleri bir mala ait her bir özelliğin örtük fiyatını tahmin etmeyi olanaklı hale getirir (Anderson vd., 2010: 168). Böylece regresyon katsayılarının tahmini ile hedonik fiyatlara ulaşmak mümkün olmaktadır.

Rosen (1974) modelinin iki aşaması vardır (Chin & Chau, 2003: 3): ilk aşama bir malın fiyatı ile özellikleri arasındaki ilişki derecesini ölçerek her bir özellik için marjinal fiyatı tahmin etmeye hizmet eder. İkinci aşama ise, ilk aşamada tahmin edilen örtük fiyat fonksiyonundan türetilen ters talep eğrisini veya marjinal ödeme istekliliği fonksiyonunu belirlemeye yarar.

Burada şunu da söylemek gerekir ki; Lancaster ve Rosen'in fikirleri temelde iki yönden birbirinden ayrılmaktadır (Herath & Maier, 2010: 5-6): birincisi, hedonik regresyonun fonksiyonel biçimi konusundadır. Lancaster'a göre, malların fiyatı ile bu malların içerdiği özellikler arasında doğrusal bir ilişki vardır. Rosen ise, malların fiyatı ile özellikleri arasında doğrusal olmayan bir ilişki olduğunu varsayar. Lancaster yaklaşımı ile Rosen yaklaşımı arasındaki bir diğer farklılık, tüketicilerin malları grup halinde mi yoksa ayrı ayrı mı tüketeceği sorusunun cevabı konusundadır. Lancaster'a (1966) göre, malların faydaları özelliklerine bağlıdır ve mallar faydalarına göre gruplara ayrılabilirler. Tüketicinin faydası, malların sağladığı farklı özelliklerden kaynaklanmaktadır. Mallar bir grubun üyeleridir ve bu özellik grubundaki malların bir kısmı veya tamamı, tüketicinin bütçesine bağlı olarak kombinasyonlar halinde tüketilir. Bu nedenle, Lancaster yaklaşımı tüketim malları için daha uygundur. Buna karşılık Rosen (1974) yaklaşımında, bir dizi mal olduğu, ancak tüketicilerin bir mal kombinasyonu satın alarak tercih edilen özellikleri elde etmediklerini, bunun yerine her bir malın marka yelpazesinden seçildiğini ve ayrı ayrı tüketildiğini ileri sürmektedir. Bu durum Rosen modelinin dayanıklı tüketim mallar için daha uygun olduğunu ortaya koymaktadır.

4. Literatür

Ridker ve Henning (1967) hedonik fiyat modelini konut piyasasına uygulayan ilk araştırmacılarıdır (Wen vd., 2005: 908). Hava kirliliğinin konut fiyatları üzerine olan etkisini inceledikleri çalışmalarında hava kirliliğinin konut fiyatlarını negatif yönde etkilediği sonucuna ulaşmışlardır. Üçdoğruk (2001), İzmir ilindeki konut fiyatları ile konut özellikleri arasındaki ilişkiyi belirlemek için emlakçılarla yüz yüze görüşerek en az dört katlı binalarda bulunan dairelere dair 2718 anket ile elde edilen verilerle hedonik fiyat modeli oluşturmuştur. Çalışmada, bağımlı değişken olarak konutun piyasa fiyatı belirlenmişken, bağımsız değişken olarak konutun büyüklüğü, otopark mevcudiyeti, balkon sayısı, oda sayısı, daire sayısı, konutun yaşı, bulunduğu kat, ısınma sistemi, duvar kaplama, salon zemini, pencere, çatı yalıtımı, bahçe içerisinde olması, site içerisinde olması, bulunduğu semti vb. konutun iç ve dış özellikleri ile konumsal özellikleri gibi değişkenler belirlenmiştir. Çalışmada, yarı logaritmik fonksiyon biçimi kullanılmıştır. Konutun site içerisinde olması, bahçe içerisinde olması ile güneş enerjili olması iktisadi olarak anlamsız bulunmuş, otopark, salon zeminine ilişkin bazı değişkenler ile çatı ıstı, mutfak sayısı değişkenleri istatistiki olarak anlamsız bulunmuştur. Konut fiyatını en çok etkileyen değişkenlerden bazıları, merkezi kalorifer, jeotermal enerji ve konutun bulvar üzerinde olmasıdır. Ayrıca, konutun büyüklüğü, oda sayısı, katı, yaşı gibi özelliklerinin de fiyat artırıcı etkisi olduğu ortaya konulmuştur. Wen vd. (2005), Çin'in Hangzhou şehrinde bulunan 2473 konut örneği ve 290 konut topluluğundan elde edilen saha araştırması verileriyle doğrusal fonksiyonel formda hedonik fiyat modeli oluşturmuşlardır. Araştırma kapsamında belirlenen 18 değişkenden 14'ünün konut fiyatı üzerinde önemli bir etkiye sahip olduğu anlaşılmıştır. Diğer 4 değişken istatistiki olarak anlamsız bulunmuştur. Konut fiyatını en çok etkileyen özellikler sırasıyla konut büyüklüğü, West Lake'e uzaklık, iç mekân durumu, merkezi iş bölgesine uzaklık, trafik durumu, garaj, çatı katı, dekor derecesi, çevre durumu, topluluk yönetimi, kat sayısı, eğlence tesisleri, işlem zamanı ve üniversiteye

yakınlıktır. Elde edilen bulgulara göre, araştırma kapsamındaki standart bir konutta, mimari özellik, mahalle özelliği, konumsal özellik ve diğer özellikler konut fiyatlarını sırasıyla, %60, %16,5, %19,8 ve %2,7 oranında etkilemektedir. Selim (2008), Türkiye İstatistik Kurumu (TÜİK) tarafından 8600 hane halkı üzerinde gerçekleştirilen 2004 Hane Halkı Bütçe Anketi verilerinden yola çıkarak yarı logaritmik fonksiyonel formun kullanıldığı hedonik fiyat modeli ile Türkiye’de konut fiyatlarını etkileyen faktörleri araştırmıştır. Çalışmada bağımlı değişken olarak konut fiyatı belirlenmişken konum (kır-kent), konut tipi, bina yaşı, bina tipi, salon zemini, oturma odası zemini, banyo zemini, ısınma sistemi, oda sayısı, m² büyüklüğü ve asansör, garaj, havuz, tuvalet vb. diğer yapısal özellikler bağımsız değişken olarak belirlenmiştir. Elde edilen sonuçlara göre su sistemi, havuz, konut tipi, oda sayısı, konut büyüklüğü, yerleşim özelliği ve bina tipi konut fiyatlarını en çok etkileyen özelliklerdir. Abdulai ve Ansah (2011), 1990-2008 yılları arasında İngiltere’nin Liverpool Şehrindeki emlak işlemlerine dayanan ve emlak bürolarından elde edilen 103.730 gözlem ile konut fiyatları ile konut özellikleri arasındaki ilişkiyi araştırmak için hedonik fiyat modeli oluşturmuşlardır. Tahmin edilen modelde fonksiyon biçimi olarak yarı logaritmik fonksiyon biçimi tercih edilmiştir. Konut satış fiyatı bağımlı değişken olarak belirlenmişken, konutun oda sayısı, kat sayısı, yatak odası sayısı, banyo sayısı, duş sayısı, tuvalet sayısı, satış ilanının yapıldığı tarih ile satışın gerçekleştiği tarih arasındaki gün sayısı, binanın yaşı, merkezi ısınma sisteminin olması, camının olması, bahçesinin olması, garajının olması ve konut tipi bağımsız değişken olarak belirlenmiştir. Konum değişkeninin kullanılmadığı çalışmada konut sahiplerinin konut özelliklerine aynı şekilde değer verip vermediğini belirlemek için veriler 2000 yılından öncekiler ve 1999 yılından sonrakiler olmak üzere ikiye ayrılarak gruplandırılmıştır. Elde edilen sonuçlara göre, kat sayısı, oda sayısı, yatak odası sayısı, banyo sayısı, duş sayısı, tuvalet sayısı, piyasadaki zaman, konut tipi, cam, bahçe, garaj ve merkezi ısıtmanın mevcudiyeti Liverpool’daki konut fiyatlarını etkilemektedir. Piyasada geçirilen süre konut fiyatları üzerinde en az etkiye sahipken, binanın yaşı en büyük etkiye sahiptir. Sonuçlar ayrıca, 2000’den önce ve 1999’dan sonra ev satın alanların konut özelliklerine farklı şekilde değer verdiğini göstermiştir. Yayar ve Gül (2014), Mersin ili kent merkezinde bulunan apartman dairelerinin fiyatını etkileyen faktörleri hedonik fiyat modeli çerçevesinde belirlemek için 2011 yılı Kasım ve 2012 yılı Şubat ayları arasında emlakçılarla yüz yüze görüşme tekniği ile elde edilen 739 daireye ait veriyi analiz etmişlerdir. Modeller doğrusal, yarı logaritmik ve tam logaritmik fonksiyon biçimleri ile tahmin edilmiştir. Dahil edilen değişkenlerden oda sayısı, balkon sayısı gibi altı tane değişken hiçbir modelde istatistiksel olarak anlamlı bulunmamıştır. On beş değişken ise her üç modelde de istatistiksel olarak anlamlı, işaretleri aynı yönlü ve teorik beklentilerle uyumlu bulunmuştur. Konutun kullanım alanının, mutfak büyüklüğünün, pazara uzaklığın, banyo sayısının artması, garajının, merkezi uydu sisteminin, özel güvenliğin ve asansörünün mevcut olması konut fiyatlarını artırdığı, konutun bahçesinin olması, site içerisinde olması, toplu taşıma araçlarına uzak olması ve eski olmasının konut fiyatlarını azalttığı sonucuna ulaşılmıştır. Yayar ve Demir (2014), TÜİK 2010 yılı Hane Halkı Bütçe Anketi sonuçlarından elde edilen 3709 gözlemlerle 45 bağımsız değişkenin bulunduğu doğrusal, yarı logaritmik ve tam logaritmik fonksiyon biçimlerinde hedonik fiyat modeli tahmin etmişlerdir. Elde edilen sonuçlara göre, konutun dubleks daire olması, ısınma sisteminin müşterek/merkezi olması,

banyo zemininin marley ya da PVC olması, banka hizmetlerine ve zorunlu eğitim hizmetlerine yakın olması, konutta kablolu yayın, telefon hattı, havuz, jakuzi, garaj ve su deposu bulunması ve konutun büyüklüğü, konut değerini artırırken, konutun bodrum ya da zemin katta bulunması, binanın eski olması, oda zemininin karo seramik olması, banyo zemininin şap (kara beton) olması, kullanılan yakıtın kömür olması konut değerini düşürmektedir. Bulut vd. (2015), Samsun İlinin üç merkez ilçesinden Canik, İlkadım ve Atakum ilçelerini kapsayan çalışmalarında tabakalı örneklem yöntemiyle oluşturdukları örneklemde tabaka olarak ilçeleri kullanmışlardır. Veriler 3+1 oda sayısına sahip konutlar arasından olmak üzere Sahibinden.com internet sitesinde bulunan ilanlardan temin edilmiştir. 395 konuta ait verilerin kullanıldığı farklı fonksiyonel formdaki model tahminleri arasından logaritmik doğrusal (yarı logaritmik) fonksiyon biçimi tercih edilmiştir. Ulaşılan sonuçlara göre, bağımlı değişken olarak belirlenen konut fiyatını açıklamada modele dahil edilen 16 bağımsız değişkenden 10 tanesinin önemli olduğu sonucuna ulaşılmıştır. Önemsiz bulunan değişkenler; ilçe, site içerisinde olup olmama durumu, kim tarafından satıldığı, ısı yalıtımı, çelik kapı, otoparka sahip olma ve konut yakınından dolmuş geçip geçmemesi durumuna ilişkin değişkenlerdir. Konut büyüklüğü (m²), bulunduğu kat, yakınında tramvay durağının olması, asansör, ebeveyn banyosu olması, binada bulunan katsayısı, ısınmanın doğalgaz ya da merkezi kalorifer ile sağlanması, yakınında otobüs durağının olması, denizi görmesi konut fiyatını pozitif yönde, bina yaşı ise negatif yönde etkilemektedir. Shabana vd. (2015), Pakistan'ın Faysalabad Şehrinde bulunan ve belirli kriterlere göre seçilen on kasabayı çalışma alanı olarak belirlemiştir. Çalışmada kullanılan veriler tasarlanan anket yoluyla elde edilmiştir. Bunun için her kasabadan on kişilik katılımcı belirlemek için belirli bir seçim yöntemi kullanılmıştır. Yarı logaritmik fonksiyon biçiminde tahmin edilen modelde, satış fiyatı bağımlı değişken olarak belirlenmişken yapısal değişkenler, komşuluk değişkenleri, uzaklık değişkenleri, piyasa değişkenleri ve çevresel değişkenler bağımsız değişkenler olarak belirlenmiştir. Ulaşılan sonuçlara göre, genel olarak çalışma alanlarına bakılmaksızın, evin yaşı, kapalı alan (m²), beton tavan, mutfak, garaj ve çimlik alan Faysalabad kentindeki konut fiyatları ile ilişkili bulunan yapısal özelliklerdir. Okuma yazma oranı, işadamlarının oranı, hizmet içi çalışanların oranı, işçilerin oranı ve hanelerin aylık geliri gibi değişkenler, Faysalabad'da bulunan araştırma kapsamındaki evlerin fiyatı ile istatistiksel olarak ilişkili bulunmuştur. Tüm uzaklık değişkenleri yani; evlerin pazardan uzaklığı, mezarlığa uzaklık, sağlık tesislerine uzaklık, ulaşım uzaklık ve sanayi bölgesine uzaklık konut fiyatları ile istatistiksel olarak ilişkili bulunmamıştır. Yalnızca tek bir pazar değişkeni olan; çalışma kapsamındaki evlerin tahmini satış fiyatı ile ilişkisi açısından analiz edilen fiyatın gelecekteki kapsamı ile tahmini satış fiyatı arasında kasabaların çoğu için önemli pozitif istatistiksel ilişki vardır. Bu, insanların gelecekte de kâr marjı yüksek olan evlerin satın alınmasına yönelik yatırım yapmaya istekli oldukları anlamına gelmektedir. Tüm çevresel değişkenler yani; sanayi bölgesi, parklar, kanalizasyon sistemi ve katı atık yönetim sistemi, araştırma kasabalarının çoğunda konut değeriyle ilişkili bulunmuştur. Çevresel değişkenlere ilişkin bulgulara göre, Faysalabad şehri sakinleri, parklar varsa, evler sanayi bölgesinde değilse, kanalizasyon sistemi uygun ve kapalıysa ve katı atıklar uygun şekilde bertaraf edilirse daha fazla ödeme yapmaya isteklidir. Arslanlı (2020), İstanbul metropol bölgesindeki konut fiyatlarını etkileyen faktörleri yarı logaritmik fonksiyonel

formdaki hedonik fiyat modeli ile analiz etmiştir. Çalışmada kullanılan veriler yerel emlakçılar, coğrafi bilgi sistemleri ve mekânsal istatistikler yardımıyla elde edilmiştir. 5303 gözlemden yola çıkarak tahmin edilen modelde, 2018 yılına ait konut fiyatları bağımlı değişken olarak belirlenmişken konut özellikleri, komşuluk özellikleri ve ulaşım altyapısına ilişkin özellikler bağımsız değişken olarak belirlenmiştir. Elde edilen sonuçlara göre, konutun Avrupa yakasında konumlanması şehrin Asya yakasına göre değer üzerinde daha fazla etkiye sahiptir. Ayrıca, oda sayısı, konut yaşı, otopark, asansör, jeneratör, otoyola uzaklık ve fay hattına uzaklığın fiyat üzerinde pozitif etkisinin olduğu, halk otobüsü taşımacılığının mevcut olması ve yakın sanayi bölgelerinin varlığının konut fiyatı üzerinde negatif etkisinin olduğu ortaya konulmuştur. Modelde yeşil alanlara ve limanlara uzaklık ile metroya, alışveriş merkezlerine ve hastanelere yakınlığın fiyata etkisinin pozitif fakat anlamsız olduğu görülmüştür. Tablo 1’de ise Ankara ili özelinde hedonik fiyat modelinin kullanıldığı çalışmalar özet halinde sunulmuştur.

Tablo: 1
Ankara Özelinde Hedonik Fiyat Modelinin Kullanıldığı Bazı Çalışmalar

Yazarlar	Çalışma Alanı	Veri Seti	Değişkenler	Sonuç
Mutluer (2008)	Çankaya İlçesinde bulunan 39 mahalle	2007 yılı Mayıs ayı sonu ve Haziran ayı başında RE/MAX Türkiye'nin web sitesinden elde edilen 392 adet satılık konut verisi	Çalışmada sadece yapısal özelliklere (konut özellikleri) yer verilmiştir. Tam logaritmik (log-log) modelin tercih edildiği analizde bağımlı değişken konut fiyatı, bağımsız değişkenler ise, bölge, oda sayısı, tuvalet sayısı, salon sayısı, konutun bulunduğu kat, binadaki kat sayısı, bina yaşı, konut büyüklüğü olarak belirlenmiştir	Önce Konut özellikleri ile birlikte bölgelere dair değişkenlerin bulunduğu genel model tahmin edilmiştir. Modelde oda sayısı, tuvalet sayısı, salon, kat, kat sayısı, konut büyüklüğü fiyatı pozitif etkilerken, bölge değişkenlerinin fiyata olan etkilerinin değiştiği görülmüştür. Daha sonra belirlenen gruplara göre 3 farklı model tahmin edilmiştir. Konut fiyatlarının yüksek olduğu ilk grupta genel modelin aksine oda ve tuvalet sayısının fiyata etkisinin olmadığı, konut fiyatlarının düşük olduğu genç konut stoğuna sahip 2. grup için yapılan tahminde konut büyüklüğü, katı, binadaki kat sayısı, tuvalet sayısı, oda sayısının fiyatı pozitif, bina yaşının ise negatif etkilediği, eski konutların yer aldığı 3. grup için yapılan tahminde sadece konut büyüklüğü, katı ve tuvalet sayısının anlamlı ve fiyata pozitif etkisinin bulunduğu görülmüştür.
Alkan (2015)	Çankaya ve Yenimahalle İlçeleri	Şubat 2011-Ekim 2011 tarihleri arasında Emlak web sitelerinden toplanan 1733 konut verisi	Bağımlı değişken; konut satış fiyatı, bağımsız değişkenler; konut yaşı, alanı (m ²), oda sayısı, balkon sayısı, banyo sayısı, bahçe, bulunduğu katı, kat sayısı, soba, kombi, merkezi ısıtma	İlk olarak mahalleler temelinde konut özellikleri kümeleri oluşturulmuş sonra kümeler arası farklar araştırarak hangi özelliklerin alt piyasaya ayrıma en çok katkıda bulunduğu analiz edilmiştir. Elde edilen bulgulara göre konut piyasası Yenimahalle ve Çankaya’da bölünmüştür. Kümelere göre farklı sonuçlar elde edilmekle birlikte genel örneklem için hedonik fiyat modeline göre kat sayısı önemlidir. Kat sayısı arttıkça konut fiyatı artar. Yaş önemli değildir ancak 3. Kümeye bulunan mahallelerde konut yaşı arttıkça fiyat artmaktadır ve bu mahallelerin tamamı Çankaya’da yer almaktadır. Bahçe ve balkon, fiyata etkili değildir. Fiyatı etkileyen en önemli değişken konut alanıdır.
Gökler (2017)	Altındağ, Çankaya, Keçiören, Mamak, Sincan, Yenimahalle Etimesgut, Gölbaşı	Hürriyetemlak.com web sitesinden 2015 yılı Eylül-Ekim-Kasım-Aralık aylarında toplanan 8942 adet veri	Bağımlı değişken; konut satış fiyatı, bağımsız değişkenler; oda sayısı, konut büyüklüğü (m ²), konut yaşı, banyo sayısı, kat sayısı, konut şekli, ısıtma şekli ve konutun bulunduğu ilçelere ilişkin kukla değişkenlerdir	m ² büyüklüğü, banyo sayısı, kat sayısı, Çankaya, Gölbaşı, Keçiören, müstakil ve merkezi ısıtma değişkenleri fiyat ile pozitif, oda sayısı, yaş ve Etimesgut değişkenleri fiyat ile negatif ilişkili çıkmıştır. Fiyatı en çok etkileyen değişken ise konutun (m ²) büyüklüğüdür

Hayrullahođlu vd. (2018)	Çankaya İlçesi; Çukurambar Bölgesi (Çukurambar, Kızılırmak, Karakusunlar Mahalleleri)	Hürriyetemlak.com İnternet sitesinden 2016 yılında çekilen 163 adet konut verisi	Bağımlı deđişken; konut satış fiyatı, bağımsız deđişkenler; alan (m ²), oda sayısı, konutun bulunduğu katı, cephe, site içinde olma, konut yaşı, metroya uzaklık, Konya yoluna uzaklıktır	İkisi doğrusal biri doğrusal olmayan üç model arasında doğrusal model seçilmiştir. Adım adım regresyon yöntemine göre fiyatı en iyi açıklayan 7 deđişkene yer verilmiştir. Alan (m ²), kat, cephe, metroya ve Konya yoluna yakınlık fiyatı pozitif etkilerken, konut yaşı ve site içerisinde olması negatif etkilemektedir. Fiyatı en çok alan (m ²) deđişkeni etkilemektedir. Yapısal özellikler, konumsal ve çevresel özelliklere göre fiyatı daha çok etkilemektedir
Özcan (2019)	Sincan İlçesi Töreke Mahallesi	Çalışma alanında bulunan 50 adet satılık konuta ilişkin emlakçılarla yapılan görüşme sonucu elde edilen veriler	Bağımlı deđişken; konut satış fiyatı, bağımsız deđişken; cephesi, metroya yakınlık, dolmuş durağına yakınlık, cadde, arayol, anayola, okula, hastaneye, AVM'ye, fitness ve spor tesislerine, açık yeşil alan ve yürüş alanlarına yakınlık, kapalı otopark, açık otopark, çevre/bina güvenlik sistemleri, apartman dairesi, müstakil konut, bina yaşı, kat sayısı, yapı durumu, büyüklüğü (m ²), banyo sayısı, katı, oda sayısı	Faktör analizi kapsamında 8 küme belirlenmiştir. Bu kümelerden yola çıkarak satılık konutlar için her biri farklı deđişken sayısına sahip 4 farklı doğrusal regresyon modeli tahmin edilmiştir. Elde edilen sonuçlara göre, 1. modelde konut büyüklüğü fiyata etkili, 2. Modelde AVM'ye yakınlık fiyata etkili, 3. modelde hastaneye yakınlık fiyata etkili, 4. modelde konutun cephesi, bulunduğu katı, yapının durumu fiyata etkilidir. Özetle, konuta ait yapısal özellikler ve AVM'ye yakınlık satış fiyatı üzerinde etkili olmaktadır

5. Çalışma Alanı, Veri ve Yöntem

Çalışma alanı olarak belirlenen Çankaya ilçesinin Ankara'nın diğer metropol ilçelerinden en büyük farkı gündüz 2,5 milyonu aşan nüfusu ile Başkent'in en yoğun ve hareketli ilçesi olmasıdır. Çankaya İlçesindeki bu hareketliliğin nedeni Ankara'nın sosyal, kültürel, siyasi ve ticari hayatına yön veren kuruluşların önemli bir bölümünün bu ilçe sınırları içerisinde yer almasıdır. Çankaya ilçesi sınırları içerisinde Cumhurbaşkanlığı eski köşkü, Türkiye Büyük Millet Meclisi, Kuvvet Komutanlıkları, Bakanlıklar, Büyükelçilikler, Kamu Kuruluşları, Üniversiteler ve önemli ticari, kültürel ve sosyal merkezler bulunmaktadır. 124 mahallesi ile başkent içinde başkent olan Çankaya, Ankara'nın en itibarlı ve en dikkat çeken ilçesi konumundadır. TÜİK rakamlarına göre, son 5 yıllık süreçte (2015-2020) Ankara'da en çok ikinci el konut satışının gerçekleştiği ilçe Çankaya İlçesidir. Birinci el konut satışlarında ise Keçiören'den sonra ikinci sırada yer almaktadır⁸. Bu durum, Çankaya'nın hareketli bir konut piyasasına sahip olduğunu göstermektedir.

⁸ <<https://data.tuik.gov.tr/Kategori/GetKategori?p=insaat-ve-konut-116&dil=1>>, 17.05.2021.

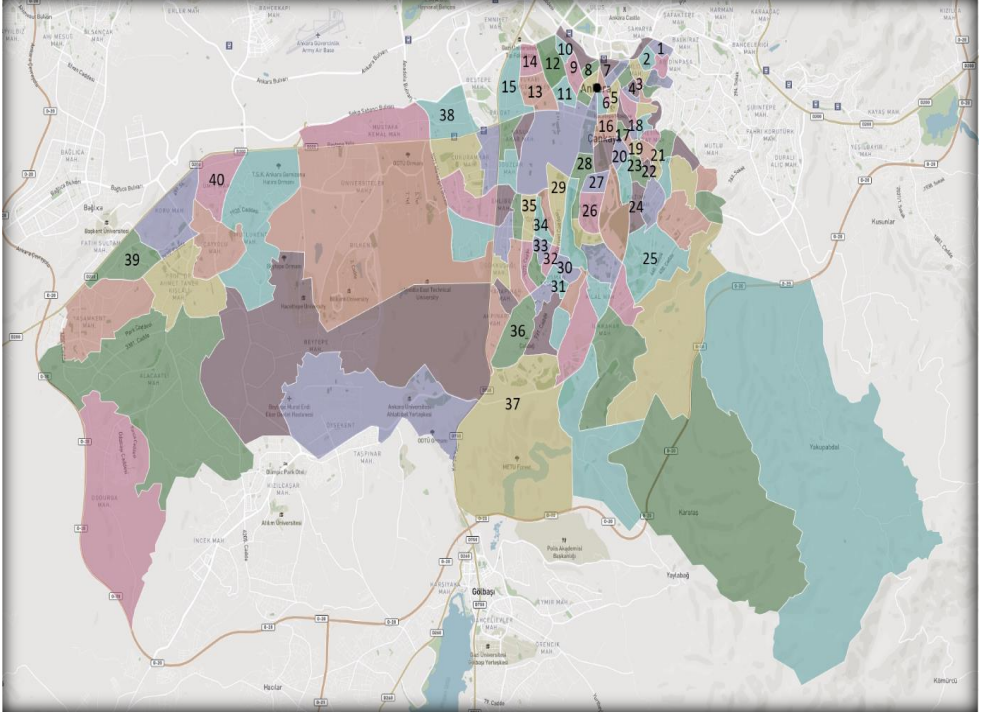
Şekil: 2
Çalışma Alanı



Kaynak: <www.wikipedia.org> adresinden alınan harita üzerinde yazara ait gösterim.

Çankaya'da satışı gerçekleşen kamu konutlarının özellikleri ile fiyatları arasındaki ilişkinin araştırıldığı bu çalışmada, ihaleleri Aralık 2019-Ekim 2020 tarihleri arasında yapılan Çankaya'nın 40 mahallesindeki 1193 adet kamu konutu satışına ilişkin yatay kesit verisi kullanılmıştır. Konutların ihale ilanları; tahmin edilen bedeli, geçici teminat tutarı, ihale yeri, tarih ve saati, ada, parsel, yüzölçümü, mahallesi, daire büyüklüğü, oda sayısı vb. bilgileri içerir şekilde günlük gazete, web sitesi, ilan panosu gibi ortamlarda ilan edilerek duyurulmuştur. İhaleler, 2886 sayılı Devlet İhale Kanununun 45. maddesine göre açık teklif usulü ile yapılmıştır. Açık teklif usulünde taşınmaz, ihaleye girme şartlarını taşıyan istekliler arasından ihale ilanında belirtilen tahmin edilen bedelden başlamak üzere en yüksek teklifi veren istekliye satılmaktadır. Ancak, kamu konutları satışlarına mahsus bir uygulama olarak eğer konutta öncelikli alım hakkı var ise ihale sonucu oluşan bedel ihale sonrasında ilk olarak öncelikli alım hakkı sahibine teklif edilmektedir. Çalışma alanı olarak belirlenen Çankaya İlçesinin Ankara İli içerisindeki konumu Şekil 2'deki haritada, çalışmada analiz edilen konutların bulunduğu mahallelerin ilçe içerisindeki konumları ise Şekil 3'teki haritada gösterilmiştir.

Şekil 3
Konutların Bulunduğu Mahallelerin İlçe İçerisindeki Mekânsal Dağılımı



Kaynak: <www.atlasbig.com.tr> web adresinden alınan harita üzerinde yazara ait gösterim.

Şekil 3'te gösterilen renkli alanda Çankaya ilçe sınırı ve satışı yapılan konutların bulunduğu mahallelerin ilçe içerisindeki konumları gösterilmektedir. Görselin daha anlaşılır olması için ilçenin güneydoğusundaki mahallelerin bir kısmı haritada gösterilmemiştir. Şehir merkezi olarak Kızılay haritada koyu renkli nokta ile gösterilmiştir. Haritada görüldüğü üzere Çankaya İlçesinde kamu konutları genelde Kızılay etrafında bulunan mahallelerde konumlanmıştır. Tablo 2'de ise konutların bulunduğu mahallelerin harita üzerindeki gösterim kodu ve mahalle bazlı konut sayılarının örneklem içerisindeki oranları gösterilmektedir. Tablo 2'de görüldüğü üzere en çok kamu konutu satışının yapıldığı mahalle Keklikpınarı iken, en az satış yapılan mahalleler ise Topraklık, Sağlık, Mebusevleri, Kavaklıdere ve Doğu Mahalleleridir.

Tablo: 2
Konutların Bulunduğu Mahalleye Göre Dağılımı

Kodu	Mahalle Adı	%	Kodu	Mahalle Adı	%	Kodu	Mahalle Adı	%	Kodu	Mahalle Adı	%
1	Cebeci	1,6	11	Yüce-tepe	1,2	21	Bayraktar	1,6	31	Osman Temiz	3,3
2	Fakülteler	1,9	12	Mebuse-leri	0,08	22	Murat	1,3	32	Aydınlar	1,9
3	Topraklık	0,08	13	Yukarı Bahçelievler	4,7	23	100. Yıl	2,9	33	Şht. Cevdet Özdemir	1,0
4	İleri	0,17	14	Bahçelievler	2,2	24	Kazım Özalp	0,3	34	Öveçler	3,0
5	Kültür	1,2	15	Emek	11,0	25	Birlik	3,2	35	Aşağı Öveçler	9,7
6	Kocatepe	0,17	16	Kavaklıdere	0,08	26	Aziziye	0,3	36	Keklikpınarı	16,7
7	Sağlık	0,08	17	Esatoğlu	1,1	27	Güvenevler	3,0	37	Oran	2,1
8	Korkutreis	0,25	18	Doğuş	0,08	28	Ayrançı	4,3	38	Söğütözü	3,0
9	Maltepe	3,9	19	Muhsin Ertuğrul	1,0	29	Harbiye	1,9	39	Konutkent	5,6
10	Anıttepe	1,3	20	Barbaros	0,17	30	Naci Çakır	1,9	40	Ümit	0,6

Kaynak: MEOP ve idari kayıtlardan yararlanılarak yazar tarafından hesaplanmıştır.

Konut fiyatlarını belirleyen faktörlere yönelik yapılan çalışmalarda üç ana ortak belirleyici olduğu genel olarak kabul edilmektedir. Bu belirleyiciler; yapısal, konumsal ve komşuluk özellikleridir (Yusof & İsmail, 2012: 2-3). Bu çalışma kapsamında kullanılan değişkenlere ilişkin veriler, İdari kayıtlardan, MEOP (Milli Emlak Otomasyon Projesi) ortamından ve satışı yapılan konutların bedel tespiti için düzenlenen 103 adet gayrimenkul değerlendirme raporundan elde edilmiştir. Konutların değerlemesi bir lisanslı gayrimenkul değerlendirme şirketince emsal karşılaştırma yöntemiyle yapılmıştır. Bu yöntemde, tahmin edilen bedeller değerlendirme tarihine yakın dönemde satış ilanına konulmuş veya satılmış benzer özelliklerdeki konutların fiyatları dikkate alınmak suretiyle piyasa değerini etkileyebilecek kriterler çerçevesinde fiyat ayarlamaları yapılarak tespit edilmektedir. Değerleme raporlarında, konut özellikleri mimari proje, vaziyet planı, yapı ruhsatı, yapı kullanma izin belgesi gibi belgelerle doğrulanmıştır. Modellerde kullanılan değişkenler elde edilen verilerle uygun olarak literatürdeki benzer çalışmalarda kullanılan değişkenlerden yararlanılarak belirlenmiştir. Yapısal özellikler belirlenirken değerlendirme raporlarında tüm konutlar için belirtilmiş olan ortak özellikler dikkate alınmıştır. Analizde kullanılan uzaklık değişkenleri coğrafi bilgi sistemleri yardımı ile metre cinsinden kuş uçuşu olarak hesaplanmıştır. Park varlığına ilişkin veriler Çankaya Belediyesinin Resmî Web sitesinde bulunan en güncel (2018 yılına ait) bilgilerden derlenmiştir⁹. Ayrıca bu çalışmaya mahsus olmak üzere bir piyasa değişkeni oluşturulmuştur. Bu değişken, öncelikli alım hakkı sahipliğinin satış fiyatları üzerinde bir etkisinin olup olmadığını belirlemek için tanımlanmıştır. Tahmin edilen ekonometrik modellerde kullanılan konut özelliklerine ilişkin değişkenler ve tanımları Tablo 3'te gösterilmektedir.

⁹ <http://www.cankaya.bel.tr/uploads/files/bolge_liste_2018.xls>, 17.05.2021.

Tablo: 3
Değişkenlerin Tanımı

Değişken Adı	Tanımı	Değişken Adı	Tanımı
Fiyat (F)*		Satış fiyatı TL (ihale bedeli)	
Yapısal Değişkenler			
Parsel	Konutun bulunduğu parselin m ² cinsinden yüzölçümü	Üst kat	Konut en üst katta ise 1, değil ise 0 değerini alan kukla değişken
Konut Büyüklüğü	Konutun m ² cinsinden büyüklüğü	Katı	Konutun bulunduğu kat
Ara kat (1)	Konut zemin kat ile en üst kat arasında ise 1, değil ise 0 değerini alan kukla değişken	Kat sayısı	Konutun bulunduğu binadaki toplam kat sayısı
Ara Kat (2)	Konut 1. kat ile en üst kat arasında ise 1, değilse 0 değerini alan kukla değişken	Konut yaşı	Konutun yaşı
1.kat	Konut 1. katta ise 1, değilse 0 değerini alan kukla değişken	Oda	Konutta bulunan oda sayısı (salon dahil)
Zemin	Konut zemin katta ise 1, değil ise 0 değerini alan kukla değişken	Bodrum	Konut bodrum katta ise 1, değil ise 0 değerini alan kukla değişken
Otopark		Konutun bulunduğu binada otoparkı var ise 1, yok ise 0 değerini alan kukla değişken	
Konumsal Değişkenler			
Kızılay	Konutun Kızılay Meydan'a metre cinsinden kuş uçuşu uzaklığı	Cadde	Konutun bulunduğu bina cadde üzerinde ise 1, değil ise 0 değerini alan kukla değişken
Sokak	Konutun bulunduğu bina sokak üzerinde ise 1, değil ise 0 değerini alan kukla değişken	Köşe	Konutun bulunduğu bina sokak(lar) ve/veya cadde(ler) kesişimin de ise 1, değil ise 0 değerini alan kukla değişken
Anıttepe	Konut Anıttepe'de ise 1, değil ise 0 değerini alan kukla değişken	Kültür	Konut Kültür'de ise 1, değil ise 0 değerini alan kukla değişken
A.öveçler	Konut A.öveçler'de ise 1, değil ise 0 değerini alan kukla değişken	Maltepe	Konut Maltepe'de ise 1, değil ise 0 değerini alan kukla değişken
Aydınlar	Konut Aydınlar'da ise 1, değil ise 0 değerini alan kukla değişken	Muhsin Ertuğrul	Konut Muhsin Ertuğrul'da ise 1, değil ise 0 değerini alan kukla değişken
Ayrançı	Konut Ayrançı'da ise 1, değil ise 0 değerini alan kukla değişken	Murat	Konut Murat'ta ise 1, değil ise 0 değerini alan kukla değişken
Bahçelievler	Konut Bahçelievler'de ise 1, değil ise 0 değerini alan kukla değişken	Naci Çakır	Konut Naci Çakır'da ise 1, değil ise 0 değerini alan kukla değişken
Bayraktar	Konut Bayraktar'da ise 1, değil ise 0 değerini alan kukla değişken	Oran	Konut Oran'da ise 1, değil ise 0 değerini alan kukla değişken
Birlik	Konut Birlik'te ise 1, değil ise 0 değerini alan kukla değişken	Osman Temiz	Konut Osman Temiz'de ise 1, değil ise 0 değerini alan kukla değişken
Cebeci	Konut Cebeci'de ise 1, değil ise 0 değerini alan kukla değişken	Öveçler	Konut Öveçler'de ise 1, değil ise 0 değerini alan kukla değişken
Emek	Konut Emek'de ise 1, değil ise 0 değerini alan kukla değişken	Söğütözü	Konut Söğütözü'nde ise 1, değil ise 0 değerini alan kukla değişken
Esatoğlu	Konut Esatoğlu'nda ise 1, değil ise 0 değerini alan kukla değişken	Şehit Cevdet Özdemir	Konut Şht. Cevdet Özdemir'de ise 1, değil ise 0 değerini alan kukla değişken
Fakülteler	Konut Fakülteler'de ise 1, değil ise 0 değerini alan kukla değişken	Yukarı Bahçelievler	Konut Y.Bahçelievler'de ise 1, değil ise 0 değerini alan kukla değişken
Güvenevler	Konut Güvenevler'de ise 1, değil ise 0 değerini alan kukla değişken	Yücepete	Konut Yücepete'de ise 1, değil ise 0 değerini alan kukla değişken
Harbiye	Konut Harbiye'de ise 1, değil ise 0 değerini alan kukla değişken	100. Yıl	Konut 100. Yıl'da ise 1, değil ise 0 değerini alan kukla değişken
Keklikpınarı	Konut Keklikpınarı'nda ise 1, değil ise 0 değerini alan kukla değişken	Konutkent	Konut Konutkent'te ise 1, değil ise 0 değerini alan kukla değişken
Komşuluk Değişkenleri			
AVM	Konutun en yakın alışveriş merkezine metre cinsinden kuş uçuşu uzaklığı	Park sayısı	Konutun bulunduğu mahalledeki park sayısı
Park	Konutun en yakın parka metre cinsinden kuş uçuşu uzaklığı	Metro	Konutun kuş uçuşu 500 m. yakınında metro durağı var ise 1, yok ise 0 değerini alan kukla değişken
Piyasa Değişkeni			
Öncelikli alım hakkı	Konutu öncelikli alım hakkı sahibi satın aldı ise 1, öncelikli alım hakkı sahibi olmayan satın aldı ise 0 değerini alan kukla değişken		

* Bağımlı değişken satış fiyatı olarak belirlenmiştir.

Tahmin edilen ekonometrik modellerde satış fiyatı bağımlı değişken olarak belirlenmiştir. Satış fiyatı olarak ihale sonucu oluşan bedeller dikkate alınmıştır. Öncelikli alım hakkı sahiplerinin konutu peşin olarak satın almak istemeleri durumunda uygulanan %10 indirim ve kamu konutunun taksitli satın alınması durumunda uygulanacak TÜFE

artışları veya kanuni faiz tutarları dikkate alınmamıştır. Tablo 3'te gösterilen değişkenlerden nicel olarak ölçülemeyenler modellere ancak var/yok evet/hayır vb. durumları ile nitel değişken olarak eklenebildiğinden, bu değişkenler modellerde kukla değişkenlerle gösterilmişlerdir.

6. Bulgular

Çankaya İlçesi sınırları içerisindeki kamu konutu satışlarının analizi sonucu elde edilen bulgulara geçmeden önce satışı yapılan konutların temel özelliklerine ilişkin istatistikler Tablo 4'te sunulmuştur.

Tablo: 4
Konutlara İlişkin Temel İstatistikler

	Minimum	Maksimum	Ortalama	Standart Sapma	Medyan
Satış Fiyatı (TL)	80.500	795.000	292.873	113.111,10	265.500
Parsel Yüzölçümü (m ²)	285	52.524	4.182,62	10.057,22	1.088
Konut Büyüklüğü (m ²)	30	173	105,17	18,13	105
Oda Sayısı	1	5	3,86	0,40	4
Kat Sayısı	4	17	8,05	3,17	7
Konut Yaşı	19	59	34,29	6,86	34

Kaynak: MEOP ve idari kayıtlardan yararlanılarak yazar tarafından hesaplanmıştır.

Tablo 4'te görüldüğü üzere, yapılan satışlarda en yüksek satış fiyatı ile en düşük satış fiyatı sırasıyla 795.000 TL ve 80.500 TL iken ortalama satış fiyatı 292.873 TL'dir. En büyük daire 173 m² iken en küçük daire 30 m² dir. Satılan dairelerin ortalama büyüklüğü ise 105,17 m²'dir. Dairelerin oda sayısı 1 ile 5 arasında, konutların yaşı ise 19 ile 59 arasında değişmektedir. Ortalama konut yaşı 34,29'dur. En yüksek bina 17 katlı iken en küçük bina 4 katlıdır. Tablo 4'te temel istatistikleri sunulan verilerden yola çıkarak tahmin edilen ekonometrik modellerin katsayıları en küçük kareler yöntemi kullanılarak çoklu regresyon tekniğiyle tahmin edilmiştir. Tahminler EViews 10 yazılımı ile yapılmıştır. Hedonik fiyat yönteminde bir konutun fiyatı; yapısal, konumsal ve komşuluk özelliklerinin bir fonksiyonu olarak belirlenmektedir. Çalışma kapsamında tanımlanan bağımsız değişkenlerin sayısının fazla olması hangilerinin modele en fazla katkı yaptığının belirlenmesi sorununa neden olmaktadır. Bağımsız değişken adayları arasından en uygun olanları seçmek iki karşıt hedefi gerektirir. Öncelikle tahmin edilecek modelin olabildiğince eksiksiz ve gerçekçi olmasını istediğimizden fiyatla ilgili olabilecek tüm değişkenlerin modele dahil edilmesi istenen bir durumdur. Buna karşın, her ilgisiz değişken tahmin edilen katsayıların ve değerlerin kesinliğini azaltacağından mümkün olduğunca az değişkenle çalışılması modelin basitliğini ve etkinliğini artıracaktır. Kısaca değişken seçiminin amacı mümkün olduğunca az değişken gerektirecek basitlik ile gerektiği kadar değişkenin sağlayacağı uyum arasında denge sağlamaktır. EViews yazılımı bu problemi çözmek için çeşitli yöntemler sunmaktadır. Bu yöntemler içerisinde adım adım ileri (stepwise forward) regresyon yöntemi bu çalışmada tercih edilen yöntemdir. Bu yöntemde öncelikle iki farklı değişken grubu belirlenir. Birinci grup, bağımlı değişken ve var ise bağımlı değişkenle birlikte modelde her zaman olması istenen değişkenlerden oluşur. Diğer grup ise potansiyel bağımsız değişken adaylarından oluşur. Bu yöntem iki anlamlılık düzeyi gerektirir. Bunlardan birisi değişken eklemek için

diğeri ise değişken çıkarmak içindir. Burada bir değişkenin eklendiği her adımdan sonra modeldeki tüm aday değişkenlerin anlamlılığının belirlenen anlamlılık seviyesinin altına düşüp düşmediği kontrol edilerek önemsiz bulunan değişken modelden çıkarılır. Süreç, henüz dahil edilmemiş değişkenin anlamlılığı değişken eklemek için belirlenen ileri anlamlılık seviyesinin altına düştüğünde sona erer. Buna göre, ana hatları anlatılan bu yöntemle iki farklı model tahmin edilmiştir. Öncelikle tüm örneklemin kullanıldığı model tahmin edilmiştir. Bazı mahallelerin gözlem sayısı düşük olduğundan bu modele Tablo 3'teki mahalle değişkenleri dahil edilmemiştir. İkinci modelde ise gözlem sayısı yetersiz olan mahalleler örneklemden çıkarılarak kalan mahallelere ilişkin kukla değişkenler modele eklenmiştir. İkinci model Tablo 3'teki değişkenlerin tamamının kullanıldığı modeldir. Hedonik fiyat modellerine ilişkin çalışmalarda genel olarak kullanılan fonksiyonel formlar; doğrusal, yarı logaritmik ve tam logaritmik fonksiyonlardır (Kuminoff vd., 2010: 147). Bu çalışma kapsamında tahmin edilen iki farklı modele uyan en iyi fonksiyonel formun seçimine yönelik belirlenmiş çeşitli kriterlerin (Düzeltilmiş belirlilik katsayısı, standart hata, Akaike bilgi kriteri, hata kareler ortalamasının karekökü) aldığı değerler Tablo 5'te gösterilmiştir. Tablo 5 incelendiğinde tahmin edilen modellere uyan en iyi fonksiyonel form yarı logaritmik fonksiyonel form olarak belirlenmiştir.

Tablo 5
Tahmin Edilen Modellere En İyi Uyan Fonksiyonel Formun Seçimi

Model 1	R ² _{Adj}	Std. Hata	AİC Değeri	RMSE
Doğrusal (Linear)	0.5790	73852.29	25.270	73355.39
Yarı Logaritmik (Semi-Log)*	0.6437	0.2252	-0.132	0.2239
Tam Logaritmik (Full-Log)	0.5601	0.2502	0.078	0.2488
Model 2	R ² _{Adj}	Std. Hata	AİC Değeri	RMSE
Doğrusal (Linear)	0.8383	45167.78	24.302	44522.92
Yarı Logaritmik (Semi-Log)*	0.8723	0.1339	-1.154	0.1319
Tam Logaritmik (Full-Log)	0.8716	0.1343	-1.151	0.1325

Birçok çalışma yarı logaritmik fonksiyonel formun diğer doğrusal fonksiyonel formlara göre avantajlarını vurgulamaktadır (Owusu-Ansah, 2013: 22). Yarı logaritmik fonksiyonun en temel avantajı, belirli bir özelliğin değerinin diğer özelliklerin değeri ile orantılı olarak değişmesine izin vermesidir (Soprantetti, 2015: 2126). Ayrıca logaritmik dönüşüm değişen varyans sorununu daha önemsiz hale getirmektedir (Gujarati, 2015: 105). Regresyon katsayılarının yorumlanmasını da kolaylaştıran logaritmik dönüşüm bağımsız değişkendeki bir birimlik artışa karşılık bağımlı değişkendeki yüzdesel artışı göstermektedir (Day vd., 2003: 20). Modellere kukla değişkenler eklenmesi durumunda herhangi bir problemle karşılaşılması (Gündoğmuş vd., 2019: 5) yarı logaritmik fonksiyonun yaygın olarak tercih edilmesinin bir diğer nedenidir. Çalışmada kullanılan yarı logaritmik fonksiyonel formdaki ekonometrik model şu şekilde gösterilebilir:

$$\ln(P_i) = \alpha_0 + \sum_{k=1}^n \beta_k X_{ik} + \sum_{y=1}^m \beta_y D_{iy} + \varepsilon_i$$

P= Konut satış fiyatı, X=Nicel değişkenler, D=Kukla değişkenler, ε=Hata terimi

Yarı logaritmik fonksiyonel form altında tahmin edilen modellerden ikinci modelde negatif işaretli ve istatistik olarak anlamlı bulunan "Kızılay" değişkeni, çoklu doğrusallığı

yüksek olduğundan ($vif > 10$) modelden çıkarılmıştır. Modellerin hata terimlerinde değişen varyans (heteroskedasite) sorunu olup olmadığı White Testi ile araştırılmıştır. Test sonuçlarına göre her iki modelin de değişen varyans sorunu taşıdığı anlaşılmıştır. Ayrıca, Tablo 6'da görülen Durbin-Watson d istatistiklerinin sırasıyla 0,67 ve 1,50 olarak hesaplanması ve Breusch-Godfrey LM test sonuçları, her iki modelin hata terimleri arasında otokorelasyon sorunu olduğunu göstermiştir. Bir modelde değişen varyans veya otokorelasyon sorunlarının olması durumunda en küçük kareler tahmincileri etkin değildir. Bu durumda tahmin edilen varyans değerleri olduğundan daha büyük veya daha küçük olacağından aralık tahminleri, t ve F istatistikleri güvenilir değildir (Kınacı & Genç, 2002: 56-58). White (1980)'ın geliştirdiği heteroskedasite tutarlı kovaryans matrisi, heteroskedasitenin neden olduğu varyansların büyük veya küçük tahmin edilmesinden doğan tahribatı ortadan kaldırmaktadır. Tahmin edilen modeldeki hata terimleri heteroskedasite sorunun yanında otokorelasyon sorununu da taşıyorsa bu durumda, Newey-West HAC Tutarlı Kovaryansları (1987) daha genelleştirilmiş bir metot olarak kullanılmaktadır (Sümer, 2006: 19-20). Newey-West standart hataları, heteroskedasite (değişen varyans) ve otokorelasyonun varlığında bile geçerli olmaktadır (Yamak ve Tanrıöver, 2012: 21). Bu yöntemle düzeltilen standart hatalar HAC (değişen varyans ve otokorelasyon tutarlı) standart hatalar olarak bilinmektedir ve bu yöntem sadece standart hataları, t istatistiklerini ve bunların p değerlerini değiştirmektedir (Gujarati, 2016: 180-181). Tahmin edilen katsayılar ise aynı kalmaktadır. Newey-West yöntemi ile değişen varyans ve otokorelasyon sorununun modellerde yarattığı tahribat ortadan kaldırıldıktan sonra tahmin edilen modellere ilişkin regresyon katsayıları ve önemli test istatistikleri Tablo 6'da sunulmuştur.

Tablo: 6
Tahmin Edilen Model Katsayıları ve Test Sonuçları

(Model 1) Değişken Adı	Katsayı (β)	Standart Hata	t Değeri	İstatistiksel Anlamlılık Düzeyi (P)	VIF Testi* Sonuçları	Yarı Esneklik Katsayıları (%)
Sabit katsayı (c)	11.33**	0,14	78,24	0,000		
Parsel	0,0000106**	0,000032	3,23	0,001	3,11	0,00106
Konut büyüklüğü	0,0076**	0,000951	8,03	0,000	1,70	0,76
Bodrum	-0,28**	0,43	-6,46	0,000	1,33	-24,42
Zemin	-0,12**	0,025	-4,92	0,000	1,33	-11,30
Köşe	0,22**	0,046	4,85	0,000	1,23	24,60
Ara kat2	0,038****	0,022	1,72	0,084	1,36	3,87
Öncelikli alım hakkı	-0,16**	0,027	-6,05	0,000	1,03	-14,78
Konut yaşı	0,014**	0,0022	6,54	0,000	1,34	1,40
Metro	0,16**	0,038	4,17	0,000	1,42	17,35
Park sayıst	0,033**	0,0048	6,93	0,000	2,16	3,3
Avm	-0,0000684***	0,0000284	-2,41	0,016	1,95	-0,0068
Kızılay	-0,0000301**	0,0000105	-2,87	0,004	4,21	-0,00301
N	1193					
R ² /Düz.R ²	0,647 / 0,643					
F _{Hes} /Prob.(F _{Hes})	180,52 / 0,000					
Durbin-Watson	0,67					

(Model 2) Değişken Adı	Katsayı (β)	Standart Hata	t Değeri	İstatistiksel Anlamlılık Düzeni (P)	VİF Testi* Sonuçları	Yarı Esneklik Katsayıları (%)
Sabit katsayı (c)	11,41**	0,087	130,88	0,000		
Konut büyüklüğü	0,0081**	0,00047	17,29	0,000	2,41	0,81
Bodrum	-0,244**	0,027	-9,043	0,000	2,37	-21,65
Otopark	0,180**	0,024	7,28	0,000	2,82	19,72
Zemin	-0,065**	0,023	-2,76	0,005	2,88	-6,29
Konut yaşı	0,010**	0,001	7,09	0,000	2,51	1,00
Ara kat 1	0,050**	0,019	2,52	0,011	4,25	5,12
Ara kat 2	0,030**	0,014	2,14	0,032	2,80	3,04
Kat sayısı	-0,0099**	0,003	-2,72	0,006	5,10	-0,99
Katı	0,013**	0,002	4,72	0,000	3,38	1,30
Sokak	-0,057**	0,016	-3,42	0,000	1,90	-5,54
Köşe	0,081**	0,030	2,63	0,008	2,39	8,43
Emek	0,497**	0,032	15,44	0,000	3,93	64,37
Bahçelievler	0,493**	0,031	15,80	0,000	1,35	63,72
Y.Bahçelievler	0,612**	0,041	14,91	0,000	1,71	84,41
Söğütözü	0,394**	0,048	8,12	0,000	2,22	48,29
Konutkent	0,278**	0,044	6,21	0,000	1,84	32,04
Birlik	0,446**	0,052	8,45	0,000	2,00	56,20
Güvenevler	-0,121**	0,038	-3,13	0,001	1,90	-11,39
Keklikpınarı	-0,082**	0,027	-3,03	0,002	2,97	-7,87
Şht C. Özdemir	-0,099**	0,026	-3,70	0,000	1,16	-9,42
100. Yıl	0,276**	0,024	11,43	0,000	1,45	31,78
Bayraktar	0,164**	0,038	4,29	0,000	1,40	17,82
Maltepe	0,080**	0,032	2,43	0,015	1,69	8,32
Harbiye	0,195**	0,054	3,60	0,000	1,35	21,53
Aydınlr	-0,115**	0,051	-2,25	0,024	1,59	-10,86
Yücepete	0,127**	0,061	2,05	0,039	1,17	13,54
A.Öveçler	-0,127**	0,035	-3,59	0,000	2,67	-11,92
Esatoğlu	0,205**	0,052	3,91	0,000	1,56	22,75
Fakülteler	0,090**	0,036	2,45	0,014	1,70	9,41
Avm	-0,00097**	0,000014	-6,73	0,000	3,45	-0,0097
Metro	0,112**	0,024	4,50	0,000	3,52	11,85
Park	-0,000327**	0,000056	-5,81	0,000	4,23	-0,0327
Öncelikli alım hakkı	-0,147**	0,015	-9,76	0,000	1,14	-13,67
N	1164					
R ² /Düz.R ²	0,875 / 0,872					
F _{Hes} /Prob.(F _{Hes})	241,84 / 0,000					
Durbin-Watson	1,50					

* Bir değişkenin viş değeri 10'dan büyüğe o değişkenin çoklu doğrusallığı yüksektir (Gujarati, 2001: 339). 1 ile 5 arasında bir değer olması çoklu doğrusal bağlantı olmadığı şeklinde değerlendirilir (Sarıkonuk vd., 2019: 54).

** %1 önem düzeyinde istatistiki anlamlılığı gösterir.

*** %5 önem düzeyinde istatistiki anlamlılığı gösterir.

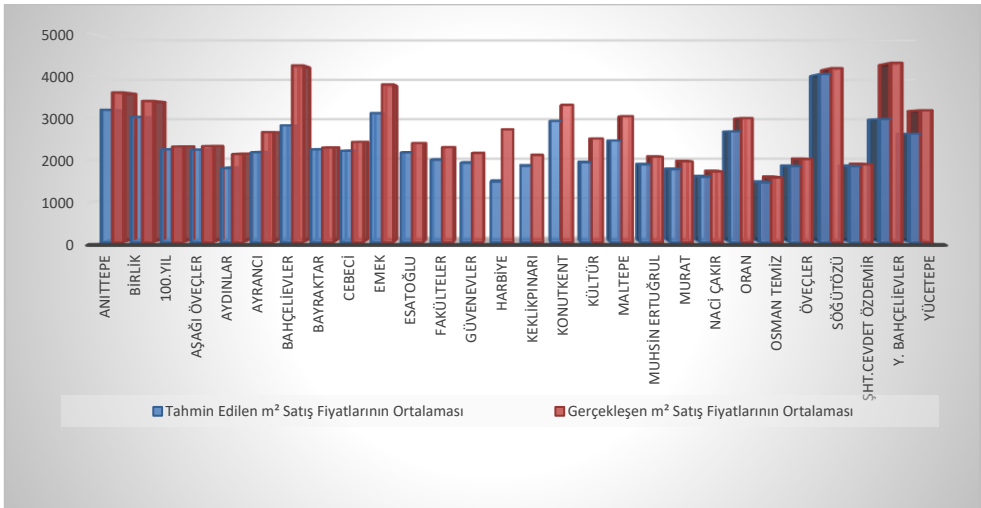
**** %10 önem düzeyinde istatistiki anlamlılığı gösterir.

Tablo 6'da görüldüğü üzere tahmin edilen modellerde yer alan değişkenlere ait katsayılar her iki modelde de istatistiki olarak anlamlı bulunmuştur. Düzeltilmiş belirlilik katsayısı olarak bilinen \widehat{R}^2 değerlerine bakıldığında bağımsız değişkenler, birinci modelde bağımlı değişken olarak belirlenen satış fiyatındaki değişimin %64'ünü açıklarken ikinci modelde satış fiyatındaki değişimin %87'sini açıklamaktadır. Anova testi sonucunda elde edilen F istatistik sonuçları her iki modelinde bir bütün olarak anlamlı olduğunu göstermektedir. Birinci modelde, parsel yüzölçümünün ve konut büyüklüğünün artması, konutun bulunduğu binanın sokak(lar) ve/veya cadde(ler) kesişiminde konumlanması, konutun ara katta (1. kat ile üst kat arasında) bulunması, konutun yaşının artması, konutun bulunduğu mahalledeki park sayısının artması, konutun 500 metre yakınında metro durağının bulunması konut fiyatını pozitif yönde etkilerken, konutun Kızılay'a uzaklığının artması, alışveriş merkezine uzaklığının artması ile konutun bodrum katta veya zemin katta bulunması konut fiyatını negatif yönde etkilemektedir. İkinci modelde ise konut büyüklüğünün artması, konutun otoparkının bulunması, konutun yaşının artması, konutun

ara katta bulunması, konutun bulunduğu katın artması, konutun bulunduğu binanın sokak(lar) ve/veya cadde(ler) kesişiminde konumlanması, konutun 500 metre yakınında metro durağının bulunması, konutun; Emek, Bahçelievler, Yukarı Bahçelievler, Söğütözü, Konutkent, Birlik, 100. Yıl, Bayraktar, Maltepe, Harbiye, Yüce-tepe, Esatoğlu, Fakülteler Mahallelerinde bulunması konut fiyatını pozitif yönde etkilerken, konutun bodrum katta veya zemin katta bulunması, konutun bulunduğu binadaki kat sayısının artması, konutun bulunduğu binanın sokak üzerinde konumlanması, konutun alışveriş merkezine ve parka olan uzaklığının artması, konutun Güvenevler, Keklikpınarı, Şehit Cevdet Özdemir, Aydınlar, Aşağı Öveçler Mahallelerinde bulunması konut fiyatını negatif yönde etkilemektedir. Yarı logaritmik modellerde tahmin edilen katsayılar değişkenlerin yarı esneklik değerlerini göstermektedir. Çalışmada fiyatın doğal logaritması (e tabanında) alınarak tahminler gerçekleştirildiğinden katsayılar yorumlanırken nicel değişkenler için tahmin edilen katsayı 100 ile çarpılmalı (Yayar & Karaca, 2014: 518), kukla değişkenlerle tahmin edilen katsayıların ise ters logaritmaları alınarak bulunan değerlerden 1 çıkarılmalı ve sonuç 100 ile çarpılmalıdır (Gujarati, 2015: 105-106). Bu şekilde hesaplanan model katsayılarının yarı esneklik değerleri Tablo 6'nın son sütununda gösterilmiştir. Yarı esneklik katsayıları yorumlanırken dikkat edilmesi gereken hususlardan birisi yorumlanan esneklik katsayısına ilişkin değişken dışındaki diğer tüm değişkenlerin sabit olduğudur. Diğer önemli husus ise nicel değişkenlerin, bağımsız değişkendeki her bir birimlik artışın bağımlı değişkende meydana getirdiği yüzde değişim şeklinde kukla değişkenlerin ise, 1 değerini alan değişkenin yani belli bir özelliğin mevcut olması durumunun bağımlı değişkende meydana getirdiği yüzde değişim şeklinde yorumlanması gerektiğidir. Bu çerçevede, Tablo 6'da sunulan yarı esneklik değerleri şu şekilde yorumlanır: birinci modele göre diğer tüm değişkenler sabitken konutun Kızılay'a uzaklığının 100 metre artması fiyatı yaklaşık %0,3 oranında düşürmektedir. Konutun bodrum katta bulunması ise fiyatı yaklaşık %24,42 oranında düşürmektedir. Konutun zemin katta bulunması durumunda fiyatı yaklaşık %11,30 oranında düşürmektedir. Eğer konut ara katta ise (1. Kat ile en üst kat arasında) fiyatı yaklaşık %3,87 oranında, konutun bulunduğu bina sokak(lar) ve/veya cadde(ler) kesişiminin de ise fiyatı yaklaşık %24,6 oranında artmaktadır. Konut yaşı arttıkça konut fiyatı yaklaşık %1,4 oranında artmaktadır. Eğer konutun bulunduğu parselin yüzölçümü 1 m² artarsa konutun fiyatı yaklaşık %0,00106 oranında, konutun büyüklüğü 1 m² artarsa konutun fiyatı yaklaşık %0,76 oranında artmaktadır. Konutun 500 metre yakınında metro durağının bulunması konut fiyatını yaklaşık %17,35 oranında artmaktadır. Konutun bulunduğu mahalledeki park sayısındaki bir birimlik artış konut fiyatını yaklaşık %3,3 oranında artırmaktadır. Konutun en yakın alışveriş merkezine uzaklığındaki her 100 metrelik artış ise fiyatını yaklaşık %0,68 oranında düşürmektedir. Bu çalışma özelinde oluşturulmuş bir piyasa değişkeni olan "öncelikli alım hakkı" değişkeninin yarı esneklik katsayısına göre ise öncelikli alım hakkı sahiplerinin satın aldığı konutların fiyatı öncelikli alım hakkı sahibi olmayanların satın aldığı konutların fiyatından yaklaşık %14,78 oranında daha düşüktür. İkinci modele göre ise diğer tüm değişkenler sabitken; konutun bodrum katta bulunması fiyatını yaklaşık %21,65 oranında, zemin katta bulunması ise yaklaşık %6,29 oranında düşürmektedir. Konutun otoparkının bulunması fiyatı yaklaşık %19,72 oranında artırırken, konutun zemin kat ile üst kat arasında bulunması fiyatı yaklaşık %5,12 oranında, birinci kat ile üst kat arasında

bulunması ise fiyatı yaklaşık %3 oranında artırmaktadır. Konut daha yüksek katlarda yer aldıkça fiyatı her bir kat için yaklaşık %1,3 oranında artmaktadır. Konutun bulunduğu katın artması fiyatı pozitif yönde etkilerken binada bulunun toplam kat sayısının artması konut fiyatını negatif yönde etkilemektedir. Konutun bulunduğu binanın kat sayısındaki her bir katlık artış konut fiyatını yaklaşık %1 oranında düşürmektedir. Konut yaşındaki her bir yıllık artış ise konut fiyatını yaklaşık %1 oranında artırmaktadır. Konut büyüğündeki her 1 m²lik artış fiyatı yaklaşık %0,81 oranında artırmaktadır. Konutun 500 metre yakınında metro durağının bulunması fiyatı yaklaşık %11,85 oranında artırmaktadır. En yakın alışveriş merkezinden her 100 metrelik uzaklık fiyatı yaklaşık %0,97 oranında, en yakın parka her 100 metrelik uzaklık ise fiyatı yaklaşık %3,27 oranında düşürmektedir. Eğer konut sokak üzerinde bulunmakta ise fiyatı yaklaşık %5,54 oranında düşerken, konutun bulunduğu bina sokak(lar) ve/veya cadde(ler) keşiminde ise fiyatı yaklaşık %8,43 oranında artmaktadır. Konutun Yukarı Bahçelievler, Emek, Bahçelievler, Birlik, Söğütözü, Konutkent, 100. Yıl, Esatoğlu, Harbiye, Bayraktar, Yücepete, Fakülteler veya Maltepe Mahallelerinde bulunması fiyatı sırasıyla, %84,41, %64,37, %63,72, %56,20, %48,29, %32,04, %31,78, %22,75, 21,53, %17,82, %13,54, %9,41 ve %8,32 oranlarında artırmaktadır. Eğer konut Aşağı Öveçler, Güvenevler, Aydınlar, Şehit Cevdet Özdemir veya Keklikpinarı Mahallelerinde bulunuyorsa fiyatı sırasıyla %11,92, %11,39, %10,86, %9,42 ve %7,87 oranlarında düşmektedir. Ayrıca öncelikli alım hakkı sahiplerinin satın aldığı konutların fiyatı öncelikli alım hakkı sahibi olmayanların satın aldığı konutların fiyatına göre yaklaşık %13,67 oranında daha düşüktür. Son olarak Grafik 1'de ikinci modele dahil edilen mahallerde bulunan konutların tahmin edilen m² satış fiyatlarının ortalaması ile ihale sonucu oluşan m² satış fiyatlarının ortalaması karşılaştırılmaktadır.

Grafik: 1
Ortalama m² Satış Fiyatları



Kaynak: MEOP ve idari kayıtlardan yararlanılarak yazar tarafından hesaplanmıştır.

Grafikte görüldüğü üzere tahmin edilen m² fiyatların ortalamasına göre ihale sonucu oluşan ortalama m² satış fiyatlarında en yüksek artışın gerçekleştiği mahalleler Bahçelievler, Yukarı Bahçelievler ve Emek Mahalleleri iken en az artış yaşanan mahalleler, 100. Yıl, Aşağı Öveçler, Bayraktar ve Şehit Cevdet Özdemir Mahalleleridir. Gerçekleşen fiyatlara göre en yüksek ortalama m² satış fiyatları ise sırasıyla Yukarı Bahçelievler, Bahçelievler, Söğütözü, Emek ve Anıttepe’de gerçekleşirken, en düşük ortalama m² satış fiyatları sırasıyla Osman Temiz, Naci Çakır, Şehit Cevdet Özdemir, Murat ve Öveçler Mahallelerinde gerçekleşmiştir. Veri seti incelendiğinde satılan konutların yaklaşık %87’sinin öncelikli alım hakkı sahiplerince satın alındığı görülmektedir. Öncelikli alım hakkı sahibi olmayanların satın aldığı konutların bir kısmının öncelikli alım hakkı sahibi olmayan boş konutlar olduğu göz önünde bulundurulduğunda öncelikli alım hakkını kullanmayan kişi sayısı oldukça düşüktür. 4706 sayılı Kanununun 7. maddesine göre Hazine taşınmazlarının satışı vergi, resim ve harçtan muaftır. Ayrıca satışı yapılan taşınmazlar satışı takip eden yıldan itibaren 5 yıl süresince emlak vergisine tabi tutulmaz. Kamu konutu satışlarında emlakçı gibi herhangi bir aracı da olmadığından komisyon giderleri de söz konusu değildir. Bu durum, Hazine mülkiyetindeki kamu konutlarını satın alanların satış bedeli dışında herhangi bir işlem maliyetine katlanmak zorunda olmadığı anlamına gelmektedir^{10,11}. Özel kanunlarla düzenlenen satışlar dışında devletin Hazine taşınmazları satışındaki temel politikası, taşınmazların yapılan ihalelerde en yüksek teklifi veren isteklilere satılmasıdır. Böylece devlet, taşınmaz satışlarından elde edilen gelirleri en üst düzeye çıkarmaya çalışır. Literatürde birçok çalışma teklif verenlerin sayısı ile satış fiyatları arasında pozitif ilişki olduğunu ortaya koymuştur (Ooi vd., 2006; Amidu & Agboola, 2009; Gunnelin, 2013). Ancak öncelikli alım hakkı sahiplerinin konutu peşin satın almak istemeleri durumunda uygulanan %10 indirim, taksitle satın almak istemeleri durumunda ise 5 yıl, 7 yıl veya 10 yıl taksitlendirme imkânı öncelikli alım hakkı sahibi olanları olmayanlara göre daha avantajlı hale getirmektedir¹². Yukarıda bahsedilen maliyet avantajları da göz önünde bulundurulduğunda öncelikli alım hakkı sahiplerinin bu haklarını kullanarak konutları satın alma konusunda istekli olmaları doğaldır. Bu durumun, öncelikli alım hakkı sahibi olmayanların öncelikli alım hakkı olan konutlara karşı ilgilerinin azalmasına buna karşılık taleplerini daha çok öncelikli alım hakkı olmayan boş konutlara yönlendirmelerine neden olmuş olma olasılığı yüksektir. Böyle durumlarda ihaleli satışların satış gelirlerini arttırmaya yönelik etkinliğinin düştüğü ise açıktır.

¹⁰ Tapu devir işlemlerinde alıcıdan ilgili tapu müdürlüğüne döner sermaye ücreti tahsil edilmektedir. Ancak bu bedelin ihmal edilebilir düzeyde olduğu söylenebilir.

¹¹ Bu çalışma kapsamında analiz edilen satışların yapıldığı dönemde yürürlükte olmamakla birlikte, 09.04.2021 tarihli ve 31449 sayılı Resmî Gazetede yayımlanan Çevre ve Şehircilik Bakanlığı Döner Sermayesi İşletmesi Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmeliğe göre artık milli emlak birimlerince yapılan satışlardan döner sermaye ücreti alınmaktadır.

¹² Öncelikli alım hakkı sahibi olmayanlar satış bedelini peşin veya taksitle ödeyebilir. Taksitle ödemek istemeleri durumunda satış bedelinin en az %25 i peşin kalan kısmı kanuni faizi ile birlikte iki yılda taksitler halinde ödenir.

7. Sonuç

Ankara İli, Çankaya İlçesinde bulunan mülkiyeti Hazineye ait kamu konutlarının satış fiyatları ile özellikleri arasındaki ilişkinin araştırıldığı bu çalışmada konut fiyatlarının yapısal, konumsal ve komşuluk özelliklerince belirlendiği varsayımına dayanan hedonik fiyat modelinden yararlanılmıştır. Çalışmanın model uygulamasında ilk olarak tüm örneklemin kullanıldığı model tahmin edilmiştir. Bazı mahallelerin gözlem sayısı düşük olduğundan bu modele mahalle değişkenleri dahil edilmemiştir. İkinci modelde ise gözlem sayısı yetersiz olan mahalleler örneklemden çıkarılmış ve kalan mahallelere ilişkin değişkenler modele eklenerek tahmin yapılmıştır. Tahmin edilen modellerden birincisinde bağımsız değişkenler bağımlı değişken olarak belirlenen satış fiyatındaki değişimin %64'ünü açıklarken, ikincisinde satış fiyatındaki değişimin %87'sini açıklamaktadır. Mahalle değişkenlerinin dahil edildiği modelin bağımsız değişkenlerce açıklanma gücü daha yüksektir.

Elde edilen bulgulara göre, birinci modelde konutun bulunduğu parselin yüzölçümünün artması, konut büyüklüğünün artması, konutun ara katta (1. kat ile en üst kat arasında) bulunması, konutun bulunduğu binanın sokak(lar) ve/veya cadde(ler) kesişiminde konumlanması, konutun yaşının artması, konutun 500 metre yakınında metro durağının bulunması ve konutun bulunduğu mahalledeki park sayısının artması konut fiyatını pozitif yönde etkilerken, konutun bodrum katta veya zemin katta bulunması, Kızılay'a olan uzaklığının artması, alışveriş merkezine olan uzaklığının artması konut fiyatını negatif yönde etkilemektedir. Tahmin edilen ikinci modele göre ise, konut büyüklüğünün artması, konutun yaşının artması, konutun bulunduğu katın artması, konutun ara katta bulunması, konutun otoparkının olması, konutun bulunduğu binanın sokak(lar) ve/veya cadde(ler) kesişiminde bulunması, konutun Bahçelievler, Emek, Yukarı Bahçelievler, Söğütözü, Konutkent, Birlik, 100. Yıl, Bayraktar, Maltepe, Harbiye, Yücepete, Esatoğlu, Fakülteler Mahallelerinde bulunması, konutun 500 metre yakınında metro durağının olması konut fiyatını pozitif yönde etkilemektedir. Konutun bodrum katta veya zemin katta olması, binadaki toplam kat sayısının artması, konutun sokak üzerinde konumlanması, konutun alışveriş merkezine uzaklığının artması, konutun parka olan uzaklığının artması, konutun Güvenevler, Keklikpınarı, Aydınlar, Şehit Cevdet Özdemir ve Aşağı Öveçler Mahallelerinde bulunması konut fiyatını negatif yönde etkilemektedir.

Ankara'daki konut fiyatlarını hedonik fiyat modeli çerçevesinde inceleyen çalışmaların birçoğunda Çankaya İlçesi çalışma alanı olarak ilgi görmüştür. Bu çalışma kapsamında tahmin edilen her iki model ile ulaşılan sonuçlar gerek iktisadi beklentilere göre gerekse Ankara özelinde yapılan diğer çalışmaların sonuçları ile genel olarak uyumludur. Ancak bina yaşı arttıkça konut fiyatlarının artması beklentilerin tersine bir durumdur. İktisadi beklenti ve ampirik çalışmalardan elde edilen bulguların çoğu bina yaşı ile konut fiyatı arasında negatif ilişki olduğu yönündedir. Ancak bu çalışma ile ulaşılan sonuç Alkan (2015)'in çalışması ile uyumludur. Alkan (2015)'a göre, Çankaya'nın Bahçelievler, Kavaklıdere gibi Ankara'nın eski ve prestijli mahallelerinde bulunan konutların yaşı arttıkça fiyatları da artmaktadır. Uğurlar ve Eceral (2014), Ankara'da bulunan konutların kullanım

değerini, değişim değerini ve prestij değerini bölgelere göre sınıflandırdıkları çalışmalarında, Çankaya'nın birçok mahallesinin bulunduğu bölgelerde konutların kullanım değerinin ve değişim değerinin yanında prestij değerinin de ön planda olduğunu ortaya koymuşlardır. Bu çalışma kapsamında analiz edilen veri seti incelendiğinde en eski konut stokunun, Bahçelievler, Anıttepe, Yukarı Bahçelievler, Ayrancı gibi Çankaya'nın eski ve konut fiyatlarının nispeten yüksek olduğu mahallelerde bulunduğu görülmektedir. Bu durum, Ankara'nın en prestijli mahallelerinin bulunduğu Çankaya'da, konut stokunun eski olmasına rağmen konut fiyatlarının yüksek olmasını kamu konutları örneği üzerinden de açıklayabilir.

Konutun bulunduğu binadaki kat sayısı ve konutun bulunduğu kat, teorik olarak konut fiyatlarını hem pozitif hem de negatif yönde etkileyebilir (Kördiş vd., 2014: 121). Mutluer (2008), Alkan (2015) ve Gökler (2017) binadaki kat sayısı arttıkça konut fiyatlarının arttığı sonucuna ulaşmışlardır. Ancak bu çalışmada elde edilen sonuç, binadaki kat sayısı arttıkça konut fiyatının düştüğü yönündedir. Bunun sebebi satılan konut stoğunun eski olması nedeniyle yüksek katlı binaların depreme dayanıklılığı konusunda duyulan kaygılar olabilir. Ayrıca, kat sayısı arttıkça her bir kat mülkiyeti sahibinin arsa payı düşeceğinden yüksek katlı binalara yönelik ödeme istekliliğinin daha düşük olması da olasıdır.

Bu çalışmanın literatüre en büyük katkısı kamu konutları üzerine yapılmış ilk hedonik fiyat modeli uygulaması olması ve gerçek satış fiyatlarının kullanılmasıdır. Elde edilen bulgular üç açıdan önemlidir; birincisi, çalışmada tamamı aynı ilçe sınırları içerisinde bulunan benzer özelliklere sahip konutlara ilişkin oldukça homojen bir veri seti kullanılmıştır. İkincisi, belli bir sosyoekonomik kesimin (konutların %87'si öncelikli alım hakkı sahibi olan memurlarca satın alınmıştır) talebi incelenmiştir. Üçüncüsü, öncelikli alım hakkı sahipliği gibi belirli bir kesim lehine yasayla düzenlenmiş bazı satın alma kolaylıklarının ihalelerde rekabet şartlarını olumsuz yönde etkileyebileceğine dair elde edilen ampirik bulgulardır. Kamu konutu satışlarından elde edilen gelirlerin özel gelir olarak kaydedilerek bu tutarlar karşılığında öncelikle personelin konut ihtiyacını karşılamak için bütçeye ödenek kaydedileceği hüküm altına alınmıştır. Elde edilen bulgular bir yönüyle kamu personelinin konut tercihlerini de yansıttığından daha kaliteli kamu konutu birimlerinin oluşturulmasına katkı sunabilir. Ulaşılan sonuçlar şüphesiz örneklemle de yakından ilişkilidir. Farklı bir örneklem ile yapılan çalışmalarda farklı sonuçlar elde edilebilir. İleride yapılacak çalışmalarda, kamu konutu satışı yapılan diğer il ve ilçelerde oluşan fiyatların belirleyicileri analiz edilerek farklılıkların karşılaştırılması yararlı olabilir. Ayrıca, öncelikli alım hakkı sahipliğinin satış fiyatları üzerine etkisinin daha iyi anlaşılması daha etkin satış süreçlerinin oluşturulmasına katkı sunabilir.

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Türkiye’de İl Düzeyindeki Mahalli İdare Harcamalarının Yakınsama Analizi

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Convergence Analysis of Local Government Expenditures at Provincial Level in Turkey

Abstract

It is considered essential to examine the expenditures of local administrations, which strengthen their position day by day in terms of administrative, political, and economic aspects. This study it is aimed to examine the local government expenditures at the provincial level in Turkey in the period 2006-2019, within the framework of economic classification and with panel convergence analysis. The convergence in terms of local government expenditures according to economic sort in 81 provinces in Turkey was examined using the Panel Log-(t) convergence test proposed by Phillips and Sul (2007, 2009). As a result of the analysis in which seven different categories were handled for local government expenditures, there is no evidence that cities converge to a single equilibrium state. However, in the sub-categories of expenditure, it was observed that the provinces converged by forming at least three and at most five clusters. Suppose an evaluation is made on the expenditure categories. There is a similar convergence in personnel expenditures and social security premium payments, total current expenditures and purchases of goods and services, and total capital expenditures. Further, it can be stated that there is a severe difference between clusters between total current expenditures and total capital expenditures. In addition, in terms of the convergence between provinces in terms of expenditures, it is estimated that municipalities in general and metropolitan municipalities and affiliated administrations, in particular, are effective in clusters in terms of both the administrative structure and the share in total local administration expenditures.

Keywords : Government Expenditure, Local Government Expenditure, Convergence, Log-t Regression Approach.

JEL Classification Codes : H5, C33, H76.

Öz

İdari, siyasi ve ekonomik açıdan gün geçtikçe pozisyonunu güçlendiren mahalli idarelere ait harcamaları çok yönlü biçimde incelemenin önemli olduğu düşünülmektedir. Bu kapsamda çalışmada 2006-2019 döneminde Türkiye’de il düzeyindeki mahalli idare harcamalarının, ekonomik sınıflandırma çerçevesinde ve panel yakınsama analizi ile incelenmesi amaçlanmıştır. Türkiye’deki 81 ilde ekonomik sınıflandırmaya göre mahalli idare harcamaları açısından yakınsamanın varlığı, Phillips ve Sul (2007,2009) tarafından önerilen Panel Log-(t) yakınsama testi kullanılarak incelenmiştir. Mahalli idare harcamaları için yedi farklı kategorinin ele alındığı analiz sonucunda; şehirlerin tek bir denge durumuna yakınsadığına dair kanıt bulunamamıştır. Ancak harcama alt kategorilerinde illerin en az üç, en çok ise beş küme oluşturarak yakınsadığı görülmüştür. Harcama kategorileri üzerinden bir değerlendirme yapılırsa; personel giderleri ile sosyal güvenlik prim ödemelerinde, toplam cari harcamalar ile mal ve hizmet alımlarında ve toplam sermaye harcamaları ile sermaye giderlerinde

benzer bir yakınsamanın, toplam cari harcamalar ile toplam sermaye harcamaları arasında ise kümeler arası ciddi bir farklılaşmanın olduğu ifade edilebilir. Ayrıca harcamalar açısından iller arasında görülen yakınsamada hem idari yapılanma hem de toplam mahalli idare harcamaları içerisindeki pay açısından genel olarak belediyelerin, daha özeldir ise büyükşehir belediyeleri ile bağlı idarelerin kümelenmeler üzerinde etkili olduğu tahmin edilmektedir.

Anahtar Sözcükler : Kamu Harcamaları, Mahalli İdare Harcamaları, Yakınsama, Log-t Regresyon Yaklaşımı.

1. Giriş

Kavramsal açıdan tarihi uygarlığın başlangıcına kadar uzanan mahalli idareler (Kpentey, 2019: 171), merkezi idarenin bir ajansı veya temsilcisi olmanın çok daha ötesinde özelliklere sahiptirler. Bu kapsamda mahalli idareleri; vergi alma hakkına ve genişletilmiş sorumluluklara sahip, seçilmiş siyasi kurumlar olarak değerlendirmek mümkündür. Söz konusu temel özellikler mahalli idarelerin sorumlu oldukları vatandaşlar adına hareket etmelerini ve yerel tercihlerde bulunmalarını haklı ve meşru bir zemine dayandırmaktadır. Bununla birlikte mahalli idareler yerel düzeydeki hizmetleri sağlamanın ötesinde, yerel düzeydeki vatandaş ve toplulukların refahından sorumlu bir birim olarak da düşünülebilir (Jones & Stewart, 2012: 347).

Mahalli idareler; gücün tekbir merkezde toplanması yerine yayılmasını, merkeziyetçiliğin oluşturacağı risklere karşı çeşitliliği, ulusal standartlarla ilişki kurulmadan yerel ihtiyaçların algılanmasını ve dolayısıyla kaynak kullanımında etkinliği, merkezi bürokrasinin sınırlamalarını, uzaklığını ve katılımı ortadan kaldırmak isteyen bir toplumda bilgi ve tepkilerin yerelliğini, demokrasiyi ve öz yönetimi (Jones & Stewart, 2012: 348-349) geliştirecek önemli varlıklardır.

Ekonomi literatüründe "merkez altı otoriteler" olarak basit biçimde ifade edilen mahalli idareler hakkında, belirli bir dönemde ve belirli ülkeler veya bölgeler açısından genel bir tanımlama yapmak oldukça zordur. Çünkü mahalli idarelerin yapısı, görevleri ve çalışma yöntemleri ile ilgili sürekli reformlar yapılmaktadır (Bailey, 1999: 2; Rao et al., 2014: 6). Uzun bir tarihi geçmişe sahip olmasına rağmen bu durum, genel geçer bir tanımlama yapmayı zorlaştırmaktadır (Kpentey, 2019: 171).

Yaşanan tanımlama zorluğuna rağmen, farklı yazarlarca yapılan tanımlamalardan ortak bazı özellikler çıkarılabilir. İlk olarak; mahalli idareler yasal bir statüye sahiptir. Söz konusu yasal (hatta anayasal) statüye göre tanımlanmakta, tanınmakta ve faaliyetlerini yürütmektedir. İkinci olarak; mahalli idarelerin kendi yetki alanları çerçevesindeki yerel vergiler hakkında karar verme hakları bulunmaktadır. Üçüncü olarak; yerel işlerin yönetiminde ve karar alma süreçlerinde yerel halkın katılımı söz konusudur. Dördüncü olarak; mahalli idareler yerelleşme süreci ve yerel özerklik ilkesi sayesinde, kanun ile belirlenen sınırlar çerçevesinde, merkezi idare organlarından bağımsız hareket etme kapasitesine sahiptir. Beşinci ve son olarak ise; mahalli idareler belirli sınırlar dahilindeki

vatandaşların genel-ortak çıkarlarına hizmet etmektedirler. Bahsedilen özellikler ve yapılan farklı tanımlamalar göstermektedir ki mahalli idareler çeşitli unsurların kombinasyonundan ibarettir. Bu unsurlar; kanunla düzenlenen yerel bir otoritenin varlığı, yerel nüfus ve tanımlanmış bir bölge/alan, merkezi idare tarafından sınırlandırılan özerklik ve yerel-yerel olmayan işlevler ayrımıdır (Ndreu, 2016: 7).

Demokrasinin gelişmesi, karar alma aşamalarına vatandaş katılımı, demokrasi okulu fonksiyonu ile geleceğin liderlerini oluşturması, vatandaşlara olan yakınlık nedeniyle yerel işlerin çok daha iyi ve verimli yönetimini sağlaması ve merkezi idare ile insanlar veya toplum arasındaki iletişimi sağlaması (vatandaşların ihtiyaçları mahalli idareler ile merkezi idareye iletilir, merkezi idare politikaları ise mahalli idareler aracılığı ile kamuya/topluma duyurulur vb.) gibi özellikler nedeniyle mahalli idareler, oldukça önemli¹ birimlerdir (Ndreu, 2016: 8; Andrew & Goldsmith, 1998: 107-108).

Mahalli idareler; siyasi, idari ve ekonomik açıdan gün geçtikçe önemi artan kamu tüzel kişilikleridir. Özellikle 1980 sonrası Neo-liberal süreçte ortaya çıkan serbestleşme, özelleşme, yerelleşme, yönetim ve yeni kamu yönetimi anlayışı gibi yaklaşımlar, merkezi planlamanın başarısızlığına vurgu yapmış ve bu kapsamda öncelikle piyasa mekanizmasının, ikinci aşamada ise piyasa mekanizmasına en yakın alternatif olarak mahalli idarelerin güçlenmesine vesile olmuştur (Tekdere, 2018: 6-10). Söz konusu süreç kapsamında hizmetlerin halka en yakın kuruluşlarca gerçekleştirilmesi (subsidiarity ilkesi) ve mahalli idarelerin görev ile gelir açısından güçlendirilmesi gibi birçok adımın atıldığı söylenebilir.

İdeolojiler, siyasal yapılar, yüzyıllara sirayet eden idari sistemler, Dünya'yı etkisi altına alan akımlar ve savaşlar gibi birçok faktörden etkilenmesine ve ülkeden ülkeye değişiklik göstermesine rağmen mahalli idarelerin geçmiş dönemlere kıyasla özellikle görev ve sorumluluk açısından daha geniş bir düzlemde hareket ettiği ifade edilebilir. Görev ve sorumluluklardaki artış mahalli idarelerce yapılan harcamaları nitelik ve nicelik açısından daha önemli bir noktaya taşımaktadır. Mahalli idareler dünya çapındaki ülkelerde anahtar/temel kamu hizmetlerinin yönetimi ve sunumundan sorumludurlar (Walker & Andrews, 2015: 101). Mahalli idarelerin üstlendiği hizmetleri gerçekleştirmek amacıyla yaptığı harcamalar; vatandaşın devleti tanımada oldukça etkili olan, devlet ile toplumun birbirine en yakın olduğu ve çoğu vatandaşın yaşamının merkezinde yer alan (çöp toplama, kar temizleme, yangından koruma, park, yol yapımı, yaşlı bakımı, sosyal hizmetler vb.) harcama alanlarıdır (Baltacı, 2005: 92; Fred, 2018: 6).

¹ Seçilmiş mahalli idarelerin değeri/önemi ile ilgili klasik ifade John Stuart Mill'e aittir. Mill; bu noktada iki argüman ortaya koymaktadır. Bunlardan birincisi; seçilmiş mahalli idarelerin demokratik sistemlerin bir gereği olması, siyasi katılımı genişletmesi ve yönetim ile politika uygulamalarında vatandaşlara bir eğitim fırsatı sağlamasıdır. İkincisi ise seçilmiş mahalli idarelerin, yerel bilgi, ilgi ve uzmanlık gibi etkenler nedeniyle yerel hizmetleri, uzak bir merkezi idareden ve diğer kurumlardan daha etkin ve verimli sunacağı kanısındır (Andrew & Goldsmith, 1998: 107-108).

Mahalli idareler gerçekleştirdiği harcamalarla; fiziki altyapının oluşumu, sosyal dayanışmanın ve beşerî sermayenin gelişmesi, kültürel değerlerin korunması ve gelişimi, şehre işlevsellik kazandırılması, şehir ekonomisi ve ticaretinin güçlenmesi, tarım ve hayvancılığın desteklenmesi, işsizliğin azaltılması, dezavantajlı kesimlerin topluma adapte edilmesi, katılımcılığın ve demokrasinin gelişimi ile etkin kaynak kullanımının sağlanması gibi birçok faktör üzerinden, hizmet sunduğu vatandaş kesiminin yaşam kalitesini artırabilmekte ve bu sayede sürdürülebilir kalkınma sürecine destek sağlamaktadır (Özer & Akçakaya, 2014: 353-362).

Belirtilen nedenlerle idari, siyasi ve ekonomik açıdan gün geçtikçe pozisyonunu güçlendiren mahalli idarelere ait harcamaları çok yönlü biçimde incelemenin önemli olduğu düşünülmektedir. Bahsedilen öneme binaen söz konusu çalışmada 2006-2019 döneminde Türkiye'de il düzeyindeki mahalli idare harcamalarının, ekonomik sınıflandırma çerçevesinde ve panel yakınsama analizi ile incelenmesi amaçlanmıştır. Çalışma çerçevesinde öncelikle mahalli idareler teorisi hakkında bilgi verilmiş, Türkiye'deki mahalli idare yapısı üzerinde durulmuş ve literatür taraması yapılmıştır. Daha sonra gerçekleştirilen analizin yöntemi, veri seti ve bulguları ortaya konulmuştur. Sonuç kısmında ise birtakım değerlendirilmeler ve öneriler sunulmuştur.

İl düzeyinde gerçekleşen tüm mahalli idare harcamalarını ekonomik sınıflandırma çerçevesinde ve Panel Log-(t) testi ile ele alması bakımından ilk olma özelliğine sahip bu çalışma, mahalli idarelere ait harcamaların ekonomik sınıflandırılması açısından sunduğu yakınsama bilgileri ile (hem harcama kategorileri hem de iller arası yakınsama açısından) konuya ilgi duyan politika yapımcılar ve araştırmacılar için rehber niteliğine sahip, değerli bulgular ortaya koymaktadır. Bu kapsamda iller arası yakınsama çalışmaları nezdinde, tüm mahalli idare harcamalarını odak noktasına alan çalışma eksikliğinin de giderildiği ifade edilebilir.

2. Mahalli İdareler Teorisi

Mahalli idareler; ulusal bir devlet içinde alt bir bölgeyi (coğrafi alanı) belirli ölçülerde kontrol eden ve bu alt bölgedeki insanları temsil eden, yine ilgili bölgedeki insanların ortak ve yerel nitelikteki ihtiyaçlarını karşılamak amacıyla oluşturulan ve yerel halkın seçtiği organlarca yönetilen, kanuni görev ve sorumluluklara sahip anayasal kuruluşlar olarak ifade edilebilir. Tarihi süreç içerisinde üstlendiği nosyonunu inişli-çıkışlı bir seyirle yerine getiren mahalli idareler, belirli yerel ihtiyaçları karşılamak ve yerel hizmetleri üretmek amacıyla devletle birlikte ortaya çıkmış, ulusal sınırlar çerçevesinde merkezi idareyi tamamlayıcı bir fonksiyon üstlenmiş ve neredeyse tüm ülkelerde kamu yönetimi sistemlerinin vazgeçilmez bir parçası olmuştur (Ulusoy & Akdemir, 2019: 22-23).

Temeli, bir insan topluluğunu ifade eden "komünlere" kadar uzanan mahalli idareler; devlet yönetiminde merkezi idarenin oluşturduğu olumsuzlukları elimine etme, sundukları hizmetler ile yerel düzeydeki insanların yaşam kalitesi pozitif yönde etkileme, demokratik değerlerin (vatandaş katılımının) gelişimine katkı sağlama, kamusal mal ve hizmet arzında

işlem maliyetlerini azaltma, yerel halkın tercihlerine uygun mal ve hizmet üretme, yeni hizmet teknikleri geliştirme, kaynak israfını engelleme ve hesap verebilirliği artırma gibi birçok açıdan oldukça önemli birimlerdir (Ulusoy & Akdemir, 2019: 24-25).

Mahalli idarelerin önemini ortaya koyan ifadeler, aynı zamanda ilgili idarelerin varlık nedenlerini de oluşturmaktadır. Bu kapsamda mahalli idarelerin varlık nedenlerini dört temel başlık altında incelemek mümkündür (Tortop vd., 2014: 16-17; Özer & Akçakaya, 2014: 7-8; Ulusoy & Akdemir, 2019: 50-56; Kjellberg, 1995: 42-44; Keleş 2009: 24-27):

Ekonomik nedenler; mahalli idareler yerel düzeyde daha yakın olmaları nedeniyle, vatandaşların yerel hizmetlerle ilgili önceliklerini, beklenti ve taleplerini rasyonel biçimde analiz edip (doğru bilgiye ulaşma avantajı) onların tercihlerine uygun hizmetler sunarak (piyasa benzeri bir anlayışla), merkezi idareye kıyasla daha etkin ve verimli bir hizmet arzı gerçekleştirebilmektedir². Mahalli idarelerin görev ve sorumluluk açısından daha da güçlenmesine vesile olan ve "hizmette halka yakınlık" olarak ifade edilen "subsidiarity" ilkesi de temelde, söz konusu ekonomik ilişki üzerine şekillenmektedir (Slack, 2004: 3; Sikander, 2015: 176; Watt, 2006: 8; Afonso & Fernandes, 2006: 40).

Siyasal nedenler; mahalli idareler, yerel düzeyde vatandaşların yönetime ve yerel kamusal işlere katılımını teşvik ederek (yönetişim), demokratik değerlerin gelişimine ve yerleşimine katkı sağlamaktadır. Bu yönüyle mahalli idarelerin "demokrasinin beşiği ve okulu" olarak görüldüğü de ifade edilebilir³. Ayrıca mahalli idareler olmadan kapsamlı ve eksiksiz bir siyasi sistemin düşünülemeyeceği ileri sürülmektedir. Mahalli idarelerin siyasi açıdan önemini ortaya koyma noktasında temel bazı gerekçeler de beyan edilmektedir. Bunlar; kitlelerin politik eğitimi için bir platform oluşturması, güçlü siyasi liderliğin gelişimi için temel eğitim işlevine sahip olması ve yönetimin hesap verebilirliğini sağlamasıdır. Söz konusu gerekçelerin mahalli idarelerin rolünü güçlendirdiği ve daha önemli hale getirdiği belirtilmektedir (Haque, 2012: 9).

İdari nedenler; coğrafi alan bakımından çok küçük olan ülkeler (Vatikan, Monako, San Marino vb.) dışında tüm hizmetleri merkezden yürütmek oldukça zor, etkinlikten uzak ve maliyetli bir anlayıştır. Bilişim teknolojilerinde yaşanan gelişmelerle merkezi düzeyde hizmet sunmak ve hizmetlere erişim açısından birtakım iyileşmeler yaşanmasına rağmen, belirli bir coğrafi alan ile sınırlı yerel düzeydeki hizmetleri; koordinasyon aksaklıkları, bilgi akışında yaşanan sorunlar, bürokrasi, kırtasiyecilik, hizmetin faydasının yayıldığı alan (optimum hizmet alanı) ve yönetim maliyetleri gibi gerekçelerle mahalli idarelerin sunması

² Yerel yetkililer, hükümetin üst düzey yetkililerine kıyasla yerel zevk ve tercihlere yanıt verme konusunda daha iyi konumdadır (Slack, 2004: 2).

³ Vatandaşların yerel kamusal işlere aktif katılımının demokrasiyi güçlendirmesini ve politik bir eğitim imkânı sunmasını Kjellberg (1995: 43-44), "mahalli idareler açısından demokratik bir ideal" olarak değerlendirmektedir. Mahalli idarelerin demokrasiyi geliştirdiği ve politik bir eğitim işlevine sahip olduğuna dair ilave bilgi için bakınız (Sikander, 2015: 175).

gerektiği belirtilmektedir. Bu noktada idari açıdan mahalli idarelerin varlığını bir sonuç olarak değerlendirmenin, doğru olacağı söylenebilir.

Toplumsal nedenler; toplumsal gelişim ile mahalli idarelerin gelişimi arasında yakın bir bağlantı vardır. Sanayi, hizmet, nüfus ve kentleşme alanında yaşanan gelişmeler, kaçınılmaz olarak mahalli idarelerin de gelişmesine yol açmaktadır. Nitekim gelişim süreci, parçalara ayrılması olanaksız bir bütün olarak görülmektedir. Bu kapsamda mahalli idarelerin katkısı olmaksızın, toplumun emek, kaynak ve düşünsel potansiyelini ortaya koyacağı bütünsel bir kalkınmanın gerçekleştirilemeyeceği dile getirilmektedir.

Bahsedilen kuruluş-varlık nedenleri çerçevesinde her ülkede farklı mahalli idare türlerinin görüldüğü ifade edilebilir⁴. Yerel bir topluluğun mahalli nitelikteki tüm ihtiyaçlarını karşılayan genel amaçlı mahalli idareler, eğitim ve sağlık gibi belirli hizmetleri yerine getirmek amacıyla kurulmuş özel amaçlı mahalli idareler, karar organları seçimle oluşturulan ve temsil ilkesine dayanan mahalli idareler ve karar organları atamayla oluşturulan, nispeten daha az sayıdaki, temsil ilkesine dayanmayan mahalli idareler şeklinde, oluşumlar görülebilmektedir (Ulusoy & Akdemir, 2019: 29-30).

Teorik ve pratik zeminde mahalli idarelerin oluşumu, yerinden yönetim ilkesinin varlığına dayanmaktadır. Yerinden yönetim ilkesi ise kendi içinde farklı uygulama biçimlerine sahiptir. Siyasi yerinden yönetim; siyasi gücün merkezi idare ile mahalli idare arasındaki bölüşümüdür. Bir iktidar paylaşımını ifade eden siyasi yerinden yönetimin ağırlıklı olarak federal yapılı ülkelerde uygulandığı bilinmektedir. Mali yerinden yönetim; merkezi idare ile mahalli idareler arasındaki ilişkilerin kamu maliyesini boyutunu ifade etmektedir. Ekonomik yerinden yönetim; kamusal hizmetlerin piyasa benzeri bir ortam oluşturma ve etkinliği artırma adına, özel sektör kuruluşları ve sivil toplum kuruluşlarınınca (NGO-Non-Governmental Organizations) yürütülmesi anlamına gelmektedir. Türkiye'nin mahalli idare yapısını da şekillendiren idari yerinden yönetim ise; yerel niteliğe sahip kamusal hizmetler ile bazı teknik, ticari ve kültürel nitelikteki hizmetlerin merkezi idarenin hiyerarşik yapısı dışındaki kamu tüzel kişilerine bırakılmasıdır. Bir diğer ifadeyle; görev bölüşümüdür. İdari yerinden yönetim sistemi; yer (coğrafi), hizmet ve meslek yönünden yerinden yönetim olarak kendi içerisinde üçe ayrılabilir. Yer yönünden (coğrafi) yerinden yönetim; belirli sınırlar içerisinde yaşayan halkın yerel nitelikli tüm ihtiyaçlarını gidermeyi esas alan bir anlayış üzerine şekillenmektedir. Tarihi bakımdan çok eskilere dayandığı söylenebilir. Hizmet ve meslek yönünden yerinden yönetim ise; sosyal devlet ilkesinin benimsenmesi sonucu sorumlulukları artan devletin, siyasi ve teknik açıdan önemli özelliklere sahip bazı hizmetlere özerklik ve tüzel kişilik tanınması olarak izah edilebilir. Hizmet ve meslek yönünden yerinden yönetim, son dönemlerde yaygınlık kazanan bir uygulama yöntemidir (Ulusoy & Akdemir, 2019: 60-62; Günday, 2004: 63-64).

⁴ *Siyaset bilimi kapsamında üzerinde uzlaşı sağlanmış bir mahalli idareler teorisi veya yerel özerklik anlayışı olmasa da üç temel değer mahalli idareler için gerekli olduğu algısı bulunmaktadır. Bunlar; özgürlük veya özerklik, demokrasi veya katılım ve verimliliktir (Kjellberg, 1995: 42).*

Uygulama biçimi konusunda tek bir standart olmasa bile mahalli idarelerin; yerel düzeydeki hizmetler özelinde daha iyi bilgi sahibi olma, kamusal mal ve hizmetlerin sunumunda etkinlik ve verimlilik sağlama, yeni hizmet yöntemleri geliştirebilme, siyasi, idari ve mali hesap verebilirliği artırma, subsidiarity ilkesinin pratikte realize edilmesini sağlama, vatandaşın yönetim aşamalarına katılımını artırarak demokratik gelişimi güçlendirme, merkezi idarenin gücünü dengeleme, sorumlu olunan yörenin ekonomik, sosyal, kültürel ve siyasal yönden gelişimine katkı sunarak, refahı çok boyutlu bir bakış açısıyla artırma ve yörede yaşayan vatandaşların yaşam memnuniyetini yükseltme gibi birçok faydalı yöne sahip olduğu kabul edilmektedir.

Mahalli idarelerin kabul gören pozitif boyutları serbestleşme/deregülasyon, yerelleşme ve özelleşme gibi akımlar, yönetim ve subsidiarity gibi olgular, kentleşme, hâkim ekonomi ve siyaset kuramları, geleneksel kamu yönetimi anlayışından yeni kamu yönetimi anlayışına geçiş gibi değişimler ile gün geçtikçe daha önemli bir pozisyona sahip olmaktadır. Küreselleşme tartışmalarının ön planda olduğu bir dönemde artan önem (Koçak, 2008: 18), mahalli idarelerin gelir ve görev bakımından güçlenmesine ve dolayısıyla mahalli idarelerin başta ekonomik potansiyel olmak üzere, tüm yönlerini inceleyen çalışmalara ilgiyi de artırmaktadır.

3. Türkiye'deki Mahalli İdare Yapısı

Türkiye'nin mahalli idare yapısı iki bölüm halinde incelenmelidir. Bunlar; Osmanlı Devleti Dönemi ve Türkiye Cumhuriyeti Dönemi'dir. Nitekim Osmanlı Devleti döneminden kalan kamu yönetimi anlayışının etkisi, Cumhuriyet Dönemi'ndeki merkezi-mahalli yapılanmayı da büyük ölçüde etkilemiştir.

Köklü mahalli idare geleneğine sahip batı ülkelerine kıyasla Osmanlı Devleti'nde yerel hizmetler temel olarak; kadılar ve kadı yardımcıları, vakıflar ve esnaf birlikleri (loncalar) tarafından yerine getirilmiştir (Ortaylı, 2005a: 14). Osmanlı Devleti'nde merkezi bürokrasinin en önemli üyesi olan kadı görevlendirildiği bölgede; kolluk, yargı, mali işler, kent yönetimi ve beledi işler gibi birçok sorumluluğu üstlenmiştir (Ortaylı, 2005b: 69). Bir diğer ifadeyle kadı; hem şer-i ve adli yargının başı hem de yerel hizmetlerden sorumlu bir yerel yönetici fonksiyonuna sahiptir (Eryılmaz, 2005: 389). Geniş bir sorumluluk alanı olan kadıya yerel işlerinde; naib, muhtesib, şubası, çöplük subaşı, asesler ve mahalle imamı yardımcı bulunmuştur (Ünal, 2011: 242; Dursun, 2005: 99).

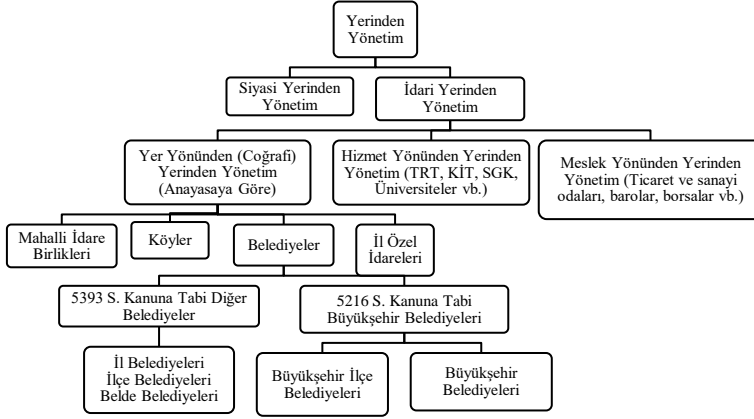
Batılı tarzda mahalli idare yapısı kurulmadan önce yerel düzeyde önemli sorumluluklar üstlenen diğer birimler ise; vakıflar ve esnaf birlikleridir (loncalar). Vakıflar özellikle şehirlerin altyapı faaliyetleri açısından, esnaf birlikleri ise merkezi yönetim ile halk arasında arabuluculuk görevi, devlet hükümlerinin uygulanması süreçlerinin takibi, çarşı yollarının yapımı, temizliği, aydınlatılması, su ihtiyacının karşılanması, malların kalitesinin ve standardizasyonunun sağlanması gibi birçok yönden yerel ihtiyaçları karşılamaya çalışmışlardır (Ulusoy & Akdemir, 2019: 257-258).

Batının ve geleneksel kültürlerin oluşumu olan modern mahalli idareler, toplumsal özgürlüğün ifadesi olarak görülmüş ve toplumların ihtiyaç ve taleplerine, kentleşmenin ve sanayileşmenin oluşturduğu baskılara bir cevap olarak ortaya çıkmıştır (Kpentey, 2019: 172; Sikander, 2015: 173). Türkiye'deki modern mahalli idare yapısının temelleri ise Osmanlı Devleti zamanında ve Tanzimat Dönemi'nde atılmıştır (Eryılmaz, 2005: 391). Sonraki süreçte yaşanan idari ve siyasi gelişmelerle (Kurtuluş Savaşı, Ulus-Devlet Projesi, İsyancılar vb.) bazen güçlendirilen, bazen ise merkezi idarenin gölgesi altında kalan ve bir istişare mekanizmasından öteye gidemeyen (Akın, 2015: 35-48; Dursun, 2005: 97-99), 2000'li yıllar sonrasında arka arkaya yapılan yasal değişiklikler ile geliştirilmeye çalışılan mahalli idareler hakkındaki en güncel ve üst düzey düzenlemeleri, 1982 Anayasası'nın 123. ve 127. maddelerinde bulmak mümkündür. Yürürlükte olan 1982 Anayasası'nın 123. maddesinde mahalli idarelerin oluşumuna vesile olan temel ilke ifade edilmektedir. Söz konusu maddede; "idarenin kuruluş ve görevleri, merkezden yönetim ve yerinden yönetim esaslarına dayanır" denilmektedir. Maddede bahsedilen "yerinden yönetim" ilkesi, mahalli idarelerin fiili oluşumunu anayasal seviyede güvence altına almaktadır.

1982 Anayasası'nın 127. maddesi incelendiğinde ise yer yönünden (coğrafi) yerinden yönetimin benimsendiği görülmektedir. Nitekim ilgili maddede; "mahalli idareler; il, belediye veya köy halkının mahalli müşterek ihtiyaçlarını karşılamak üzere kuruluş esasları kanunla belirtilen ve karar organları, yine kanunda gösterilen, seçmenler tarafından seçilerek oluşturulan kamu tüzel kişileri" olarak ifade edilmiştir⁵. Türkiye'de yer yönünden (coğrafi) yerinden yönetimin esas alındığı güncel mahalli idare sistemini Şekil 1'deki gibi şematize etmek mümkündür.

⁵ 5018 sayılı Kamu Mali Yönetimi ve Kontrol Kanunu'nun 3. maddesinin "e" fıkrasına göre mahalli idare; "yetkileri belirli bir coğrafi alan ve hizmetlerle sınırlı olarak kamusal faaliyet gösteren belediye, il özel idaresi ile bunlara bağlı veya bunların kurdukları veya tüye oldukları birlik ve idareler" şeklinde tanımlanmaktadır. İlgili maddede yer alan tanımlamada mahalli idare birliklerine vurgu yapıldığı görülmektedir. Söz konusu tanımda bir mahalli idare birimi olarak köyler hakkında doğrudan bir ifade yer almamaktadır.

Şekil: 1
Türkiye Cumhuriyeti'nin Mahalli İdare Sistemi



Kaynak: Parlak, 2015: 7; Tekdere, 2018: 28.

1982 Anayasası'nın 127. maddesine ait hükümler bir bütün olarak ele alındığında; il özel idaresi, köy, belediye, mahalli idare birlikleri ve büyükşehir belediyeleri ile ilgili anayasal düzeyde çıkarımlar yapmak mümkündür. Bununla birlikte anayasal düzeyde ifade edilmese de büyükşehir belediyelerinde bulunan bağlı idareler ile 2012 yılında çıkarılan 6360 Sayılı Kanun⁶ ile oluşturulan ve büyükşehir statüsüne sahip olan şehirlerde kaldırılan il özel idarelerinin yerine getirilen yatırım izleme ve koordinasyon başkanlıkları da⁷ (YİKOB) (Akman ve Kalender, 2018: 1030-1031) Türkiye'deki güncel mahalli idare yapılanmasının bir parçası olarak ifade edilebilmektedir.

4. Literatür

Yakınsama analizi üzerine detaylı bir literatür incelemesi yapıldığında; kamu harcamaları (özellikle sağlık, eğitim, turizm ve savunma alanlarında), kamu yatırımları, yabancı yatırımlar, GSYH, sosyo-ekonomik gelişmişlik göstergeleri, yaşam kalitesi, gelir

⁶ "On Dört İilde Büyükşehir Belediyesi ve Yirmi Yedi İlçe Kurulması ile Bazı Kanun ve Kanun Hükmünde Kararnamelerde Değişiklik Yapılmasına Dair Kanun"

⁷ Yatırım İzleme ve Koordinasyon Başkanlıkları'nın konumu üzerine tartışmalar devam etmektedir. Nitekim Yılmaz (2020) göre; "Büyükşehirlerde il özel idarelerinin kapatılması sonrası kurulan YİKOB'lar, ilk bakışta il özel idarelerinin görev ve yetkilerinin bir kısmının devredildiği yerel niteliklere sahip, özel idarelere ikame bir kuruluş gibi algılsın ve özel idarelerinin yaptığı bütün görevleri yerine getireceği beklentisi oluşsa da 6360 sayılı Kanunun hazırlık döneminde il özel idaresinin devamı niteliğinde bir kuruluş olmaları düşünülmemiştir. YİKOB'lar kuruluş ve görev açısından valilere bağlı ve vali başkanlığında çalışacak, merkezin denetiminde, bir merkezi yönetim birimidir. Görevleri incelendiğinde ildeki kamu kurum ve kuruluşlarının hizmetlerini belli şartlarda üstlenen, yerelde aracı - joker bir kurum niteliği taşımaktadır." Sayıştay raporlarında yer alan eleştirilerde dikkate alınrsa YİKOB'ların, il özel idaresinin ikamesi bir mahalli idare birimi olduğu görüşünün zayıfladığını ifade etmek mümkündür.

dağılımı, faktör verimliliği, enflasyon, ekonomik özgürlükler, vergiye gönüllü uyum, ihracat, ticari açıklık, finansal göstergeler, temel bankacılık faaliyetleri, konut talebi, sağlık ve turizm göstergeleri, göç, işsizlik, trafik hareketliliği ve kadın temsiliyeti gibi birçok alanda çalışmalar gerçekleştirildiği görülmektedir. Yapılan çalışmalarda örneklem olarak kimi zaman AB ve OECD gibi oluşumlar ele alınırken, kimi zamanda bölgesel ve il düzeyinde incelemeler gerçekleştirilmiştir. Özellikle, il düzeyini esas alan çalışmaların yoğunlukta olduğu ifade edilebilir. Literatürde kamu harcamaları özelinde Panel-Log(t) testi kullanılarak yapılan yakınsama çalışmalarının daha çok yabancı menşeli olduğu görülmekle birlikte, mahalli idarelerin yapmış olduğu harcamaların analize konu edildiği gözlemlenememiştir. Bu çerçevede ampirik literatür incelemesinde kamu harcaması ve gelirleri üzerinde ilgili analiz tekniğini kullanan yabancı çalışmalara ağırlık verilmiştir. Yerli çalışmalarda ise kamu harcama ve gelirleri ile mahalli idarelere ait harcama ve gelir yapısının yakınsamasına dair çalışmalar mevcuttur. Bunların dışında sadece yerel yönetim harcamalarını esas alan bazı çalışmalara da temas edilmiştir.

Apergis vd. (2013) ve Apergis (2015) farklı zaman frekansı ve ülke örnekleriyle yaptığı çalışmalarda; kamu harcamaları açısından AB ülkelerinde tek bir yakınsamanın varlığına dair kanıt bulamazken, gelişmekte olan ülkelerde yakınsama olduğu sonucuna ulaşmıştır. Bununla beraber kamu harcamaları alt kategorilere ayrıldığında; eğitim, sağlık, genel kamu hizmetleri vb. alanlarda kulüp yakınsamanın varlığı ortaya çıkmıştır. Çalışmalar neticesinde elde edilen bir diğer önemli bulgu ise; gelişmekte olan ülkelerin kamu harcaması alt kalemlerinde daha çok kulüp yakınsaması bulunmuş olmasına rağmen daha az ülkenin yakınsadığının görülmüştür. Kamu harcamaları konu alan bir diğer çalışma ise Saba ve Ngepah (2019) tarafından yapılmıştır. Yazarlar, Afrika'daki sekiz bölge için askeri harcamalar ve güvenlik çıktıları açısından yakınsamanın varlığını araştırmışlardır. Askeri harcamalar için GSYH içindeki payın kullanıldığı çalışmada, güvenlik çıktısı olarak analizde kırılma noktasına yer verilmiştir. Çalışma sonucuna göre incelenen bölgelerde, askeri harcamalar ve güvenlik çıktıları açısından tam yakınsama bulunmamaktadır. Bununla birlikte yazarlar, yakınsamanın sağlanabilmesi için ortak güvenlik tehditlerine karşı bölgelerin savunma ve güvenlik politikalarını uyumlu hale getirmelerini önermektedir. Traore (2021), Sahraaltı 44 Afrika ülkesi için sağlık harcamalarında yakınsamanın varlığını araştırmıştır. Sağlık harcamalarını temsilen kişi başına düşen sağlık harcamalarının kullanıldığı çalışmada, Sahraaltı Afrika ülkelerinde tam yakınsamanın varlığına rastlanılmamıştır. Kulüp yakınsaması açısından ise 8 kulüp oluşumu görülmekte ve birleştirme algoritmasıyla 12, 14 ve 14 şeklinde üyesi bulunan 3 kulübün yakınsadığı ifade edilmektedir. Yakınsayan ülkelerin küresel sağlık sistemine uygun bir yapıya ulaşmak adına sağlık harcamalarını artırmaları gerektiği dile getirilmektedir.

Apergis ve Cooray (2014) Panel-Log(t) metodolojisi uyguladıkları çalışmalarında; toplam vergi gelirleri ve vergi türlerine göre elde edilen gelirler açısından Asya-Pasifik ülkelerini incelemişler ve ülkelerin tek bir denge durumuna yakınsadığına dair sonuca ulaşamamışlardır. Benzer bir şekilde Delgado ve Presno (2017) ile Delgado vd. (2019) kamu gelirleri açısından AB üyesi ülkelerin yakınsamalarını incelemişlerdir. 2017 yılında yapılan çalışmada 15 AB ülkesi için 1975-1995 ile 1995-2011 olmak üzere iki alt dönemde vergi

yükü ile vergi gelirleri açısından yakınsamanın varlığını araştırmışlardır. Her bir değişken için alt dönemlerde kulüplerin varlığına rastlanılmakla beraber farklı vergi türlerinde ve zamanlarda, farklı yakınsama dereceleri elde edilmiştir. 2019 yılında yürütülen çalışmada ise AB'ye üye 27 ülke için büyüme ve istihdam üzerindeki etkisinden dolayı, kurumlar vergisi açısından Panel Log-(t) analizi ile kulüp yakınsamanın varlığını araştırmışlardır. Analiz sonucuna göre; oluşan üç kulüpten birinci kulüp yüksek efektif vergi oranına sahip Fransa, Malta, İspanya ve Portekiz'den meydana gelmektedir. Belçika, Almanya, Yunanistan, Lüksemburg, İtalya, Avusturya, Slovakya, Macaristan, Polonya ve Çek Cumhuriyeti ikinci kulübü oluştururken, geri kalan ülkeler ise üçüncü ve düşük efektif vergi oranına sahip ülkelerdir. Netice olarak her iki çalışma, ülkelerin farklı dereceden de olsa yakınsadığını ortaya koymaktadır. Son olarak kamu gelirleri özelinde Akram ve Rath (2021) Hindistan eyaletleri arasında yakınsamanın varlığını araştırılmışlardır. Hem toplam kamu gelirleri hem de kamu gelirlerinin çeşitleri açısından yapılan analizin sonucuna göre; toplam gelirler açısından ele alındığında sadece tek bir küme yakınsamasının varlığına rastlanılırken, toplam gelirlerin sermaye gelirleri ve vergi gelirleri olarak ayrılması durumunda, üç farklı küme yakınsamasına ulaşılmıştır.

Kamu harcama ve gelirleri ile mahalli idare harcama ve gelirleri konusunda yakınsama tekniğini esas alan yerli çalışmalardan biri, Tekeli ve Akdede (2007)'ye aittir. Yazarlar çalışmalarında belediye harcama ve gelirlerinin iller arası yakınsama üzerindeki etkisini araştırmışlardır. Çalışmanın sonucunda; yerel mali politika değişkenlerinin büyükşehir belediyeleri ile büyükşehir dışı il belediyelerinin olduğu iller arasında koşullu beta yakınsamasına neden olmadığı, kişi başı toplam belediye harcaması analize dâhil edildiğinde ise büyükşehir dışı il belediyelerinin olduğu iller arasında ıraksama oluştuğu bulguları elde edilmiştir. Yüksel (2019a) herhangi bir analiz tekniği kullanmadan, yalnızca verileri enflasyon etkisinden arındırarak ve kişi başına ve oransal değerlendirmeler yaparak, mahalli idarelere ait yerel harcama ve yerel vergi gelirlerini incelediği çalışmasında; 2006-2018 döneminde kişi başına yerel harcama düzeyi en düşük ve yüksek iller ile oransal olarak yerel harcama değişimi en düşük ve yüksek iller hakkında birtakım çıkarımlar gerçekleştirmiştir. Ayrıca büyükşehir statüsüne sahip olan ve olmayan iller ayrımı yaparak, kişi başına reel harcama değişimini yıllar itibarıyla ortaya koymaya çalışmıştır. Atılğan Yaşa ve Yüzbaşı Künc (2020) fonksiyonel sınıflandırma çerçevesinde ele aldıkları kamu harcamaları ile sosyoekonomik gelişmişlik düzeyleri bakımından illeri gruplandırdıkları çalışmalarında; illerin sosyoekonomik gruplanmalarıyla kamu harcamalarına ait gruplanmaların birebir olmasa da paralele yakın sonuçlar verdiği neticesini elde etmişlerdir. Allahverdi ve Alagöz (2019) 81 ili vergi gelirleri açısından kümelenme analizi ile sınıflandırmışlar ve vergi tahsilat değişkenleri açısından benzer özelliklere sahip illerin aynı kümelerde olduğu ve kümeler arasında farklar bulunduğu sonucuna ulaşmışlardır.

Yakınsama tekniğini esas almamakla birlikte, yalnızca yerel yönetim harcamalarına odaklandığı için literatüre dahil edilen çalışmalardan Çiçek vd. (2015) mahalli idare harcamalarının büyük kısmını gerçekleştiren belediyelerin harcamalarını 2007-2011 dönemini esas alarak incelemişlerdir. 81 ilde yer alan belediyelerin toplam harcamalarını nüfusa oranlayarak kişi başına düşen harcama miktarı en yüksek 10 ildeki belediyelerin

performansını Gri İlişkisel Analiz (GİA) tekniği ile değerlendirdikleri çalışmalarında; performansı en yüksek belediyelerin, İstanbul ilindeki belediyeler olduğu; performansı en düşük belediyelerin ise Kocaeli ilindeki belediyeler olduğu tespitinde bulunmuşlardır. Yavan ve Hotunoğlu (2018) yaptıkları çalışmada; 2007-2010 yılları arasında Türkiye'deki 81 ile ait mahalli idarelerin yapmış oldukları çevresel harcamalar ile il bazında hava kirliliği göstergesi olarak alınan partikül madde (PM10) arasındaki ilişkiyi incelenmişlerdir. Çalışmanın sonucunda Türkiye'de hava kalitesinin yerel kamu harcamalarıyla pozitif, nüfus artışı ve GSYH ile negatif ilişkisi bulunduğu neticesine ulaşmışlardır. Yüksel (2019b) mahalli idareler üzerine gerçekleştirdiği bir diğer çalışmada ise; 2006-2018 döneminde yerel harcama ve gelirlerin, toplam yerel bütçe içindeki payları üzerine oransal değerlendirmeler yapmıştır. Personel giderlerinin azalışı ve merkezi idareden alınan payların artışına dair tespitler, çalışmanın temel çıkarımlarıdır.

Literatür incelemesi neticesinde birtakım çıkarımlar yapmak mümkündür. Bu kapsamda hem kamu harcamaları hem de kamu gelirleri özelinde gerek ülkeler gerekse bölgeler arasında tek bir denge durumuna yakınsamanın varlığından söz etmek oldukça güçtür. İlgili sonuca rağmen ele alınan değişkenlerin alt kategorileri analize dâhil edildiğinde, örneklem olarak incelenen ülke ve bölge örnekleri arasında yakınsama olduğu sonucuna ulaşılabilmektedir. Ulusal çalışmalara bakıldığında ise; kamu harcamaları ve gelirleri açısından illerin sosyoekonomik gelişmişlik düzeyi ve vergi tahsilat değişkenlerine göre kümelenemediği sonucuna varılabilir. Bir mahalli idare birimi olan belediyeler açısından, belediye seviyeleri nezdinde iller arası yakınsamanın olmadığı, kişi başı toplam belediye harcamaları analize dâhil edildiğinde ise büyükşehir statüsüne sahip olmayan iller arasında iraksama olduğu söylenebilmektedir.

5. Yöntem ve Veri Seti

5.1. Log-T Test Yaklaşımı

Phillips ve Sul (2007 ve 2009) tarafından önerilen yaklaşım, ilgili değişkenin geleneksel panel veri ayrıştırmasının bir modifikasyonuna dayanmaktadır. Geleneksel panel verileri 1 no.lu eşitlikte gösterildiği şekilde ayrıştırılmaktadır:

$$X_{it} = g_{it} + a_{it} \quad (1)$$

Buna göre X_{it} panel veri olmak üzere g_{it} kalıcı ortak bileşen ve a_{it} geçici bileşendir. Denklem (1), geçici heterojenliğin dâhil edilmesiyle aşağıdaki denklem şeklinde yazılabilmektedir.

$$x_{it} = \left(\frac{g_{it} + a_{it}}{\mu_{it}} \right) \mu_{it} = b_{it} \mu_{it} \quad (2)$$

Dinamik bir ifade olan denklem (2)'de gösterilen b_{it} parametresi, panel veri setinde zaman içinde gelişime olanak sağlayan ve geçici bileşeni barındıran ayırt edici unsur, μ_{it} parametresi ise panelin ortak faktörüdür. Buna göre ortak olanı kendine özgü bileşenlerden

ayırmaya izin bu formülasyonda b_{it} ifadesi, μ_{it} tarafından belirlenen ortak değişimin geçiş patikası haline dönüşmektedir (Sichera & Pizzuto, 2019: 143). Diğer bir ifadeyle μ_{it} panel verinin ortak değişimini, b_{it} bu ortak değişimin stokastik eğilim veya sabit trend gibi farklı yollarını temsil etmektedir.

Farklı örneklemelerin yakınsayıp yakınsamadığını test etmek için önemli bir rol oynayan b_{it} parametresini modellemenin uygun yolu denklem (3)'teki geçiş katsayısını bulmaktır (Phillips & Sul, 2007: 1780).

$$h_{it} = \frac{X_{it}}{N^{-1} \sum_{i=1}^N X_{it}} = \frac{b_{it}}{N^{-1} \sum_{i=1}^N b_{it}} \quad (3)$$

3 no.lu eşitlik doğrudan panel veriden hesaplanabilmekte ve görelî geçiş patikası olarak adlandırılmaktadır. Bu denklem sayesinde her örneklem için ayrı bir patika izleyerek verideki μ_{it} ortak sabit durum trendi çıkarılabilmektedir. Diğer bir ifadeyle, görelî geçiş patikası her bir örneklemin kendi davranışını sergilemekte ve her örnek için ortak trendden sapmayı göstermektedir (Nghiem & Connelly, 2017: 5). Panel veri içindeki örnekler arasında yakınsamanın varlığından bahsedebilmek için her örneklemin görelî geçiş katsayısı (h_{it}), t sonsuza giderken, 1'e yakınlaşmalı ve aynı zamanda yatay kesit varyansı (H_{it}), 0 değerine yaklaşmalıdır (Phillips & Sul, 2007: 1780).

$$H_{it} = N^{-1} \sum_{i=1}^N (h_{it} - 1)^2 \rightarrow 0 \text{ ve } t \rightarrow \infty \quad (4)$$

Panel veri örnekleminde yakınsamanın varlığının istatistiksel test bulgularına, yarı parametrik olan 5 no.lu denklemden elde edilen sonuçlar ile karar verilmektedir (Phillips & Sul, 2009: 1166):

$$b_{it} = b_i + \frac{\sigma_i \delta_{it}}{L(t)t^\alpha} \quad (5)$$

Denklemden yer alan b_i zamanla değişmeyen sabit parametredir ve δ_{it} ise her bir örnek karşısında 0 ile 1 arasında değişen, bağımsız ve her örneklemden dağılımı aynı olan rassal değişkendir. $L(t)$, denklemin artan fonksiyonudur ve t sonsuza giderken $L(t)$ değeri de sonsuza yaklaşmaktadır. Son olarak α parametresi yatay kesit sapmalarının zamanla sıfıra düştüğü yakınsama oranı temsil etmektedir (Du, 2017: 884). 5 no.lu denklemden elde edilen değerlerin yorumlanması için aşağıdaki hipotezler kurulmaktadır. Buna göre;

$$H_0: b_{it} = b \text{ tüm } i \text{ değerleri için } \alpha \geq 0$$

$$H_1: b_{it} \neq b \text{ tüm } i \text{ değerleri için } \alpha < 0$$

Buna göre boş hipotezin reddedilemediği durumlarda örnekler arasında yakınsamanın varlığından bahsedilirken, alternatif hipotezin kabul edildiği durumlar

örneklerin birbirinden iraksadığını göstermektedir. Bununla beraber Phillips ve Sul (2007 ve 2009) farklı örnekler arasındaki yakınsamanın varlığını test etmek için en küçük kareler metodunu kullanarak aşağıdaki denklem (6)'yı tahmin etmeyi önermektedir.

$$\log\left(\frac{H_t}{H_r}\right) - 2\log(L(t)) = \alpha + \beta \log t + \varepsilon_t, \quad t = [rT], [rT] + 1, \dots, T \quad (6)$$

Denklem (6)'nın sağ tarafında yer alan H_1/H_t yatay kesitin varyansını temsil ederken " $-2\log(L(t))$ " terimi ise boş hipotezin test gücünü iyileştirmekte böylece panelin bütünü için genel yakınsama ile küme yakınsama arasında ayırım yapma gücünü vermektedir. Monte Carlo simülasyonunun bir sonucu olarak " r " değeri belirli bir gözlem bloğunu atmak için kullanılmakta ve 0 ile 1 arasında bir değer almaktadır. Bu doğrultuda küçük örneklemeler $T < 50$ için $r = 0,3$ ve büyük örneklemeler $T \geq 50$ için $r = 0,2$ değerleri tercih edilmektedir (Phillips & Sul, 2007: 1802).

Yakınsamanın varlığına dair boş hipotez, $\alpha > 0$ ($\beta=2\alpha$) eşitliğinin değişen varyans ve otokorelasyon sorununun bulunmadığı tek kuyruk t-testi ile analiz edilmekte ve $t_{\beta} < -1,65$ olduğu durumlarda %5 güven aralığında reddedilmektedir (Sichera & Pizzuto, 2019: 143). Kısaca Log(t) testi olarak adlandırılan bu yöntemle göre panelin bir bütün haliyle yakınsaması reddedilirse kümeleme mekanizmasına geçilmektedir.

5.2. Kümeleme Algoritması

Tüm örneklem için Log(t) testinin sonucunda boş hipotez reddedilirse analiz, birimleri kümelere ayırarak tekrarlanmalı ve kümeler arasında yakınsamanın varlığı test edilmelidir. Phillips ve Sul (2007)'un yakınsayan ve iraksayan kümeleri tespit etmek için geliştirdikleri algoritma aşağıda verilen dört adımla gerçekleştirilmektedir:

Birinci adım: Birimler dönemin son panel gözlemine göre azalan düzende sıralanmaktadır.

İkinci adım: Log(t) testi t-değerinin -1,65'in üstünde olduğu maksimum k birim ($2 < k < N$) çekirdek küme denilen ilk küme oluşturulmaktadır.

Üçüncü adım: Çekirdek küme tespit edildikten sonra teker teker yeni birimler eklenerek Log(t) testi yeniden yapılır ve t testi sonucu kritik değerden büyükse eklenen birim yakınsayan kümeye dâhil edilmektedir.

Dördüncü adım: İkinci ve üçüncü adım tekrarlanarak yeni alt kümeler oluşturulmaktadır. Başka yakınsama kümeleri bulunamazsa (yeni eklenen her k için t-değeri -1,65'ten küçükse) kalan birimler bir alt küme oluşturularak yeni yakınsayan küme olarak ayrılır.

5.3. Birleşik Kümeler Algoritması

Belirli bir örneklemede tanımlanan kümelerin sayısı kritik değerin seçimine bağlı olmaktadır. Yüksek bir kritik değer, asıl olandan daha fazla küme tanımlanmasına yol açabilmektedir (Lyncker & Thoennesen, 2017: 437). Bu sorunu düzeltmek adına Phillips ve Sul (2009) bitişik kümeler için Log(t) testi önermişlerdir. Buna göre $t_{\beta} > -165$ ise söz konusu kümeler %5 güven aralığında birleştirilmektedir.

Başlangıçta belirlenen K kadar küme için, komşu kümeler arasında yeniden bir Log(t) testi yapılması gerekmektedir. Böylece yeni oluşacak K-1 kadar küme için yakınsamanın olduğunu ifade eden boş hipotez reddedilmeyebilir (Phillips & Sul, 2009: 1170). Diğer bir ifadeyle bir kümede yer alan birim bir üst kümeyle birleşecek unsurlara sahip olabilir. Bu nedenle önemli bir t-değerine sahip olan tüm komşu kümelerin birleşimi, yakınsamanın reddedilemediği yeni kümeler oluşturabilmektedir (Lyncker & Thoennesen, 2017: 437).

Birinci Adım: Temel kümeleme algoritması ile oluşturulan ilk iki küme alınır ve Log(t) testi analizi yapılır. Test istatistiği -1,65 değerinden büyükse bu grup yakınsama kümesini oluşturmaktadır.

İkinci Adım: Bir sonraki grup eklenerek test tekrarlanır ve temel koşulu oluşturan kümeler birleştirilir ($t_{\beta} > -165$).

Üçüncü Adım: Yakınsamanın varlığına dair boş hipotezin reddedildiği küme hariç komşu kümelerle birleştirilir. Bu nedenle yakınsama hipotezinin reddedildiği gruptan başlanarak, birleşik kümeler algoritmasına baştan başlanıp yeni alt kümeler oluşturulmaktadır.

5.4. Veri Seti

Çalışmada 81 il için 2006-2019 yılları arası verileri ile⁸ panel yakınsama analizi yapılmıştır. Yakınsama analizi için kullanılan değişkenler T.C. Hazine ve Maliye Bakanlığı Muhasebat Genel Müdürlüğü'ne ait sitede yer alan "Genel Yönetim Mali İstatistikleri" bölümünden elde edilmiştir. Analizde il düzeyinde mahalli idarelerin⁹ ekonomik sınıflandırmaya göre¹⁰ yaptığı harcamaların toplam bütçe giderleri içindeki payları dikkate

⁸ 2020 yılının incelenmeme nedeni; analizin yapıldığı süreçte Ekim-Aralık olarak ifade edilen son çeyreğe ait harcama verilerinin olmamasıdır.

⁹ Sayıştay Denetim Raporlarındaki eleştiriler doğrultusunda Yatırım İzleme ve Koordinasyon Başkanlıkları 2019 yılına ait değerlendirmelere dahil edilmemiştir. Bu kapsamda daha önce yayımlanan 2019 yılına ait ilk üç dönem verilerinin yenilenmiş versiyonu kullanılmıştır. Yatırım İzleme ve Koordinasyon Başkanlıklarının fiili olarak faaliyette olduğu 2017 ve 2018 yıllarına ait veriler ise yenilenmediği için söz konusu yıllara ait veriler kapsamında Yatırım İzleme ve Koordinasyon Başkanlıkları analize dahildir. Ayrıca çalışma kapsamına 2006 yılından sonra verileri yayınlanmadığı için köy idareleri dahil değildir (Ulusoy & Akdemir, 2019: 393).

¹⁰ Ayrıntılı bilgi için Analitik Bütçe Sınıflandırmasına İlişkin Rehber'e bakınız <https://sbb.gov.tr/wp-content/uploads/2019/04/AnalitikEkorehber_2019-2021.pdf>.

alınmıştır. Bununla beraber mahalli idare harcamaları ekonomik sınıflandırmaya tabi tutulduğunda faiz harcamaları, sermaye transferleri ve borç verme değişkenleri bazı yıllarda mevcut olmadığından analize dâhil edilmemiştir. Ancak söz konusu değişkenlerin de içinde bulunduğu toplam cari harcamalar ve toplam sermaye harcamaları değişkenleri analize konu edilmiştir.

Tablo: 1
Veri Seti ve Betimleyici İstatistikler

Değişkenler		Açıklama				
Lpers		Log(Personel Giderleri/Toplam Bütçe Giderleri)				
Lsos		Log(Sosyal Güvenlik Kurum Ödemeleri/Toplam Bütçe Giderleri)				
lmvh		Log(Mal ve Hizmet Alımları/Toplam Bütçe Giderleri)				
lcari		Log(Cari Transferler/Toplam Bütçe Giderleri)				
lser		Log(Sermaye Giderleri/Toplam Bütçe Giderleri)				
ltcari		Log(Toplam Cari Harcamalar/Toplam Bütçe Giderleri)				
ltser		Log(Toplam Sermaye Harcamaları/Toplam Bütçe Giderleri)				
	Ortalama	Standart Hata	Min	Max	Skewness	Kurtosis
lpers	-1,5323	0,3467	-3,0176	-0,7364	-0,5000	3,4269
lsos	-3,4269	0,3344	-4,8530	-2,5698	-0,4407	3,4522
lmvh	-1,0375	0,2049	-2,4764	-0,3067	-1,1770	9,0303
lser	-1,2352	0,2394	-1,9515	-0,5575	-0,0795	2,6160
lcari	-3,5851	0,4679	-5,7962	-1,1503	0,6157	6,3034
ltcari	-0,3957	0,1158	-0,9072	-0,1521	-0,7087	3,4559
ltser	-1,2018	0,2375	-1,8350	-0,4777	0,0426	2,5611

Değişkenlerin tanımlamaları ve betimleyici istatistikleri Tablo 1’de verilmiştir. Her bir değişken için 1134 gözlemden oluşan panel veri setinde, ortalaması en yüksek olan logaritmik toplam cari harcamalar verisi aynı zamanda standart hatası en düşük olan değişkendir. Değişkenlerin Skewness (çarpıklık) değerleri incelendiğinde beş tanesinin sola, iki tanesinin sağa çarpık dağılım sergilediği görülmekle birlikte, logaritmik mal ve hizmet harcamaları hariç diğer değişkenlerin -1/+1 değerleri arasında yer aldığı gözlemlenmektedir. Diğer yandan Kurtosis (basıklık) değerleri tüm değişkenler için pozitif olup sivri bir dağılım göstermektedir. Skewness ve Kurtosis değerleri birlikte değerlendirildiğinde; genellikle serilerin simetrik dağılmış olmalarına rağmen basıklık değerleri -1 ile +1 arasında yer aldığı için değişkenlerin normal bir dağılıma sahip olmadığı söylenebilmektedir.

6. Bulgular

2006-2019 dönemi arası her bir seri için 81 ile ait mahalli idare harcamalarının Log(t) ekonometrik yakınsama analiz¹¹ sonuçları Tablo 2’de sunulmaktadır.

¹¹ Log(t) test analizi, kümeleme ve birleşik kümeler algoritmalarının Stata kodları için ayrıntılı bilgiye Keriu Du (2017) "Econometric Convergence test and club clustering using Stata" adlı makaleden ulaşılabilir.

Tablo 2
Değişkenlerin Log(t) Test Sonuçları

Değişkenler	Katsayı	Standart Hata	Log(t) Test Değerleri
lpers	-0.7855	0.0276	-28.4390
Lsos	-1.2146	0.0566	-21.4664
lmvh	-1.5430	0.1318	-11.7042
lcari	-1.0005	0.1406	-7.1184
Lser	-1.8644	0.1265	-14.7360
ltcari	-1.2515	0.0821	-15.2488
ltser	-1.8811	0.1237	-15.2049

Tablo 2 incelendiğinde; analiz için ele alınan yedi değişkenin Log(t) test sonuçlarının %5 güven aralığında anlamlı olmadığı görülmektedir. Bu durumda her bir değişken için panelin bütünü adına yakınsamanın var olduğunu ifade eden boş hipotez, t değerleri -1,65'ten küçük olduğu için reddedilmektedir. Diğer bir ifadeyle, söz konusu değişkenler açısından herhangi bir il tam yakınsama göstermemektedir. Bu nedenle birimler açısından kümeler belirlenmiş ve yakınsama ilişkisi kümeler çerçevesinde incelenmiştir.

Tablo 3
Değişkenlerin Küme Yakınsama Log(t) Test Sonuçları

lpers		Birleşik Kümeler Log(t) Test			Nihai Kümeler Log(t) Test	
Başlangıç Kümeler Log(t) Test		Küme 1+2	Küme 2+3	Küme 3+4	Küme1	Küme2
Küme1	0.005	-0.059			0.062*	0.316
	0.062					5.780*
Küme2	0.316	-2.692			0.484	9.350*
	5.780				0.382	5.193*
Küme3	0.484					
	9.350					
Küme4	0.382					
	5.193					
lsos		Birleşik Kümeler Log(t) Test			Nihai Kümeler Log(t) Test	
Başlangıç Kümeler Log(t) Test		Küme 1+2	Küme 2+3	Küme 3+4	Küme1	Küme2
Küme1	0.158	-0.039			-0.039	0.037
	1.792				-0.848*	0.750*
Küme2	0.683	-0.848*			0.037	0.011
	6.399				0.254*	
Küme3	0.037					
	0.750					
Küme4	0.011					
	0.254					
lmvh		Birleşik Kümeler Log(t) Test			Nihai Kümeler Log(t) Test	
Başlangıç Kümeler Log(t) Test		Küme 1+2	Küme 2+3	Küme3+Grup4	Küme1	Küme2
Küme1	-0.064	-0.763			-0.064	0.263
	-0.192				-0.192*	3.864*
Küme2	0.263	-7.658			0.263	-0.082
	3.864				-1.509	-1.509*
Küme3	-0.082				-5.102	-5.102
	-1.509				-32.724	-32.724
Grup4	-5.102					
	-32.724					

İcari

Başlangıç Kümeler Log(t) Test		Birleşik Kümeler Log(t) Test				Nihai Kümeler Log(t) Test	
Küme1	0.713	Küme 1+2				Küme1	-0.207
	2.882	-0.207					-1.371*
Küme2	0.800	-1.371	Küme 2+3			Küme2	2.342
	4.503		-0.455				6.673*
Küme3	4.018		2.703	Küme 3+4		Grup3	-2.636
	4.220			2.342	Küme4+Grup5		-52.462
Küme4	1.561			6.673	-2.570		
	1.216				-53.000		
Grup5	-2.636						
	-52.462						

İser

Başlangıç Kümeler Log(t) Test		Birleşik Kümeler Log(t) Test				Nihai Kümeler Log(t) Test	
Küme1	0.571	Küme 1+2				Küme1	-0.169
	2.275	-0.169					-0.755*
Küme2	0.965	-0.755	Küme 2+3			Küme2	0.375
	2.973		-0.732				2.518*
Küme3	0.375		-5.755	Küme 3+4		Küme3	0.603
	2.518			-1.200	Küme4+5		3.644*
Küme4	0.603			-7.028	-0.534	Küme4	0.132
	3.644				-7.963		1.412*
Küme5	0.132						
	1.412						

İtcari

Başlangıç Kümeler Log(t) Test		Birleşik Kümeler Log(t) Test				Nihai Kümeler Log(t) Test	
Küme1	-2.234	Küme 1+2				Küme1	-2.234
	-0.877	-0.643					-0.877*
Küme2	0.481	-4.849	Küme 2+3			Küme2	0.481
	2.542		-0.225				2.542*
Küme3	0.847		-4.758	Küme 3+4		Küme3	0.847
	7.407			-0.425	Küme4+5		7.407*
Küme4	0.025			-5.413	-0.599	Küme4	0.025
	0.280				-5.150		0.280*
Küme5	1.400					Küme5	1.400
	1.065						1.065*

İtser

Başlangıç Kümeler Log(t) Test		Birleşik Kümeler Log(t) Test				Nihai Kümeler Log(t) Test	
Küme1	1.432	Küme 1+2				Küme1	1.432
	1.437	-0.667					1.437*
Küme2	-0.197	-4.149	Küme 2+3			Küme2	-0.197
	-1.167		-1.099				-1.167*
Küme3	0.766		-8.428	Küme 3+4		Küme3	0.766
	3.176			-1.193	Küme4+5		3.176*
Küme4	0.167			-5.672	-0.487	Küme4	0.167
	0.955				-5.340		0.955*
Küme5	-0.147					Küme5	-0.147
	-0.092						-0.092*

Tablo 3 mahalli idarelerin ekonomik sınıflandırmaya göre bütçe gider kalemlerinin 2006-2019 yılları arası iller bazında kümeleme sonuçlarını göstermektedir. Buna göre personel giderleri, sosyal güvenlik kurum ödemeleri, mal ve hizmet alımları değişkenleri açısından dört farklı küme oluşurken; cari transfer, sermaye giderleri, toplam cari harcamalar ve toplam sermaye harcamaları açısından beş farklı küme oluşumu söz konusudur. Tablodan da görülebileceği üzere mal ve hizmet alımları çerçevesinde oluşan dördüncü küme ile cari transferler değişkeninde oluşan beşinci küme hariç tüm kümelerin Log(t) testi sonuçları -1,65'ten büyük bulunmuştur. Bu sonuca göre bahsedilen kümeler hariç diğer tüm kümelerin yakınsadıkları söylenebilmektedir. Ayrıca Tablo 3'te kümeler arasındaki yakınsama derecesi sıralı bir şekilde ifade edilmektedir. Daha açık bir ifadeyle; birinci kümedeki birimlere en çok yakınsayan birimler, ikinci kümede bulunmaktadır.

Kümeleme sonuçları ve kümelerin yakınsayıp yakınsamadığı bulunduktan sonra birbirine yakın kümelerin birleşik küme oluşturup oluşturmadığına bakılmaktadır. Hatalı küme oluşumunu engellemek için yapılan bu işlem sonrasında elde edilen kümeler analiz edilerek, birimler arası yakınsamanın varlığı tartışılmaktadır.

Tablo 3 incelendiğinde; sosyal güvenlik kurum ödemeleri, cari transferler ve sermaye giderleri değişkenleri ile oluşturulan kümelerin birleştiği görülmektedir. Buna göre nihai durumda sosyal güvenlik ve kurum ödemeleri ile cari transferlerde oluşan küme sayısı üç, sermaye giderlerinde oluşan küme sayısı ise dört olarak gerçekleşmiştir. Söz konusu değişkenler kapsamında elde edilen kümeleme sonuçları analiz edildiğinde; cari transferler değişkeninin üçüncü kümesi hariç tüm kümelerin t değerinin %5 güven aralığında yakınsamanın varlığını ifade eden boş hipotezin reddedilemediği sonucuna ulaşılmıştır. Personel harcamaları, mal ve hizmet alımları, toplam cari harcamalar ve toplam sermaye harcamalarının birleşik küme Log(t) testi t-değerleri -1,65 değerinden küçük olduğu için nihai küme sonuçları ile ilk küme sonuçları aynıdır.

Elde edilen bulgular ışığında her bir değişken için toplam 81 ilden oluşturulan kümeler Tablo 4'te gösterilmektedir.

Tablo: 4
Küme Yakınsama Sonuçları

Personel Giderleri
Küme 1 (3)
Edirne, İğdir, Sinop
Küme 2 (43)
Adıyaman, Ağrı, Amasya, Antalya, Artvin, Aydın, Bartın, Batman, Bayburt, Bilecik, Bingöl, Bitlis, Burdur, Düzce, Elâzığ, Erzincan, Eskişehir, Giresun, Gümüşhane, Isparta, İzmir, Karabük, Kars, Karaman, Kastamonu, Kırıkkale, Kırklareli, Kocaeli, Mersin, Muğla, Muş, Nevşehir, Niğde, Siirt, Tekirdağ, Tokat, Tunceli, Yalova, Yozgat, Van, Zonguldak, Çanakkale, Çankırı,
Küme 3 (26)
Adana, Afyonkarahisar, Aksaray, Ardahan, Balıkesir, Bolu, Bursa, Diyarbakır, Hakkâri, Hatay, İstanbul, Kayseri, Kilis, Kırşehir, Kütahya, Mardin, Osmaniye, Rize, Sakarya, Samsun, Şanlıurfa, Şırnak, Sivas, Trabzon, Uşak, Çorum
Küme 4 (9)
Ankara, Denizli, Erzurum, Gaziantep, Kahramanmaraş, Konya, Malatya, Manisa, Ordu
Sosyal Güvenlik Kurum Ödemeleri
Küme 1 (22)
Ardahan, Artvin, Aydın, Bartın, Batman, Bayburt, Edirne, Hakkâri, İğdir, Isparta, Kars, Kastamonu, Kırıkkale, Kırklareli, Muğla, Nevşehir, Osmaniye, Sinop, Tokat, Tunceli, Yozgat, Zonguldak
Küme 2 (40)
Adıyaman, Afyonkarahisar, Aksaray, Antalya, Balıkesir, Bilecik, Bingöl, Bitlis, Burdur, Diyarbakır, Düzce, Elâzığ, Erzincan, Eskişehir, Giresun, Gümüşhane, Karaman, Kırşehir, Mersin, Muş, Niğde, Rize, Siirt, Tekirdağ, Van, Yalova, Çanakkale, Adana, Ağrı, Amasya, Hatay, İzmir, Karabük, Kocaeli, Mardin, Sakarya, Şanlıurfa, Sivas, Uşak, Çorum
Küme 3 (19)
Ankara, Bolu, Bursa, Denizli, Erzurum, Gaziantep, İstanbul, Kahramanmaraş, Kayseri, Kilis, Konya, Kütahya, Malatya, Manisa, Ordu, Samsun, Şırnak, Trabzon, Çankırı
Mal ve Hizmet Alımları
Küme 1 (20)
Adana, Antalya, Aydın, Balıkesir, Burdur, Diyarbakır, Eskişehir, Hatay, Malatya, Manisa, Mardin, Mersin, Muğla, Ordu, Osmaniye, Sakarya, Şanlıurfa, Trabzon, Van, Zonguldak
Küme 2 (47)
Adıyaman, Afyonkarahisar, Amasya, Ankara, Ardahan, Artvin, Bartın, Batman, Bilecik, Bingöl, Bitlis, Bursa, Düzce, Edirne, Elâzığ, Erzincan, Erzurum, Gaziantep, Giresun, Gümüşhane, Hakkâri, Isparta, İstanbul, İzmir, Kahramanmaraş, Karabük, Karaman, Kars, Kastamonu, Kayseri, Kırıkkale, Kırklareli, Kırşehir, Kocaeli, Konya, Kütahya, Nevşehir, Samsun, Siirt, Sinop, Tekirdağ, Tokat, Yalova, Yozgat, Çanakkale, Çankırı, Çorum
Küme 3 (11)
Ağrı, Aksaray, Bayburt, Bolu, Denizli, Muş, Niğde, Şırnak, Sivas, Tunceli, Uşak
Grup 4 (3)
İğdir, Kilis, Rize

Cari Transferler
Küme 1 (70)
Adana, Afyonkarahisar, Ağrı, Aksaray, Amasya, Antalya, Artvin, Aydın, Balıkesir, Bartın, Bayburt, Bitlis, Bolu, Burdur, Bursa, Denizli, Diyarbakır, Düzce, Edirne, Elâzığ, Erzincan, Erzurum, Eskişehir, Gümüşhane, Hakkâri, Hatay, Isparta, İzmir, Kahramanmaraş, Kars, Kastamonu, Kırklareli, Kırşehir, Konya, Kütahya, Malatya, Manisa, Mardin, Mersin, Muğla, Muş, Nevşehir, Osmaniye, Rize, Sakarya, Samsun, Şanlıurfa, Siirt, Şırnak, Tekirdağ, Tokat, Trabzon, Uşak, Van, Yalova, Zonguldak, Çanakkale, Çorum
Küme 2 (8)
Ardahan, Bingöl, Karabük, Kilis, Ordu, Sinop, Sivas, Yozgat
Grup 3 (3)
İğdir, Karaman, Niğde
Sermaye Giderleri
Küme 1 (39)
Afyonkarahisar, Amasya, Ardahan, Artvin, Bartın, Bilecik, Bingöl, Bitlis, Bursa, Elâzığ, Erzincan, Erzurum, Iğdır, İstanbul, Kahramanmaraş, Karabük, Kars, Kastamonu, Kayseri, Kırşehir, Kocaeli, Konya, Niğde, Samsun, Sivas, Tunceli, Çorum, Ağrı, Aksaray, Bayburt, Bolu, Denizli, Gaziantep, Hakkâri, Kütahya, Muş, Siirt, Şırnak, Uşak
Küme 2 (30)
Adıyaman, Ankara, Antalya, Batman, Diyarbakır, Düzce, Edirne, Giresun, Gümüşhane, Hatay, Isparta, İzmir, Karaman, Kırıkkale, Kırklareli, Malatya, Manisa, Mardin, Ordu, Osmaniye, Sakarya, Şanlıurfa, Sinop, Tekirdağ, Tokat, Trabzon, Yalova, Yozgat, Çanakkale, Çankırı
Küme 3 (9)
Adana, Aydın, Balıkesir, Burdur, Eskişehir, Mersin, Muğla, Nevşehir, Zonguldak
Küme 4 (3)
Rize, Kilis, Van
Toplam Cari Harcamalar
Küme 1 (2)
Kilis, Rize
Küme 2 (12)
Adana, Aydın, Balıkesir, Burdur, Eskişehir, Kırıkkale, Mersin, Muğla, Nevşehir, Sinop, Van, Zonguldak
Küme 3 (29)
Antalya, Artvin, Batman, Bilecik, Bursa, Diyarbakır, Düzce, Edirne, Giresun, Gümüşhane, Hatay, Isparta, İstanbul, Karabük, Karaman, Kayseri, Kırklareli, Malatya, Mardin, Ordu, Osmaniye, Sakarya, Şanlıurfa, Tekirdağ, Tokat, Trabzon, Yalova, Yozgat, Çankırı
Küme 4 (36)
Adıyaman, Afyonkarahisar, Amasya, Ankara, Ardahan, Aksaray, Bartın, Bayburt, Bitlis, Bolu, Erzurum, Siirt, Şırnak, Sivas, Uşak, Çorum, Bingöl, Denizli, Elâzığ, Erzincan, Gaziantep, Iğdır, İzmir, Kahramanmaraş, Kars, Kastamonu, Kırşehir, Kocaeli, Konya, Kütahya, Manisa, Muş, Niğde, Samsun, Tunceli, Çanakkale
Küme 5 (2)
Ağrı, Hakkâri
Toplam Sermaye Harcamaları
Küme 1 (3)
Ağrı, Hakkâri, Şırnak
Küme 2 (45)
Adıyaman, Afyonkarahisar, Aksaray, Amasya, Ankara, Ardahan, Artvin, Bartın, Bayburt, Bilecik, Bingöl, Bitlis, Bolu, Bursa, Denizli, Elâzığ, Erzincan, Erzurum, Gaziantep, Hatay, Iğdır, İstanbul, Kahramanmaraş, Karabük, Kars, Kastamonu, Kayseri, Kırklareli, Kırşehir, Kocaeli, Konya, Kütahya, Manisa, Muş, Niğde, Ordu, Samsun, Siirt, Sivas, Tunceli, Uşak, Yozgat, Çanakkale, Çankırı, Çorum
Küme 3 (21)
Antalya, Batman, Diyarbakır, Düzce, Edirne, Giresun, Gümüşhane, Isparta, İzmir, Karaman, Kırıkkale, Malatya, Mardin, Osmaniye, Sakarya, Şanlıurfa, Sinop, Tekirdağ, Tokat, Trabzon, Yalova
Küme 4 (10)
Adana, Aydın, Balıkesir, Burdur, Eskişehir, Mersin, Muğla, Nevşehir, Van, Zonguldak
Küme 5 (2)
Kilis, Rize

Çalışma kapsamında ele alınan değişkenlerin 2019 yılında mahalli idare toplam harcamalarından ne kadar pay aldığını bilmek kümeler arası yakınsama yorumlarında rasyonel değerlendirmeler yapma fırsatı verecektir. Bu kapsamda 2019 yılında toplam mahalli idare harcamalarının; %14,4'ü personel giderlerine, %2,25'i sosyal güvenlik kurumlarına yapılan prim ödemelerine, %45,03'ü mal ve hizmet alım giderlerine, %4,55'i faiz giderlerine, %3,70'i cari transferlere, %27,56'sı sermaye giderlerine (doğrudan yatırımlar), %1,08'i sermaye transferlerine ve %1,69'u ise borç verme¹² alanına gitmiştir

¹² "Borç Verme: Bir mali hakka dayanan veya devletin teşebbüs mülkiyetinde hisse (sermaye) katılımına neden olan ve likidite yönetimi veya kazanç sağlama amaçları dışında kamusal amaçlarla yapılan ödemeleri kapsar. Devlet tarafından verilen krediler, alınan hisseler borç verme olarak sınıflandırılırken, KİT'lerin görev

(<https://muhasebat.hmb.gov.tr/>). Personel giderleri, sosyal güvenlik kurumlarına yapılan prim ödemeleri, mal ve hizmet alım giderleri, faiz giderleri ve cari transferler, analitik bütçe sınıflandırması¹³ çerçevesinde ve ekonomik sınıflandırmaya göre toplam cari harcamaları temsil etmektedir. İlgili oranlar toplandığında, 2019 yılında toplam mahalli idare harcamalarının %69,67'sini toplam cari harcamalar oluşturmaktadır. Söz konusu oranda belirleyici gider kategorilerinin; personel giderleri ile mal ve hizmet alımları olduğu söylenebilir. Analitik bütçe sınıflandırması çerçevesinde sermaye giderleri (doğrudan yatırımlar) ile sermaye transferlerinin birleşimi ise toplam sermaye harcamalarını ifade etmektedir. Bu doğrultuda 2019 yılında toplam mahalli idare harcamalarının %28,64'ünün toplam sermaye harcamaları alanına gittiği söylenebilir. Toplam sermaye harcamalarında ise sermaye giderlerinin (doğrudan yatırımlar) önemli bir oransal ağırlığı bulunmaktadır. Ayrıca toplam cari harcamalara ayrılan payın artması, doğal olarak toplam sermaye harcamalarının azalması anlamına gelmektedir.

Mahalli idare harcamalarının, mahalli idare türlerine göre dağılımı da oldukça önemlidir. Söz konusu öneme binaen yapılan oransal incelemede 2019 yılında toplam mahalli idare harcamalarının %74,37'sinin belediyelerce, %17,38'inin bağlı idarelerce, %6,79'unun il özel idarelerince ve %1,46'sının ise mahalli idare birliklerince gerçekleştirildiği görülmektedir¹⁴ (<https://muhasebat.hmb.gov.tr/>). İlgili oranlar değerlendirildiğinde mahalli idare birimleri arasında belediyeler ile büyükşehir belediyelerine bağlı idarelerin, toplam mahalli idare harcamalarının yaklaşık %92'sini gerçekleştirdiği sonucuna ulaşılmaktadır. Dolayısıyla söz konusu iki birime ait harcama yapısı ve değişimlerinin, il düzeyinde mahalli idare harcamaları açısından oluşan kümelenme yaklaşımlarında birinci derece etkili olduğu ifade edilmelidir. Belediyelere ait toplam harcamalar kendi içerisinde değerlendirildiğinde ise büyükşehir belediyeleri (%48,23), il ve ilçe belediyeleri (%44,81) ve büyükşehir dışı il belediyeleri (%7,06) şeklinde bir sıralama gerçekleşmektedir. Yalnızca büyükşehir belediyelerinde bulunan bağlı idareler de sürece dahil edildiğinde, belediyeler arasında büyükşehir belediyelerinin harcamalar açısından daha önemli bir konuma sahip olduğu anlaşılmaktadır.

Belediyelerin harcama yapısına detaylı biçimde bakıldığında ise 2019 yılında toplam belediye harcamalarının %72,12'si cari harcamalara, %25,96'sı sermaye harcamalarına ve %1,92'si ise borç verme alanına gitmiştir. Cari harcamalar sınıflaması altında mal ve hizmet alım giderleri (%45,58) ile personel giderlerinin (%14,21), sermaye harcamaları sınıflaması altında ise sermaye giderlerinin (doğrudan yatırımlar) daha önemli olduğu görülmektedir. Bağlı idareler incelediğinde ise 2019 yılında toplam bağlı idare harcamalarının cari harcamalara ayrılan kısmı %66,88 iken, sermaye harcamalarına ayrılan kısım %31,80'dir

zararları cari transferler içerisinde sınıflandırılmaktadır" (https://sbb.gov.tr/wp-content/uploads/2019/04/AnalitikEko_rehber_2019-2021.pdf).

¹³ Ayrıntılı bilgi için Analitik Bütçe Sınıflandırmasına İlişkin Rehber'e bakınız (https://sbb.gov.tr/wp-content/uploads/2019/04/AnalitikEkorehber_2019-2021.pdf).

¹⁴ Belediyeler ile bağlı idarelerin oransal anlamda yüksek olmasının bir diğer nedeni; Sayıştay Denetim Raporları'ndaki eleştiriler doğrultusunda Yatırım İzleme ve Koordinasyon Başkanlıkları'na ait verilerin değerlendirmeye dahil edilmemesi ve bu kapsamda 2019 yılına ait ilk üç dönem verilerinin güncellenmesidir.

(<https://muhasebat.hmb.gov.tr/>). Alt kategorilerde yine personel giderleri, mal ve hizmet alım giderleri ile sermaye giderlerinin ağırlığı bulunmaktadır.

Tablo 4 genel bir değerlendirmeye tabi tutulduğunda her küme içerisinde yer alan birimlerin ilgili değişkenin ortak trendinden benzer sapmaya sahip olduğu söylenebilir. Ayrıca oluşan kümelerden t-değeri istatistiki olarak anlamlı kümelerin birbirine yakınsadığı yorumunu yapmak da mümkündür.

Tablo 4 ayrıntılı biçimde incelediğinde ise; personel giderleri ile ilgili birinci kümede 3, ikinci kümede 43, üçüncü kümede 26 ve dördüncü kümede ise 9 il yer almıştır. Birinci kümede büyükşehir statüsüne sahip olmayan Edirne, Iğdır ve Sinop illerinin olduğu görülmektedir. Dördüncü küme ise sadece büyükşehir statüsüne sahip illerden ibarettir. Ayrıca illerin büyük kısmının ikinci ve üçüncü kümelerde yoğunlaştığı ifade edilebilir. Personel giderleri ile doğrudan bağlantısı olan sosyal güvenlik kurum ödemeleri (primleri) değişkeninde ise nihai üç küme oluşmuştur. Birinci kümede 22, ikinci kümede 40 ve üçüncü kümede 19 il bulunmaktadır. Personel giderlerinde birinci kümede yer alan Edirne, Iğdır ve Sinop'un sosyal güvenlik kurum ödemelerinde de birinci kümede yer aldığı görülmektedir. Benzer bir değerlendirmeyi personel giderlerindeki dördüncü küme ile sosyal güvenlik kurum ödemelerindeki üçüncü küme için yapmak mümkündür. Ayrıca sosyal güvenlik kurum ödemelerinde de yoğunlaşmanın yine ikinci kümede olduğu sonucuna varılmaktadır. Neticede il düzeyinde ve kümeler nezdinde oluşan benzerlikler, ilgili harcama kalemleri arasındaki doğrudan bağlantı ile açıklanabilir. Bir diğer ifadeyle; personel giderlerinde yaşanan yakınsamanın izdüşümünü, sosyal güvenlik kurum (prim) ödemelerinde de bulma imkânı vardır.

Mal ve hizmet alım giderleri alanında birbirine yakınsayan üç küme bulunmuştur. Birinci kümede 20, ikinci kümede 47 ve üçüncü kümede ise 11 il yer almaktadır. Iğdır, Kilis ve Rize illeri ise mal ve hizmet alım giderlerinde yaşanan değişimler açısından hiçbir kümeye yakınsama göstermeyerek kendi içerisinde bir grup oluşturmuştur. Birinci kümede yer alan 20 ilden 17 tanesinin büyükşehir statüsüne sahip olması dikkat çekmektedir. İkinci kümede de 12 tane büyükşehir statüsüne sahip il bulunmaktadır. Üçüncü kümede yer alan iller arasında ise büyükşehir statüsüne sahip tek il, Denizli'dir. Bu durumda mal ve hizmet alım giderleri açısından birinci kümede büyükşehir statüsüne sahip illerin, ikinci ve üçüncü kümede ise büyükşehir dışı il belediyelerinin ağırlıkta olduğu bir kümelenme durumu ortaya çıkmaktadır. Ayrıca mal ve hizmet alım giderleri alanında yoğunlaşma 47 ilden oluşan ikinci kümede gerçekleşmektedir.

2019 yılında toplam mahalli idare harcamalarının %3,70'inin gerçekleştiği cari transferler¹⁵ alanında 70 ilin, bir diğer ifadeyle toplam il sayısının %86'sının, benzer bir trend ortaya koyduğu sonucuna ulaşılmaktadır. Bu durum cari transferler açısından birinci kümede önemli bir yoğunlaşmanın olduğunu göstermektedir. Ayrıca Grup 3'te yer alan

¹⁵ "Cari nitelikli mal ve hizmet alımlarının finansmanı amacıyla yapılan karşılıksız ödemelerdir" (https://sbb.gov.tr/wp-content/uploads/2019/04/AnalitikEkorehber_2019-2021.pdf).

İğdır, Karaman ve Niğde şehirleri hiçbir kümeye yakınsama göstermemektedir. İğdır ilinin hem mal ve hizmet alımlarında hem de cari transferlerde hiçbir ile yakınsamaması, analiz sonucunda elde edilen bir diğer sonuçtur.

Sermaye giderleri (doğrudan yatırımlar); "bütçe kanunları ile belirlenmiş asgari değeri aşan ve normal ömrü bir yıldan daha uzun olan mal ve hizmet alımları" olarak ifade edilebilir. 2019 yılında toplam mahalli idare harcamalarının yaklaşık %28'inin gerçekleştiği sermaye giderleri değişkeni için nihai dört küme oluşmuş olup birinci kümede 39, ikinci kümede 30, üçüncü kümede 9 ve son kümede 3 il bulunmaktadır. İlgili verilere göre toplam il sayısının neredeyse yarısı birinci kümede, yaklaşık %86'sı ise birinci ve ikinci kümede yer alarak benzer bir eğilim göstermektedir.

2019 yılında toplam mahalli idare harcamalarının yaklaşık %70'ini oluşturan toplam cari harcamalar sınıflaması altında nihai beş kümenin oluştuğu görülmektedir. Birinci kümede yalnızca Kilis ve Rize illeri yer almaktadır. Toplam cari harcamalar açısından yoğunlaşmanın üçüncü (29 il) ve dördüncü (36 il) kümelerde gerçekleştiği söylenebilir. Beşinci ve son kümede ise sadece Ağrı ve Hakkâri illeri bulunmaktadır. Büyükşehir statüsüne sahip illerin ikinci, üçüncü ve dördüncü kümelere dağıldığı ifade edilebilir. Toplam cari harcamalar içerisinde en önemli alt kategorilerin; mal ve hizmet alım giderleri ile personel giderleri olduğu bilinmektedir. İlgili değişkenler ile toplam cari harcamalar arasında bir bağlantı kurulursa; toplam cari harcamalar açısından birinci kümede bulunan Kilis ve Rize'nin, mal ve hizmet alım giderleri açısından hiçbir kümeye yakınsama göstermeyerek kendi içerisinde bir grup oluşturduğu bilgisine ulaşılmaktadır. Toplam cari harcamalar sınıflaması altında ikinci kümede yer alan 12 ilin, mal ve hizmet alım giderleri altındaki birinci kümeyle büyük oranda tutarlılık gösterdiği ifade edilebilir. Benzeri bir yorumu her iki değişken için büyük ölçekli yoğunlaşmaların gerçekleştiği kümeler (toplam cari harcamalarda dördüncü, mal ve hizmet alımlarında ikinci kümeler) için söylemek de mümkündür. Toplam cari harcamalar sınıflaması altında oluşan kümeler ile personel giderleri alanında oluşan kümeler birlikte değerlendirilirse; mal ve hizmet alım giderlerinde olduğu gibi bir benzerliğin ortaya çıkmadığı söylenebilir. Bu durum, 2019 yılında toplam mahalli idare harcamalarından mal ve hizmet alımlarına ayrılan payın, personel giderlerine ayrılan payın üç katı olmasıyla açıklanabilir. Bir diğer ifadeyle; mal ve hizmet alımlarında yaşanan değişim ve trendler, oransal açıdan toplam cari harcamalar üzerinde daha etkilidir.

Toplam sermaye harcamaları; sermaye giderleri ve sermaye transferlerinden oluşmaktadır. Ayrıca sermaye giderlerinin toplam sermaye harcamalarında büyük bir oransal ağırlığı vardır. Bu durum iki değişken açısından gerçekleşen kümelenmeleri karşılaştırmalı olarak inceleyince net biçimde ortaya çıkmaktadır. Nitekim toplam sermaye harcamalarında yer alan ve Ağrı, Hakkâri ile Şırnak illerinden oluşan birinci kümenin olmadığı varsayımı altında, kalan ikinci, üçüncü, dördüncü ve beşinci kümelerin, sermaye giderlerinde oluşan birinci, ikinci, üçüncü ve dördüncü kümelerle büyük oranda uyum sağladığı ifade edilebilir. Özellikle her iki değişkende de oluşan son iki küme incelenirse, benzerlik daha açık biçimde görülecektir. Ayrıca toplam sermaye harcamaları açısından

büyük ölçekli kümelenmelerin, ikinci ve üçüncü kümeler çatısı altında gerçekleştiği de ifade edilmelidir.

İl düzeyinde mahalli idare harcamaları açısından gerçekleşen kümelenme sonuçları toplam cari harcamalar ve toplam sermaye harcamaları üzerinden birlikte değerlendirilse; her iki değişken içinde beş kümenin olduğu ve kümeler arası ciddi bir farklılaşmanın olduğu ifade edilebilir. Söz konusu farklılaşma özellikle ilk ve son kümeler üzerinden net biçimde görülmektedir. Örneğin toplam cari harcamalar değişkeninde çekirdek kümeyi oluşturan Kilis ve Rize, toplam sermaye harcamalarında çekirdek kümeye en uzak iller olarak kümelenme gerçekleştirmiştir. Benzer bir değerlendirmeyi toplam sermaye harcamalarında çekirdek kümeyi oluşturan Ağrı, Hakkâri ve Şırnak illeri ile toplam cari harcamalardaki ikinci küme ve toplam sermaye harcamalarındaki dördüncü küme için yapmak da mümkündür.

1982 Anayasası'nın 123. ve 127. maddelerine göre yer yönünden (coğrafi) yerinden yönetimin benimsendiği Türkiye'de, il düzeyinde mahalli idare harcamaları bazında gerçekleşen kümelenmelerde, özellikle bir mahalli idare türü olarak belediyelere ait harcama trendlerinin belirleyici olduğu söylenebilir. Harcama trendlerini ve kümelenmeleri belirleme durumu büyükşehir statüsüne sahip illerde, büyükşehir belediyelerine bağlı idareler de dahil edilince artış göstermektedir. Bu noktada öncelikle belediyeler ile bağlı idarelerin toplam mahalli idare harcamaları içerisindeki payı etkili olmaktadır. Daha sonra belediyelere ait her ilde bir yapılanmanın olması da büyük oranda önemlidir¹⁶. Çünkü 2012 yılında çıkarılan 6360 Sayılı Kanun¹⁷ ile; "büyükşehir belediye sayısı 30'a çıkarılmış, büyükşehir belediye sınırları il mülki sınırlarına çekilmiş, büyükşehirlerdeki il özel idaresi yapılanması sonlandırılmış, yeni ilçeler oluşturulmuş, büyükşehir belediyelerinin sınırları içerisindeki belde belediyeleri ve köyler kaldırılarak mahalle konumuna getirilmiş, 30 büyükşehir belediyesinde Yatırım İzleme ve Koordinasyon Başkanlığı kurulmuş ve merkezi yönetim paylarında yapılan idari düzenlemelerle tutarlı olarak değişiklikler gerçekleştirilmiştir. Bir diğer ifadeyle; büyükşehir ilçe belediyeleri ile büyükşehir belediyelerine genel bütçe vergi gelirlerinden aktarılan paylar artırılmış, büyükşehir dışı il belediyeleri ile il özel idarelerine aktarılan paylar ise azaltılmıştır" (Tekdere, 2018: 30). Gerçekleşen idari ve mali değişiklikler çerçevesinde ve güncel durumda; il özel idarelerine ait harcamalar il düzeyindeki mahalli idare harcamaları açısından 51 ilde, yatırım izleme ve koordinasyon

¹⁶ Temmuz 2021 itibarıyla Türkiye'de; 30 büyükşehir belediyesi, 519 büyükşehir ilçe belediyesi, 51 il belediyesi, 403 ilçe belediyesi, 387 belde belediyesi bulunmaktadır. Toplam belediye sayısı ise 2000 yılından beri azalış göstermektedir ve güncel durumda 1390'dır (<https://www.e-icisleri.gov.tr/Anasayfa/MulkiIdariBolumleri.aspx>, Yerel Yönetimler Genel Müdürlüğü, 2021: 13). 2020 yılına ait Mahalli İdareler Genel Faaliyet Raporu'na göre Türkiye'de; 33 bağlı idare, 699 mahalli idare birliği ve 51 il özel idaresi vardır (Yerel Yönetimler Genel Müdürlüğü, 2021: 27).

¹⁷ "On Dört İlde Büyükşehir Belediyesi ve Yirmi Yedi İlçe Kurulması ile Bazı Kanun ve Kanun Hükmünde Kararnamelerde Değişiklik Yapılmasına Dair Kanun".

başkanlıkları ise¹⁸ 30 ilde kümelenme davranışları üzerinde etkili olmaktadır¹⁹. Belediyelere ait her il, ilçe ve belde de bir idari yapılanma bulunmaktadır. Büyükşehir belediye sayısının 30'a çıkması, büyükşehir belediyelerinin sorumluluk alanının il mülki sınırı olması dolayısıyla ilgili birimlerce daha fazla harcama yapılması ve yaşanan bu değişime binaen genel bütçe vergi gelirlerinden aktarılan paylarda yaşanan değişiklikler ise öncelikle belediyelerin, daha özelde ise büyükşehir belediyeleri ile büyükşehir ilçe belediyelerinin kümelenmeler üzerindeki belirleyici etkisini artırmaktadır.

7. Sonuç ve Değerlendirme

Mahalli idareler gerçekleştirdiği harcamalarla hem buldukları illerin hem de ilgili illerde yaşayan vatandaşların refahlarını çok boyutlu biçimde ve pozitif yönde etkileyebilmektedir. Söz konusu pozitif etkileri maksimize etme yolunda ilgili idarelere ait harcamaları detaylı biçimde incelemenin, benzer gelişme eğilimine, harcama yapısına veya yasal statüye sahip illeri değerlendirme açısından önemli olduğu düşünülmektedir. Bahsedilen ilişki çerçevesinde 2006-2019 döneminde Türkiye'de il düzeyindeki mahalli idare harcamalarının, ekonomik sınıflandırma çerçevesinde ve panel yakınsama analizi ile incelemesinin gerçekleştirildiği bu çalışma; hem ekonomik sınıflandırma yöntemi ile il düzeyindeki mahalli idare harcamalarını incelemesi bakımından, hem de inceleme dönemi ve kullandığı analiz tekniği ile ilk olma özelliğine sahip, oldukça özgün bir çalışmadır.

Çalışmada Türkiye'deki 81 kente ait mahalli idare harcamaları ekonomik sınıflandırmaya göre ayrılmış ve toplam bütçe harcamaları kapsamında ekonometrik yakınsamanın varlığı araştırılmıştır. 2006-2019 arası dönem için panel veriler ile yapılan çalışmada Phillips ve Sul (2007, 2009) tarafından önerilen Log-t yakınsama testi kullanılmıştır.

Log-t testi, değişkenin ortak bir eğilimden sapmalarının panel ortalamasına yakınsayıp yakınsamadığını test etmekte ve belirli bir yakınsamaya sahip birimleri kümelere ayırmaktadır. Analizde personel giderleri, sosyal güvenlik kurum ödemeleri (primleri), mal ve hizmet alımları, cari transferler, sermaye giderleri, toplam cari harcamalar ve toplam sermaye harcamalarının, toplam bütçe harcamaları içindeki payları kullanılmıştır. Faiz harcamaları, sermaye transferleri ve borç verme değişkenleri veri eksikliği nedeniyle analize dâhil edilmemiştir.

Analiz sonuçlarına göre 81 ilde gerçekleşen mahalli idare harcamaları nezdinde personel giderleri, mal ve hizmet alımları ile sermaye giderleri açısından dört, sosyal

¹⁸ *Sayıştay Denetim Raporları'ndaki eleştiriler çerçevesinde Yatırım İzleme ve Koordinasyon Başkanlıkları'na ait veriler, 2019 yılına ait toplam verilere dahil edilmemiştir. Dolayısıyla 2019 yılı verilerinin de dahil olduğu bu çalışma özelinde gerçekleşen kümelenmelerde (sadece 2019 yılı özelinde) Yatırım İzleme ve Koordinasyon Başkanlıkları'na ait harcamaların herhangi bir belirleyici etkisi yoktur. YIKOB'ların fiili olarak faaliyette bulunduğu 2017 ve 2018 yılları, veri güncellemesi yapılmadığı için bu değerlendirmeye dahil değildir.*

¹⁹ *İdari ve mali değişikliklerin etkisi, fiili olarak uygulamaya geçtiği dönemler çerçevesinde kümelenme davranışları üzerinde etkili olmaktadır.*

güvenlik kurum ödemeleri ve cari transferler açısından üç, toplam cari harcamalar ve toplam sermaye giderleri açısından ise beş küme oluşmuştur. Mal ve hizmet alım giderlerinde Iğdır, Kilis ve Rize'nin oluşturduğu küme ile cari transferler için Iğdır, Karaman ve Niğde illerinin oluşturduğu kümelerin hiçbir kümeye yakınsama göstermediği sonucuna ulaşılmıştır. Iğdır ilinin yakınsama göstermeyen kümelerin kesişim kümesi olması dikkat çekici bir diğer durumdur.

Analiz sonucunda elde edilen bulgular genel bir değerlendirmeye tabi tutulduğunda personel harcamaları ile sosyal güvenlik ve kurum ödemeleri açısından birbirine benzer küme oluşumları gözlemlenmektedir. İki değişken arasındaki bağlantı düşünüldüğünde ortaya çıkan benzerlik, beklenen bir sonuçtur. Mal ve hizmet alımlarında çekirdek kümede yer alan illerin büyük çoğunluğunun büyükşehir belediyesi olduğu görülmüştür. Cari transferler açısından illerin %86'sı tek bir kümede yer almıştır. Diğer bir ifadeyle; mahalli idarilerin büyük bölümünün cari transferler özelinde benzer harcama eğilimi gösterdiği ve birbirlerinden ayrılmadığı sonucuna varılmıştır. Sermaye giderleri değişkeni incelendiğinde illerin yaklaşık yarısı birinci kümede, %38'i ise ikinci kümede yer almıştır. Sermaye giderleri açısından mahalli idarelerin ortak harcama eğilimi olmakla birlikte büyükşehir belediyesi olup olmama gibi belirgin bir ayrışma görülememiştir. Toplam cari harcamalar ve toplam sermaye harcamaları birlikte değerlendirildiğinde ise yakınsamanın benzer ancak kümelemenin ters yönde ayrıştığı görülmektedir. Örneğin toplam cari harcamalar açısından çekirdek kümeyi oluşturan Kilis ve Rize illeri, toplam sermaye harcamalarında çekirdek kümeye en uzak kümede yer almıştır. Benzer biçimde toplam sermaye harcamalarında birinci kümede yer alan Ağrı ve Hakkâri illeri toplam cari harcamalar kaleminde çekirdek kümeye en uzak küme olan beşinci kümede yer almaktadır. Bu durum her iki değişken özelinde oluşturulan kümelerin tamamına yansımıştır. İlgili sonucun izdüşümü olarak her iki harcama kaleminin üçüncü kümelerinin bir kesişim özelliği gösterdiği ve üçüncü kümelerde bulunan illerin ekonomik sınıflandırmaya göre yapılan harcamalar açısından birbirine en benzer iller olduğu söylenebilir.

Ayrıca mahalli idare birimleri arasında hem idari yapılanma ve son dönem mali değişiklikler, hem de toplam mahalli idare harcamaları içerisindeki pay açısından; öncelikle belediyelerin, daha özeldir ise büyükşehir belediyeleri (ve bağlı idareler) ile büyükşehir ilçe belediyelerinin kümelenmeler üzerinde daha belirleyici etki gösterdiğini ifade etmek mümkündür.

Bu çalışma; il düzeyinde mahalli idarelerin neden birbirine benzer harcama eğiliminde olduğu ya da olmadığı noktasında merkezi ve yerel düzeyde alınan kararlar, regülasyonlar, teşvikler, coğrafi veya kültürel benzerlikler ile harcama alışkanlıkları vb. değişkenler eklenerek geliştirilebilir. Söz konusu geliştirme önerileri açısından çalışmanın, bundan sonraki çalışmalara rehberlik edeceği de düşünülmektedir.

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Rasyonel Vergi Sisteminin Ölçülebilirliğine Yönelik Endeks Çalışması: Geçiş Ekonomileri Örneği¹

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Index Study on Measurability of Rational Tax System: Example of Transition Economies²

Abstract

To reach their fiscal targets, countries must establish a rational tax system. The historical heritage of the transition economies and the initial conditions were determined as a sample because they were similar, 31 countries. An equally weighted rational tax system index was developed using the data for the period 2000-2018. In addition, the index results were evaluated together with the fiscal, legal, and historical dynamics of the transition economies. According to the findings, Estonia, Kosovo, and Slovenia are in the first place among the countries that can establish this system, while Uzbekistan, Belarus, and Turkmenistan are in the last place.

Keywords : Rational Tax system, Tax Policies, Transition Economies, Index.

JEL Classification Codes : H20, P10, P20.

Öz

Ülkelerin maliye politikası hedeflerine ulaşabilmesi için önemli bir koşul rasyonel vergi sisteminin kurulmasıdır. Rasyonel vergi sistemi tesisinin incelenmesinde tarihsel mirası ve başlangıç koşullarının benzer olması nedeniyle geçiş ekonomileri önemli bir örnektir. Çalışmada, otuz bir geçiş ekonomisinde rasyonel vergi sisteminin uygulanabilirliğinin tespit edilmesi amaçlanmaktadır. Bu tespitin yapılmasında 2000-2018 dönemine ait veriler kullanılarak eşit ağırlıklandırılmış rasyonel vergi sistemi endeksi geliştirilmiş ve endeks sonuçları geçiş ekonomilerinin mali, hukuki ve tarihsel dinamikleriyle birlikte değerlendirilmiştir. Bulgulara göre bu sistemi kurabilen ülkeler arasında ilk sırada Estonya, Kosova ve Slovenya yer alırken son sırada Özbekistan, Belarus ve Türkmenistan bulunmaktadır.

Anahtar Sözcükler : Rasyonel Vergi sistemi, Vergi Politikaları, Geçiş Ekonomileri, Endeks.

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1. Giriş

Maliye literatüründe vergilerin hangi kaynaktan alınacağı veya vergileme sisteminin nasıl olması gerektiği hususu sıklıkla tartışılmıştır. Bu konuda genellikle A. Smith'in ilkelerine yer verilmekte ve ardılları tarafından genişletilerek tartışılmaya devam etmektedir. Mevcut çalışmada, bu vergileme ilkeleri kabul edilmekle birlikte rasyonel bir vergi sisteminin ne olduğu hakkında birtakım tartışmalar ve çıkarımlar, geçiş ekonomileri örneğinde, yapılmaktadır.

1991 yılında merkezden planlanan iktisadi sistemden serbest piyasa sistemine geçmeyi tercih eden ülkelere geçiş ekonomisi denilmektedir. Bu ekonomilerin en belirgin özelliği, piyasa tecrübesi olmamasıdır. Dolayısıyla serbest piyasa sistemine uygun bir vergi sistemi deneyimleri de yoktur. Bu ekonomiler için vergi, geçiş sürecinin bir finansmanı olarak görülmektedir. Ekonomilerin 1991 yılından itibaren yaptıkları reformlar da kurulacak vergi sisteminin küresel piyasalara entegrasyon çabası olarak görülmektedir.

Literatürde geçiş ekonomilerinin kuramsal yapısı, Sovyetler Birliği'nin dağılmasının ardından önem kazanmıştır. Kuramsal kapsamı ise bu ülkelerin, merkezi planlı bir ekonomiden serbest piyasa ekonomisine geçiş sürecinde izledikleri politikalar ve sonuçlarının değerlendirilmesi oluşturmaktadır. Geçiş ekonomilerinin kuramsal kapsamını büyük ölçüde Avrupa İmar ve Kalkınma Bankası (EBRD - European Bank for Reconstruction and Development), Uluslararası Para Fonu (IMF - International Monetary Fund) ve Dünya Bankası (WB - World Bank) oluşturmaktadır.

Çalışmanın ilk bölümünde rasyonel vergi sisteminin kavramsal yapısı ile ölçütleri yer almaktadır. Ardından bu ölçütler vasıtasıyla rasyonel vergi sistemi endeksi geliştirilmiştir. Bu endeks, ülkeler arası kıyaslama ve sıralama yapmaya imkân tanımaktadır. Çalışmanın son bölümünde endeksin, küresel regülatörlerin göstergeleriyle ve literatürle kıyaslaması yapılmıştır. Çalışma, sonuç bölümüyle sonlandırılmıştır.

2. Rasyonel Vergi Sistemi Kavramı

Maliye disiplinin konusu, mali olaylar olup devletlerin ortaya çıkması kadar eski bir tarihe sahiptir. Bununla birlikte ilkel toplumlarda bile kendine özgü fonksiyonları yerine getirebilmek amacıyla mali kaynaklara ve araçlara ihtiyaçların olduğu şüphesizdir. İlkel toplumlarda mal ve hizmet şeklinde olan mali araçlar modern devletlerde nakit şeklini almıştır. Ancak kamusal gelir ve giderlerde para sadece bir araç olup esas amaç para ile karşılanan mal ve hizmetlerdir. Bu açıdan vergi politikaları daha çok hedeflenen harcamaların yapılması ve amaçların gerçekleştirilmesidir. Bir diğer ifadeyle vergi, gelir politikasının değil gider politikasının bir aracı olarak görülmüştür. Dolayısıyla ilk olarak vergi, iktisadi bir fiyat olarak değil *siyasi fiyat* olarak ortaya çıkmıştır (Dikmen, 1969: 3-6). Eğer vergi bir siyasi araç haline gelmişse ve hükümet de toplumsal reform yapmak için bu aracı keyfi kullanırsa sistemin tesisi negatif etkilenecektir. Zira verginin siyasi bir araç

olarak görülmesi, dönemin vergi politikalarını tesis edecek olan merkezi gücün siyasi görüşünü de göstermektedir (Laufenburger, 1961: 258, 374-5).

Bir ülkedeki vergilerin genel yapısına ise vergi sistemi denilmektedir. Bu kavramla, toplumun ihtiyaçlarını vatandaşlardan servet veya gelirlerine karşılık istenecek tek bir vergi ile karşılamaktan ziyade, birden çok olan vergiler bütünü anlaşılır. Bu çerçevede vergi sistemi, toplumun tarihsel muhakemesi, dönemin siyasi ve sosyal yapısı ile kamunun mali ihtiyaçlarının genişliğiyle belirlenir. Ancak birkaç verginin olması, beraberinde vergi sistemini getirmez: Rasyonel bir vergileme sisteminden bahsedilmesi için vergiler arasında mantıksal bir bağ olması ve vergilemeyle beklenen mali ve mali olmayan amaçların açık olarak anlaşılması ve tartışılması gerekir (Schmölders, 1953: 111-2). Dolayısıyla vergi sistemi, birden çok verginin dağınık ve birbiriyle uyumsuz şekilde oluşturulmamasını, kurumsal yapının ve vergilerin uyum içinde olmasını ifade eder. Böyle bir uyumun oluşması tarihsel süreçte olabileceği gibi teorik bir hedefe yönelme şeklinde de ortaya çıkabilir. Bu uyumun tarihsel süreçte oluşması durumunda tarihsel vergi sistemlerinden; *ad hoc* bir biçimde gerçekleşmesi durumunda ise rasyonel vergi sistemlerinden bahsedilir.

Rasyonel bir vergi sisteminin araştırılıp ortaya çıkarılması, vergilendirme şeklinin tespiti anlamına gelmektedir. Ancak bu, vergi oranlarının ayrı ayrı tespiti anlamına gelmemektedir. Bu kapsamda vergi oranlarının yüksekliği, devletin mali ihtiyacı ile mevcut duruma ve ulaşılmak istenen yeniden dağıtımın derecesine bağlıdır. Bu sebeple, vergi oranlarının mutlak yüksekliği ve dağılımı değil, birbiriyle olan genel bağlantıları önemlidir (Haller, 1974: 311-5). Dolayısıyla rasyonel vergi sistemi, mali sistemin ilmi, akli, açık ve net şekli ibaret olup yeni düzeni karşılamayan, dağınık ve verimi düşük vergilerden temizlenmiş olan vergi düzenini ifade eder. Vergilerin özellikle gelişmekte olan/geçiş sürecindeki ekonomilerde yatırımın başlıca finansman kaynağı olduğu kabul edildiğinde iktisadi kalkınma, enflasyona başvurmadan gerçekleştirilmek istendiğinde rasyonel ve verimli bir mali sistemin oluşturulması bir zorunluluk halini almaktadır (Alaybek, 2017: 12-3, 117). Bunun yanında rasyonel vergi kavramı, A. Smith ve A. Wagner gibi öncülerinden ilkelerini de kapsar. Vergi politikalarının ölçülmüş ve bir hedefe yönelmiş olmasının yanında toplumda paydaşlarca tartışılmış olması ise rasyonel vergi sistemi için zorunludur.

Vergi sisteminin rasyonel biçimde düzenlenmesi bakımından ortaya çıkan ilk bilimsel tartışma 19. yüzyılda A. Wagner ile O.V. Bismarck arasında meydana gelmiştir: Wagner, Bismarck'ın vergi idealini; kamu gelirlerinin büyük kısmının dolaylı vergilerle karşılanması fikrini eleştirmiştir. Bu çatışma, vergi sistemlerinin zamanın devlet anlayışının ve rasyonel düşüncelerden ziyade başka esaslara dayanan maliye politikasına ilişkin irade oluşumunun ifadesidir. Bu nedenle, demokrasiden totaliter devlete doğru atılan her adımda tüketimin vergilendirmesi, artan oranlı gelir vergisine kıyasla, daha fazla önem kazanmaktadır. Vergilemenin muamele ve münferit tüketim vergilerinden oluştuğu Sovyetler Birliği örneği, böyle bir gelişimi en belirgin şekilde göstermektedir. Parlamentodaki kuvvet şartlarına göre değişen vergi mücadeleleri, verginin etkilerine ilişkin bilimsel bilgilerden bağımsız olarak vergi şekillerinin doğmasına yol açmıştır: 1901 tarihli

Prusya büyük mağazalar vergisi ve şampanya vergisi, bunun tipik örnekleridir (Schmölders, 1976: 250-3).

Verginin eşitsizliği ve adaletsizliği en aza indirebilmesi, ancak rasyonel bir vergi sisteminde mümkündür. Vergi sistemi, milli gelire dayanan ve aralarında teorik, teknik ve hukukî yönlerden sıkı bağlantılar bulunan münferit vergiler ve vergi kategorilerinin uyum ve düzen dâhilinde teşkil ettikleri mali sistemi ifade etmektedir. Rasyonel (ilmi) anlamda vergi sisteminden bahsedilmesi için sistemin belirli ilkelere dayanması, öngörülebilir ve net olması gerekmektedir (Alaybek, 1948: 3).

Diğer taraftan rasyonel esaslardan yoksun olan vergilerin belirli bir mali politikaya dayanmadıkları ve sadece hazinenin acil gelir ihtiyacını karşılama amacına yönelik oldukları da söylenebilir (Nadaroğlu, 1987: 15). Bu açıdan rasyonel vergi sisteminde vergilerin öngörülebilir ve istikrarlı olması; belirli ve istikrarlı bir maliye politikasına dayanması gerekmektedir. Vergilemenin mali amacını ifade eden böyle bir yaklaşım neticesinde yatay ve dikey adalet sağlama fonksiyonu ön planda yer almamakta; vergi yüküne sosyal devlet ilkesi çerçevesinde nispeten daha az önem verilmektedir. Ayrıca büyük miktardaki miraslarla ilgili düzenlemelerin yapılması da eşitsizliğin giderilmesi rasyonel vergileme açısından değerlendirilebilir. Toplumda eşitsizliğe neden olacak miras aktarımı, sermaye birikimini engellememesi koşuluyla, vergileme yoluyla iyileştirilmelidir (Brown, 1961: 443-7).

Rasyonel vergi politikasının bir ölçütü olarak ekonomik büyüme de dahil edilmektedir. Bu durumda çeşitli vergi sistemlerinin ekonomik kalkınmaya olan etkisinin ötesinde vergi politikasının ekonomik büyümenin gerekliliklerine uyum sağlaması önemlidir. Ancak vergi yükünün eşitliği ve adil paylaşımı gibi hususların büyümedeki yerinin ne olduğu, ülkelerin hedeflerine göre değişiklik göstermektedir (Schmölders, 2006: 198).

Rasyonel vergi sistemi genellikle uygulayıcıların formüle etmeleri kolay olmayan teorik fikirlere dayanır. Küreselleşmeyle ortaya çıkan ekonomik entegrasyon (AB üyeliği ve bunun sonucunda ortaya çıkan vergi uyumu) gibi nesnel ekonomik ve sosyal süreçlerin getirdiği değişiklikler nedeniyle içeriği yeniden yorumlanmakta ve vergi sisteminin rasyonelliği zaman içinde değişmektedir. Bu açıdan vergi ahlakı, vergi kaçırma, denetimin gevşekliği veya katılığı, vergi oranlarının yüksekliği/düşüklüğü gibi birçok faktör ve bu faktörleri inceleyen birçok çalışma aslında rasyonel vergileme sistemiyle ilişkilidir.

3. Rasyonel Vergi Sisteminin Ölçütleri

Rasyonel vergi sisteminin dayanması gereken temel ölçütler (Blakey, 1953: 74-84; Turhan, 1998: 345-357): (i) vergileme ile izlenen amaçlara uygunluk derecesi, (ii) iktisadi sisteme olan uygunluk derecesi, (iii) iktisadi, idari ve kültürel yapıya olan uygunluk derecesi ve (iv) vergi türlerinin iç düzeni olarak belirlenmiştir. Ölçütlerin belirlenmesinde, Alaybek

(1948), Neumark (1948), Blakey (1953), Haller (1974) ve Turhan (1998).’dan yararlanılmıştır.

Vergileme ile izlenen amaçlara uygunluk derecesi ölçütünde yer alan mali amaca göre vergi sistemi, vergi yükünü artırmadan kamu giderlerini finanse etmelidir. Buna göre bütçe açığı ve vergi yükü yükseldikçe rasyonel vergi sisteminden uzaklaşmaktadır. Mali olmayan amaca göre ise Gini katsayısı ve enflasyonun yükselmesi ile vergi gelirleri artarken GSYH’nin düşmesi rasyonel vergileme sistemi negatif etkilemektedir. Diğer taraftan vergilemenin iktisadi sisteme olan uygunluk derecesi ölçütüne göre toplam hasıladan kamu kesiminin aldığı pay ile dolaylı vergilerin toplam kamu gelirindeki oranı arttıkça rasyonel vergileme sisteminden uzaklaşmaktadır. Rasyonel vergi sistemindeki bir diğer ölçüt ise vergilemenin idari ve kültürel yapıya olan uygunluk derecesidir. Buna göre başta vergi idaresi olmak üzere regülatörlerin etkin; rüşvet ve yolsuzluğun ise en az düzeyde olması rasyonel vergileme sisteminin önemli unsurlarıdır. Son ölçüt ise vergi türlerinin iç düzeni ile ilgilidir. Buna göre vergi kanunlarının politik hedefler arasındaki uyumu rasyonel vergi sisteminin tesisinde gereklidir.

Rasyonel vergi endeksinin oluşturulmasında Tablo 1’de belirtilen ölçütler kullanılmıştır. Ancak belirtilen tüm ölçütlere ait verilerin elde edilememesi çalışmanın kısıtını oluşturmaktadır. Söz konusu kısıtlardan hareketle çalışmada kullanılacak rasyonel vergi sistemi ölçütleri Tablo 2’de gösterilmiştir.

Tablo: 1
Literatürde Yer Alan Rasyonel Vergi Sistemi Ölçütleri

Ölçüt	Amaçlara Uygunluk			İktisadi Sisteme Olan Uygunluk	İdari ve Kültürel Yapıya Olan Uygunluk	Vergi Türlerinin İç Düzeni
Tanım	Vergilemenin mali amacı, vergi yükü artırmadan kamu giderlerini finanse etmektir.	Vergilemenin mali olmayan amacı gelir dağılımında adaleti sağlamak ve enflasyon düşürmektir.	Vergilemenin mali olmayan bir diğer amacı ekonomik büyümeyi sağlamaktır.	Vergi sistemlerinin, serbest piyasa modeline uygunluğu piyasa ile kamu kesimi arasındaki sınırlı ilişkilidir.	İdari ve kültürel yapının geçiş sürecine olan uyumu, vergilerin mali ve mali olmayan amaçlarının finansmanını doğrudan etkilemektedir.	Vergi türlerinin iç düzeni, vergilerin birbiriyle çelişmemelerini ve politika amaçlarına olan uyumunu ifade etmektedir.
Gösterge	Bütçe Açığı ve Vergi Yükü	GINI katsayısı ve Enflasyon	Vergi Gelirleri ve GSYH	Kamu Harcamaları / GSYH, Dolaylı Vergiler / Toplam Gelirler	Dışa açıklık düzeyi, Gelişmişlik düzeyi, Vergi idaresinin etkinliği, Vergi ahlakı	Vergi kanunları ile politik hedefler arasındaki uyum

Kaynak: Alaybek (1948), Neumark (1948), Blakey (1953), Haller (1974) ve Turhan (1998).

Literatürde yer alan ölçütlerin birçok noktada kısıtları bulunmaktadır: İlk olarak, 1991 yılından itibaren verisi bulunan tek ölçüt iktisadi büyümedir. Tablo 1’de belirtilen diğer ölçütlerden kamu geliri ve gideri ile bütçe açığına dair verilerin düzensiz olması endeks geliştirilmesine imkân tanımamaktadır. Bu açıdan veriler ile ülkelerin ortak bir başlangıç noktasının tespit edilmesi gerekmektedir. Böyle bir başlangıç yılının tespitinde ise 1991 yılına en yakın 2000 yılının olabileceği; 2000 yılının başlangıç yılı olarak kabul edilmesi durumunda dahi, Sırbistan, Karadağ ve Kosova ülkelerine ait veri sorunlarıyla karşılaşmıştır.

Söz konusu kısıtlar nedeniyle, rasyonel vergi sistemi endeksinin hesaplanmasında Tablo 2’de belirtilen ölçütlerin kullanılmıştır. Bu ölçütlerden vergi yükü, enflasyon ve büyüme kavramlarının tanımı açıktır. Diğer ölçütlerden ekonomik özgürlük endeksi, geçiş ekonomilerinin serbest piyasa odaklı bir iktisadi sistemi tercih etmesi nedeniyle vergi sistemlerini doğrudan etkileyen kamu harcaması, mali sağlık, ticaret ve yatırım özgürlüğü gibi unsurları dâhil etmektedir. Diğer taraftan idari ve kültürel yapıya uygunluk derecesi yolsuzluk endeksi ile ölçülecektir. Bunun nedeni başta vergi idaresi olmak üzere regülatörlerin etkin; rüşvet ve yolsuzluğun en az düzeyde olması rasyonel vergileme sisteminin önemli bir unsurunu oluşturmasıdır. Vergilerin tahsilatının yapılamaması özellikle vergi yükünün ve bütçe açığının artmasına neden olmaktadır. Son olarak vergilerin iç düzeninin değerlendirilebilmesi amacıyla kamu etkinliği endeksi kullanılmıştır. Bu endeks, kamu hizmetinin kalitesi ve siyasi baskılardan bağımsızlığının derecesini, politika oluşturma ve uygulama kalitesini ve hükümetin bu politikalara olan bağlılığını yansıtmaktadır. Bir başka ifadeyle vergi türlerinin maliye politikası amaçlarına uygun ve bu şekilde birbiriyle çelişmemesi ancak karar alıcıların siyasi baskılardan uzak durarak; keyfi kararlar rasyonel regülasyonları uygulaması ile mümkün olacağı düşüncesine dayanmaktadır.

Tablo: 2
Çalışmada Kullanılacak Rasyonel Vergi Sistemi Ölçütleri

Kapsam	Ölçüt	Tanım	Açıklama
Mali Amaç	Vergi Yükü	Toplam gelirin, kamu kesimine aktarılan payı ifade eder.	Vergi yükünün artması, rasyonel vergi sistemini negatif etkilemektedir.
Mali Olmayan Amaç	Enflasyon	Fiyatlar genel seviyesindeki sürekli artış ifade eder.	Enflasyon oranındaki artış, rasyonel vergi sistemini negatif etkilemektedir.
Mali Olmayan Amaç	Büyüme	Bir ekonomide belirli bir dönemde üretilen mal ve hizmet miktarındaki artışın parasal ifadesidir.	Büyüme oranındaki artış, rasyonel vergi sistemini pozitif etkilemektedir.
İktisadi Sisteme Uygunluk Derecesi	Ekonomik Özgürlük Endeksi	Mülkiyet hakları, kamu bütünlüğü, vergi yükü, kamu harcaması, mali sağlık, çalışma özgürlüğü, işgücü özgürlüğü, parasal özgürlük, ticaret özgürlüğü, yatırım özgürlüğü, finansal özgürlük puanlarının toplamından oluşmaktadır.	Ekonomik özgürlükteki artış, rasyonel vergi sistemini pozitif etkilemektedir.
İdari ve Kültürel Yapıya Uygunluk Derecesi	Yolsuzluk Endeksi	Uzmanlara ve iş insanlarına göre algılanan kamu kesimi yolsuzluğunu ifade etmektedir.	Yolsuzluktaki artış, rasyonel vergi sistemini negatif etkilemektedir.
Vergilerin İç Düzeni	Kamu Etkinliği Endeksi	Kamu hizmetinin kalitesi ve siyasi baskılardan bağımsızlığının derecesi, politika oluşturma ve uygulama kalitesi ve hükümetin bu politikalara bağlılığının güvenilirliğini yansıtır.	Kamu etkinliğindeki artış, rasyonel vergi sistemini pozitif etkilemektedir.

Literatürde yer alan söz konusu ölçütlerin değerlendirilmesine imkân tanıyan veriler ise bazı ülkelerin henüz siyasi birlik sağlayamaması ve/veya verileri düzenli olarak yayınlamaması gibi gerekçelerle mevcut çalışmada kullanılamamıştır.

4. Rasyonel Vergi Sistemi Endeksi

Endeksin oluşturulmasında nicel veri analizi kapsamında nicel ölçüm kullanılmıştır. Ardından nicel veri analizine imkân tanıyan ölçüm düzeyinin belirlenmesi gerekmektedir. Ölçüm düzeyinin belirlenmesinde önemli etkisi olan kantitatif değişken türü ise sürekli değişkendir. Kantitatif değişken türünün kesikli olarak belirlenmesinin ardından ölçüm düzeyi olarak “oran düzeyinde ölçüm” tekniği kullanılacaktır. Böyle bir ölçüm tekniğinin belirlenmesinin nedeni, oranların gerçek bir sıfır değerinin olmasıdır (Neuman, 2009: 295-8).

Araştırmanın yöntemi ile ilgili bilgiler Tablo 3’te gösterilmiştir.

Tablo: 3
Araştırmanın Yöntemi

Ölçüm Yöntemi	Nicel ölçüm kapsamında özelleşmiş ölçümler: Endeks Oluşturma
Ölçüt	Alaybek (1948), Neumark (1948), Blakey (1953), Haller (1974) ve Turhan (1998) tarafından oluşturulmuştur.
Karşılıklı Dışlayıcı Özellikler	Ülkelerin tarihsel mirası ve başlangıç koşulları: Çalışmada geçiş ekonomileri, herhangi bir sınıflandırmaya tabi tutulmaması nedeniyle karşılıklı dışlayıcı özelliğe sahiptir.
Kapsayıcı Özellikler	Endeksler sadece ilgili ülkenin rasyonel vergi sisteminin hangi oranda tesis ettiğini belirttiğinden bu ilkeye ayrıklık bulunmamaktadır.
Tek Boyutluluk	Endeks için kullanılan göstergelerle sadece rasyonel vergi sistemi hakkında çıkarımlar yapılmaktadır. Bu açıdan tek bir yapıyı göstermesi nedeniyle tek boyutluluk ilkesine ayrıklık bulunmamaktadır.
Endeks	Ölçütler vasıtasıyla tarafımızca oluşturulacaktır.

Kaynak: Neuman (2009) dan yararlanarak hazırlanmıştır.

Rasyonel vergi endeksinin, bildiğimiz kadarıyla, literatürde yer almaması nedeniyle nicel veri analizi yapmayı sağlayan özelleşmiş ölçümler arasından “endeks oluşturma” metodu kullanılacaktır. Endeks oluşturma amacı, rasyonel vergi sisteminin değerlendirilmesi için gereken kapsamlı veri setlerinin yoğunlaştırmasına ve basitleştirmesine imkân tanınmasıdır.

4.1. Literatür Taraması

Literatürde rasyonel vergi sistemi kapsamında ele alınan bir niceliksel çalışma, *bildiğimiz kadarıyla*, bulunmamaktadır. Geçiş ekonomilerinin vergi sistemini inceleyen çalışmalara bakıldığında Schneider ve Enste (1999), Frey ve Torgler (2007) ile Medina ve Schneider (2017)’e göre 1991-2015 döneminde ekonomilerin kayıtdışılık ortalaması GSYH’nin %35’i kadardır. Aynı dönemde ABD’de bu oran %9’dur. 1991-2015 döneminde en yüksek kayıt dışı ekonomi %64,87 ile Gürcistan olurken %52,2 ile Azerbaycan ve %44,52 ile Belarus takip etmektedir. Diğer taraftan 1991-2015 döneminde Slovakya %16,63 ile en az kayıt dışı ekonomiye sahipken ardından %17,13 ile Çekya ve %25,19 ile Macaristan gelmektedir. Başta özelleştirme uygulamalarında rüşvet, zimmete geçirme ve eski bürokratların düşük bedelle mal edimleri bu ekonomilerin kayıt dışı ekonomilere sahip olmasına neden olmaktadır. Kayıt dışı ekonominin, vergi uygulamalarının etkisini azalttığı göz önüne alındığında rasyonel vergi sistemine de negatif etkide bulunacaktır. Bu husus Engelschalk (2005) ve Aydın (2018)’in bulgularını desteklemektedir.

Engelschalk, (2005: 27-8)’a göre geçiş ekonomisinde karmaşık vergi yasaları ve idari uygulamalar ile gönüllü vergi uyumu kültürünün bulunmaması, kayıt dışı ekonomiyi artırmaktadır. Geçiş ülkelerinde vergi ahlakının gelişimine bakıldığında, Dünya Değerler Anketi (World Values Survey) verilerine göre, bireylerin vergi kaçakçılığına güçlü şekilde karşı olmadıkları ve önemli bir kısmının dünya ortalamasının altında bir vergi ahlakına sahip oldukları görülmektedir. Merkez ve Doğu Avrupa geçiş ülkeleri arasında vergi ahlakının Sovyetler Birliği ülkelerinden daha yüksek düzeyde gerçekleştiği ve bu farkın geçiş sürecinde daha fazla arttığı görülmektedir. Bu durum, Merkez ve Doğu Avrupa ülkelerinin geçiş sürecinde devlet kurumlarını, mükellef ilişkilerini ve yeni vergi sistemini oluşturmada eski Sovyetler Birliği ülkelerine göre daha başarılı olduklarını işaret etmektedir (Turana & Yurdakulb, 2014: 137).

Yolsuzluk, kayıt dışı ekonomi, vergi kaçırma ve marjinal vergi oranının yüksekliği gibi irrasyonel vergi sistemi ile ilgili geçiş ekonomileri kapsamında Aydın (2018) tarafından yapılan çalışmada ulaşılan bulgular şu şekildedir: (i) Kamu kesimi büyüklüğü arttıkça kayıt dışı ekonomi artış göstermektedir, (ii) Özel sektör lehine regülasyonlar arttıkça kayıt dışı ekonomi azalma eğilimine girmektedir. (iii) Toplam vergi oranı ne kadar büyük olursa, kayıtsız ekonomi o kadar artmaktadır. Dolayısıyla kamu etkinliği arttıkça kayıt dışı ekonomi azalmakta ve vergilemenin başta mali amacı olmak üzere diğer unsurlar pozitif etkilenmektedir. Diğer taraftan vergi yükündeki artış işgücüne katılım oranını da azaltmaktadır.

Bununla birlikte Iwasaki ve Suzuki (2007), geçiş ekonomilerinde kamusal müdahale ile yolsuzluk arasında güçlü pozitif ilişki bulmuştur. Bunun nedeni bürokratların kişisel menfaatlerine yönelik kurumları kullanması ve yöneticilerle rüşvet ilişkisi gösterilmiştir. Bu açıdan geçiş sürecinin en önemli aktörü kamu kesimi olmuştur. Bu hususu destekler nitelikteki Guo ve Hu (2004) tarafından Çin'deki yolsuzlukla ilgili yapılan çalışmada, yolsuzluğun bir çeşidi olarak idari tekelleri (administrative monopoly) gösterilmiştir. Bu şekilde kamunun müdahalesi artmakta ve rant ekonomisi yaygınlık kazanmaktadır.

Torgler (2012) çalışmasına göre kamu kesimine, adalet sistemine ve rasyonel vergi sistemi bileşenlerinden olan kamu kalitesine güven artışı vergi ahlakını güçlü ve pozitif bir şekilde etkilemektedir. Vergi mükelleflerinin vergilerini beyan ederken kurumsal kolaylığın ve güvenilirliğin olması; vergilerin etkin harcanmasına yönelik inancı da yolsuzluğu azaltmaktadır. Shlapentokh (2013) ise hukuk kurumlarının zayıflığının yolsuzluğu artırdığı bulgusuna ulaşmıştır.

Muraközy (2010) ise kurumsal iktisatçı D. North (2005)'un yaklaşımından yola çıkarak Baltık, Balkan ve orta Doğu Avrupa ülkelerine yönelik çalışmasında da Batı Avrupa ülkelerine kıyasla birçok geçiş ekonomisinin daha zayıf performans göstermesinin nedeni olarak bu ekonomilerde gelenekler, değerler ve yazılı olmayan diğer kuralların, kurumların üzerinde güçlü bir etkisinin olması ve bu nedenle kurumların kalitesini ve verimliliğini önemli ölçüde etkilediğini ileri sürmüştür. Aynı çalışmada Kamu Tercih Kuramının paradigmasına dayanarak Sovyet döneminin baskı ve çıkar gruplarının önemli bir kısmı rejim değişikliğinden sonra da rollerini koruduğu ve birçok alanda kamu kesimiyle iç içe geçtiği ileri sürülmüştür. Bu ise paternalist anlayışa yol açarak piyasa ekonomisinin etkin işleyişini önemli ölçüde engellemiş ve yolsuzluk önlenememiştir. Benzer şekilde Zurnic (2018) ise geçiş ekonomilerinde yolsuzluğun yüksek olduğu ekonomilerde kamu müdahalelerinin de yüksek olduğunu ileri sürmüştür. Bununla birlikte, çalışmanın bulgularını destekleyecek şekilde, 2003 yılında Rusya, Orta Asya ve Kafkasya ekonomileri ile Doğu Avrupa geçiş ekonomilerinin ele alındığı OECD (2005) raporunda yolsuzlukla mücadelede İstanbul Yolsuzlukla Mücadele Eylem Planı onaylanarak ilgili ülkelerin özellikle yasal ve kurumsal regülasyonlarının hızlandırılması hususuna dikkat çekilmiştir.

Diğer taraftan Gehlbach (2008) Doğu Avrupa geçiş ülkeleri ve diğer geçiş ekonomileri arasındaki vergi sistemlerindeki farklılığı açıklamak amacıyla yaptığı analizde

Doğu Avrupa geçiş ülkelerinin geniş bir vergi tabanına sahip bir batı tarzı vergi sistemine geçtiğini ifade etmektedir. Çalışmaya göre Sovyetler Birliği'nin çöküşünden bu yana politika yapıcıların daha önce devlete ait işletmeler ve endüstrilerden vergi geliri üreten politikaları tercih ettikleri için bu durum girişimcilik/özel sektörün ortaya çıkmasına negatif etkide bulunmuştur. Böyle bir sorunun varlığı beraberinde işletmelerin sürekli olarak sübvansiyonlara güvenmesine ve ortaya çıkan yeni işletmelerin iktisadi kararlarının önemli ölçüde etkilenmesi neticesinde emek ve sermayenin optimum şekilde yeniden tahsisinin gerçekleşmemesine neden olmaktadır. Buna karşılık Doğu Avrupa geçiş ekonomileri vergi politikalarını geliştirmekte olan özel sektörün iktisadi faaliyetlerine göre tasarlamıştır. Bu ise aslında vergi idaresinin etkinsizliğini, tekelci işletmelerin piyasadaki hâkimiyetinin daha da artmasıyla fiyat mekanizmasındaki bozukluğu ve piyasanın önemli oranda kamusal karar alıcılara bağımlılığını göstermektedir. Bu gibi nedenler, geçiş sürecinde vergi sistemlerinin rasyonel bir şekilde tesis edilmemesinde büyük bir rol oynamaktadır.

Keen vd. (2006) ile Sabirianova Peter vd. (2010) Orta ve Doğu Avrupa geçiş ekonomilerinin karmaşık vergi sistemlerini daha basit vergi sistemlerin halini getirildiği ileri sürmüştür. Buradaki amaç vergi kaçakçılığının azaltılması ve ekonomik verimliliğin artırılması hedeflenmiştir. Saavedra vd. (2017) Orta ve Doğu Avrupa ülkelerindeki vergi reformlarının vergi gelirleri, vergi yapıları ve vergi uyumu üzerindeki etkisini analiz etmişlerdir. Ancak, toplanan vergi gelirleri üzerinde hiçbir etki bulamamasına rağmen, vergi reformlarının vergi sisteminin dolaylı vergilere (tüketim vergileri dâhil) doğru kaymasına yol açtığını bulmuşlardır.

Vergi idaresinin etkinliğine tahakkuk/tahsilat ilişkisini ele alarak açıklayan Turley (2006)'e göre geçiş ekonomilerinin Avrupa ülkelerine kıyasla vergi toplama etkili olmadıkları bulgusuna ulaşmıştır.

4.2. Veri Seti

Geçiş ekonomilerine ait veriler öncelikle Avrupa İmar ve Kalkınma Bankası (EBRD-European Bank for Reconstruction and Development) tarafından hazırlanan Geçiş Raporlarından (Transition Report) elde edilmiştir. Bunun yanında raporlarda yer almayan/güncel olmayan birtakım veriler Dünya Bankası ve Uluslararası Para Fonu tarafından hazırlanan verilerinden tamamlanmıştır. Veriler 2000-2018 dönemini kapsamaktadır. Çalışmada kullanılan verilerin, geçiş sürecinin başlangıcı olan 1991 yılından itibaren olması ve böylece analiz yapılması daha doğru bir sonuca ulaştıracağı açıktır. Ancak ülkelerin verilerinde düzensizlik olması ve ülkelerin veri birliğinin 2000-2018 döneminde olması çalışmada bu dönemin kullanılmasını zorunlu kılmıştır.

Çalışmada veri toplama yöntemi yazılı (belgesel) kaynaklardan tarama yöntemiyle elde edilmiştir. Örneklem açısından sosyalist ekonomik sistemden geçiş yapan ekonomilerin tamamı çalışmada değerlendirilmiştir. Bununla birlikte Kosova, Karadağ ve Sırbistan veri

yetersizliği nedeniyle istatistiksel analizde sadece verilerinin olduğu yıllar itibariyle yer almıştır.

4.3. Endeksin Belirlenmesi

Endeks oluşturabilmek için öncelikle endeksi oluşturan her bir bileşenin ağırlıklarının tespit edilmesi gerekmektedir. Söz konusu ağırlık, kullanılan bileşenin endeksteki oransal ağırlığıdır. Bu noktada endeksi oluşturan bileşenin niteliği ve büyüklüğüne göre eşit ya da farklı ağırlıklar verilmektedir. Ayrıca endeks oluşumunda verilerin dengeli olması gerekmektedir. Çalışmada bu kural gözetilmiştir. Bununla birlikte bileşenlerin görünüş geçireliliği olması gerekmektedir. Bir diğer ifadeyle ölçütlerin her birinin, vergi sistemiyle ilişkisi açık olmalıdır (Neuman, 2009: 296-299).

Bu kısımda rasyonel vergi sistemini sayısal olarak ifade edebilmek amacıyla geliştirilecek endekste kullanılan bileşenlerin ağırlıkları da belirlenecektir.

4.4. Endeks Bulguları

Endeks hesaplamasında kullanılacak ölçütlerin katsayısının farklı ağırlıkta olması için daha önce tartışılmış ve kabul edilmiş olmalıdır. Zira Neuman (2009: 298), endeks oluşturulmasında farklı ağırlıklar verilebilmesi için literatürde geniş kabul görmüş kuramsal analizlerin olması gerektiğini ve aksi belirtilmediği sürece endekslerinin eşit ağırlıklı olarak alınması gerektiğini vurgulamıştır. Literatürde bu yöntemi kullanan birçok çalışma olmakla birlikte Falcetti vd. (2006), Boulanger (2014), Becker (2017) ve Schanz vd. (2017) tarafından yapılan çalışmalar örnek gösterilebilir.

Eşit ağırlıklı endeks, her bir bağımsız değişkene eşit ağırlık vermeyi ifade etmektedir. Bağımsız değişkenleri değiştirmeden her birini 1 ile ya da negatif değişkenler için -1 ile çarpmış gibi toplamayı gerektirmektedir (Neuman, 2009: 299). Çalışmada kullanılan eşit ağırlıklı formül şöyledir:

$$\text{Rasyonel Vergi Sistemi Endeksi} = (-1)\text{vergi yükü} + (-1)\text{enflasyon} + (+1)\text{büyüme} + (-1)\text{yolsuzluk} + (+1)\text{kamu etkinliği} + (+1)\text{ekonomik özgürlük} \quad (1)$$

Denklemden vergi yükü (tb), enflasyon (inf) ve yolsuzluk (crp) değişkenlerinin -1 ile çarpılmasının nedeni, bu değişkenlerin büyüdükçe vergi sisteminin rasyonelliğini azaltmasıdır. Benzer şekilde büyüme (gr), kamu etkinliği (pe) ve ekonomik özgürlük (ef) değişkenlerinin +1 ile çarpılmasının nedeni, bu değişkenlerin büyüdükçe vergi sisteminin rasyonelliğini artırmasıdır.

Bu endeksin geliştirilmesinde şöyle bir yol izlenmiştir: Öncelikle bir yıla ait rasyonel vergi endeksi (RTI_y), ilgili yıla ait (y) ölçütü (K_y), ilgili yılın ölçütleri toplamına bölünmektedir ($\sum K_y$). Ölçütlerin toplamı her bir ülkede veya aynı ülkenin her bir yılında farklı olduğu için ölçütlerin yüzde şeklinde ifade edilmesi gerekmektedir. Bu nedenle söz

konusu oran $(\frac{K_y}{\sum K_y} \times 100)$ ile çarpılarak tüm ölçütlerin toplamının 100 olması ve yüz üzerinden değerlendirilmesi sağlanmaktadır. Böylece vergi sistemindeki yüzde ağırlıkları bulunan ölçütler, rasyonel vergi sisteminin negatif etkileyen ölçütlerden çıkartılarak $(\frac{K_y}{\sum K_y} \times 100 - NK)$ yıllık rasyonel vergi endeksi bulunmuştur.

$$RTI_y = \frac{K_y}{\sum K_y} \times 100 - NK \quad (2)$$

Yıllık rasyonel vergi endeksi bulunmasının ardından aritmetik ortalamayla ilgili ülkeye ait dönemsel rasyonel vergi endeksi bulunmuştur. Bir diğer ifadeyle 2000-2018 dönemi rasyonel vergi endeksi (RVE_D) yukarıda yıllık bazda bulunan rasyonel vergi endekslerinin toplanarak ($\sum RVE_y$) dönemde yer alan toplam yıl sayısına ($\sum Y$) bölünmesiyle elde edilmiştir.

$$RTI_D = \frac{\sum RTI_y}{\sum Y} \quad (3)$$

Bu şekilde hesaplanan endeks, Neuman (2009:299) ve tarafından belirtilen ve EBRD gibi küresel regülatörler tarafından kullanılan eşit ağırlıklı endeks oluşturma yöntemine uygundur.

Yukarıda belirtilen eşit ağırlıklı endeks hesaplamasının 2000-2018 dönem ortalaması ve geçiş ekonomileri arasındaki sıralaması aşağıda gösterilmiştir.

Tablo: 4
Ülkelerin Eşit Ağırlıklı Endeks Sonuçları

Ülkeler	Eşit Ağırlıklı Endeks	Sıralama	Ülkeler	Eşit Ağırlıklı Endeks	Sıralama
Estonya	72,89	1	Makedonya	57,27	17
Kosova	70,79	2	Romanya	55,22	18
Slovenya	69,05	3	Arnavutluk	54,20	19
Litvanya	67,96	4	Moğolistan	53,47	20
Çekya	67,32	5	Kazakistan	49,81	21
Karadağ	66,35	6	Azerbaycan	49,66	22
Polonya	65,20	7	Moldova	49,40	23
Slovakya	65,09	8	Kırgızistan	47,39	24
Letonya	64,97	9	Rusya	47,23	25
Macaristan	64,21	10	Bosna-Hersek	47,07	26
Sırbistan	62,18	11	Ukrayna	41,97	27
Hırvatistan	60,06	12	Tacikistan	40,59	28
Bulgaristan	59,38	13	Türkmenistan	38,62	29
Çin	59,29	14	Belarus	38,43	30
Gürcistan	58,73	15	Özbekistan	38,01	31
Ermenistan	57,79	16			

Eşit ağırlıklı endeks sonuçlarına göre, genel olarak, Baltık, Balkan ve Doğu Avrupa bölgelerinin üst sıralarda olduğu görülmektedir. Çin Halk Cumhuriyeti, Gürcistan ve Ermenistan'ın pozitif ayrışmasının dışında Asya bölgesinin ise rasyonel vergi sistemi endeksleri oldukça düşüktür.

4.5. Bulguların Değerlendirilmesi

Bu kısımda nitel veri analizi yardımıyla elde edilen verilerin endeks oluşturma ile analizinin yapılması sonucunda elde edilen bulgular, ikinci bölümde oluşturulan kuramsal çerçeve doğrultusunda değerlendirilecektir. Ek olarak geçiş ekonomilerinin rasyonel vergi sistemini tesis etmesine yönelik mevcut durumu etkileyen saikler ortaya konulacaktır.

Bulguların değerlendirilmesinde, rasyonel vergi sistemi ölçütleri esas alınacaktır. Bunun nedeni bulguların rasyonel vergi sistemi açısından ne ifade ettiğini ortaya koymaktır. Ancak ölçütler arasında geçişkenliğin fazla olması nedeniyle değerlendirmeler katı bir ayrıma tabi tutulmamış; bir bütün içinde değerlendirilmiştir.

4.5.1. Vergileme ile İzlenen Amaçlara Uygunluk Derecesi

Önceki bölümlerde ifade edildiği gibi Sovyetler Birliği'nin ve diğer sosyalist ekonomilerin dağılmasından ve iktisadi sistemlerinin sosyalizmden piyasa sistemine dönüşümünün ardından bu ülkelerin kamu politikaları da değişmiştir. Bu değişimin öznel ve nesnel kuramsal dayanağı üçüncü bölümde açıklanmıştır. Geçiş ekonomilerinin Avrupa piyasasına yakınlığı ve entegrasyonu ile bürokratların geçiş sürecine olan desteği ve serbest piyasa ekonomisine yönelik bilinci gibi nedenler bu ülkelerin dönüşümünü ve istikrarını belirlemede önemli bir etken olmuştur.

Geçiş ekonomilerinin başlangıç koşullarındaki farklılıklarının neden olduğu vergileme ile izlenen amaçlara uygunluk derecesine yönelik çalışmalardan Purfield (2003), geçiş ekonomilerinin başlangıç reformlarında ele alınan sıkı maliye politikalarına yönelik reformların düşük enflasyon beklentisine neden olduğunu ve bunun da nominal faiz oranlarını düşürdüğünü ifade etmektedir. Ancak ilerleyen dönemde reformlara yönelik izlenen politikaların kamu açıklarını ve beraberinde faiz oranlarını artırdığını; bunun bir sonucu olarak faiz ödemelerinin bütçede önemli bir gider kalemi olduğunu ifade etmiştir. Bunun bir sonucu olarak geçiş ekonomileri, Gevorkyan (2012)'a göre artan kamu harcamalarını telafi edebilmek amacıyla vergi gelirlerinin artırılması yoluna gitmişlerdir. Özellikle doğal kaynak ihracatından kaynaklanan vergi gelirleri, istikrarsız bir mali yapıya neden olsa da vergilendirmenin mali amacında önemli bir rol oynamıştır. Ancak geçiş sürecinin başlangıcındaki kamu regülasyonlarının oldukça fazla olması yolsuzluk, rant kollama ve kayıt dışı ekonomi gibi önemli sorunlara da yol açmıştır (Turan, 2007: 25-6). Alam ve Sundberg (2002), Orta Asya ve Kafkasya ile Doğu Avrupa ülkelerinin maliye politikalarından sorumlu kurumların yetersizliğinin, bu geçiş sürecinin önemli belirleyicilerinden olduğunu ileri sürmüştür.

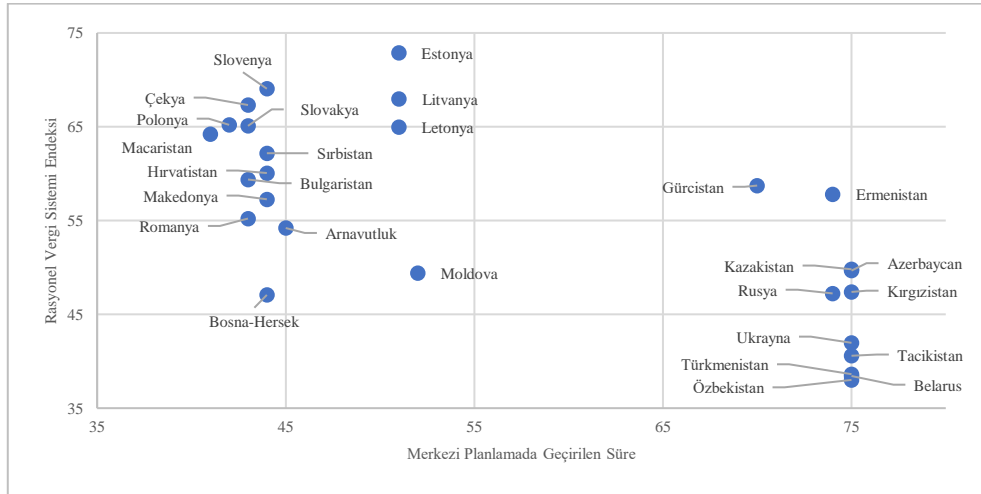
Geçiş sürecinde merkezi planlı sistemin kurumsal mekanizmalarını terk etmek kolay olmamıştır. Geçiş sürecine yönelik alınan kararlar ülkelerin tarihsel mirasıyla kısmen ilişkili olduğu görülmektedir. Geçiş sürecinin başlangıcında makroekonomik istikrarsızlık yaşayan ülkeler, rasyonel vergi sistemini tesis etmede günümüzde de zorluk yaşamaktadır. Geçiş sürecinin uzunluğunu resesyon açısından ele alan Mickiewicz (2005: 13)'e göre Moldova

ve Ukrayna en uzun geçiş sürecine sahip olup 10 yılda tamamlamış; ardından Rusya ve Türkmenistan 9 yıl; Bulgaristan ve Tacikistan 8 yıl, Azerbaycan, Kazakistan, Makedonya 7 yıl, Belarus, Bosna-Hersek, Estonya, Gürcistan 6 yıl ve son olarak Hırvatistan, Kırgızistan, Letonya, Özbekistan ve Sırbistan 5 yıl süre sonunda geçiş sürecinin resesyona etkilerini sonlandırmışlardır. Geçiş sürecinin neden olduğu resesyona etkilerini en hızlı şekilde tamamlayan ülke ise 2 yıl ile Polonya olmuştur.

Resesyona bu etkisinin ülkelerin merkezi planlı bir ekonomide geçirdiği süreyle olan ilişkisi geçiş ekonomilerinin başlangıç koşullarının farklılığıyla ilgilidir. Mevcut çalışmada ortaya konan rasyonel vergi sistemi endeksinde tarihsel miras³ daha katı bir merkezi plana dayanan ve SSCB ile daha yakın ilişki kuran ekonomilerin nispeten düşük puanlarda kaldığı bulgusuna ulaşılmıştır. Mevcut çalışmadaki bu bulgu ile Mickiewicz (2005: 13) çalışmasında resesyona etkileyen açıklayıcı değişken olarak ele alınan sosyalist yönetimde geçirdikleri süreye dair veriler, Şekil 1'de rasyonel vergi endeksi ile ilişkilendirilmiştir.

Şekilde yatay ekseninde sosyalist yönetimde geçirilen süre, dikey ekseninde ise rasyonel vergi sistemi endeksi yer almaktadır.

Şekil: 1
Tarihsel Miras ve Rasyonel Vergi Sistemi Endeksi



³ Belirtilen çalışmalarda tarihsel miras ile merkezi planlı yapının sosyal, siyasi ve iktisadi özelliklerinden etkilenme ve bunların benimsenme düzeyi kastedilmektedir. Ancak bu etkilerin ölçülebilmesi/somutlaştırılması amacıyla "merkezi planlamada geçirilen süre" ölçütünü esas almışlardır. (Kaufmann & Siegelbaum, 1997: 446).

Çalışmanın kuramsal çerçevesinde değinilen tarihsel miras ile rasyonel vergi sistemi endeksi arasındaki ilişki Şekil 1’de gösterilmiştir. Bulgulara uygun bir şekilde, rasyonel vergi sistemi endeksi düşük olan ülkeler aynı zamanda merkezi planlı ekonomide daha fazla bulunan ülkelerdir. Ancak ülkelerin makroekonomik yapısının ele alındığı üçüncü bölümde açıklanan, iç savaş ve diğer siyasi istikrarsızlıkları olan ve bu nedenle siyasi birliğini tesis etmede oldukça geç kalan Bosna-Hersek ve mali gücü zayıf olan Arnavutluk gibi ekonomiler bu ilişkideki istisnaları oluşturmaktadır. Benzer şekilde de Melo vd. (1996) tarafından yapılan çalışmada geçiş ekonomilerinin tarihsel miraslarının farklılaştığını, geçiş sürecinden itibaren uyguladıkları başlangıç reformlarının birbirine benzer olduğunu ancak tarihsel miraslarının liberalizasyon politikalarına da yansıdığını ileri sürmüştür. Ek olarak de Gelb vd. (1999)’ göre başlangıç koşulları ile iç savaş veya bölgesel siyasi ve askeri gerilimler, serbest piyasanın tesisini ve diğer reformları doğrudan etkilemektedir. Buna göre Belarus ve Özbekistan politik dönüşümün ve ekonomik liberalizasyonu nispeten daha yavaş ilerlediği ülkeler olurken Moğolistan ve Kırgızistan ise başlangıç koşulları dikkate alındığında beklenenden daha hızlı bir şekilde reform yapmış; Bulgaristan ve Romanya daha yavaş ve Çekya ise ortalama bir hızla geçiş sürecine girdiği ifade edilmektedir.

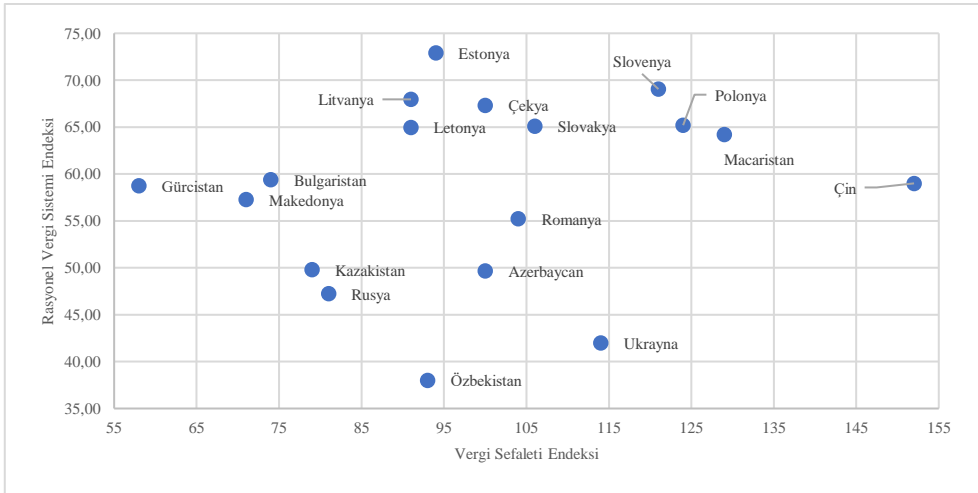
Diğer taraftan geçiş ekonomilerinin en önemli aktörlerinden olan Rusya’nın geçiş döneminin batılı anlamda bir modernizasyon sürecine sahip olmasına yönelik Mau ve Drobyshevskaya (2012) tarafından yapılan çalışmada, öncelikle işgücü verimliliğinin düşük olduğu dönemlerde askeri anlamda önemli ilerlemeler yaşandığı ifade edilmektedir. Rusya’da sektörel kapsamdaki böyle bir dengesizliğe ek olarak iktisadi gelişmede de benzer bir süreç yaşanmıştır. Buna göre istikrarlı politikaların yokluğu ile iktisadi planlama sürecinin çoğunlukla askeri hedefler etrafında belirlendiği ileri sürülmektedir: 18. yüzyılda metalürji, ardından demiryolu taşımacılığı ve günümüzde uzay araştırmaları gibi hedeflerin esasında kalkınma politikalarından ziyade askeri hedefler çerçevesinde belirlenmiştir. McGee (2008a)’in bulgusuna göre ise geçiş ekonomilerinden vergi kanunlarına uyum sürelerinin en fazla Orta Asya, Kafkasya ve Doğu Avrupa ülkelerinde olduğu; en az ise Baltık ülkelerinde olduğu sonucuna ulaşmıştır.

Geçiş sürecinden itibaren makroekonomik istikrarı nispeten sağlamaya başlayan ülkeler Baltık Ülkeleri (Litvanya, Letonya ve Estonya) olmuştur. Baltık ülkelerinin Avrupa’ya yakınlığı, tarihsel ve kültürel olarak Avrupa’ya daha fazla bağlılığı, Sovyetler Birliği içerisine daha geç (ikinci dünya savaşından sonra) katılmaları gibi önemli etkenler diğer geçiş ekonomilerinden bu şekilde farklılaşmasına neden olmuştur. Ekonomik bağlantılar açısından daha serbest olan, sanayisi ve diğer sektörleri kendisine bağlı olarak kurulmuş ya da kalmış olan Baltık ülkelerinin bağımsızlığını ilan etmesi, nispeten daha kolay olmuştur. Benzer nedenlerden dolayı bu ülkelerde ideolojik sahiplenme de olamamıştır (Ramazanoğlu & Arnold, 2006: 12-13). Çalışmada ele alınan Orta Asya ve Kafkasya, Doğu Avrupa ve Balkan ülkeleri ise Sovyet politikalarından daha yoğun etkilenmiş ve kültürel bağların da etkisiyle geçiş sürecinde sosyal, siyasi ve iktisadi krizlerle mücadele etmiştir.

Geçiş ekonomilerinin rasyonel bir vergi sistemini oluşturmasında önemli etkenlerden biri de AB'ye üyelik hedefidir. Özellikle doğrudan yabancı yatırımlar gibi serbest piyasanın rekabetçi tarafını öne çıkaran vergi teşvikleri gibi uygulamalar AB'ye aday olmanın önemli bir ölçütüdür. Ancak böyle bir vergi politikası, serbest piyasanın işleyişini negatif etkilemektedir: Geçiş ekonomilerinde vergi teşvikleri, piyasa denge fiyatının ve rekabetinin yerine geçerek maliye politikasının karar alıcılarına daha bağımlı hale gelmesine neden olmaktadır. Bu kapsamda Dabrowski ve Tomczynska (2001: 33) tarafından yapılan çalışmada, Baltık ülkeleri vergi sistemlerini AB ülkeleriyle uyumlaştırmada önemli ilerlemeler kaydederken Orta Asya ve Kafkasya ile Doğu Avrupa ülkeleri bu alanda istikrarsızlığa maruz kalmaktadır. Balkan ülkeleri ise bu iki grup arasında kalmaktadır. Bu nedenle Rusya dâhil olmak üzere Orta Asya, Kafkasya ve Doğu Avrupa ülkelerinde vergi sisteminin ve idaresinin tesisi, özellikle Rusya'da mali federalizm gibi vergi reformlarının yapılmasını gerektirmiştir. Ancak, Bulgaristan, Gürcistan, Ermenistan ve Kazakistan gibi, sosyal devlet anlayışı sınırlı olan ülkeler teorik olarak Orta Avrupa komşularına kıyasla daha rekabetçi vergi sistemlerine sahip olmuştur.

Rasyonel vergi sistemini etkileyen bir diğer husus ise marjinal vergi oranlarının yüksekliği kapsamında vergi sefaletinin yüksek olduğu ekonomilerin, rasyonel vergi sistemlerini tesis etmede nispeten başarısız olduğudur.

Şekil: 2
Vergi Sefaleti ve Rasyonel Vergi Sistemi Endeksi



Kaynak: Andersen (2008).

Forbes tarafından hazırlanan ve 2008 yılı verilerine ulaşılan Vergi Sefaleti Endeksi (Tax Misery Index), geçiş ekonomilerinin göreceli vergi yükünü karşılaştırmayı mümkün kılan bir değişken olarak, mevcut bulgularımızı destekler niteliktedir. Buna göre özellikle geçiş ekonomisi olan AB üyesi ülkeler, geçiş ekonomisi olup AB üyesi olmayan

ekonomilerden daha az vergi sefaletine sahip olduğu görülmektedir. Bu kapsamda vergi sefaletinde yüksek sıralarda olan ülkeler rekabete yönelik piyasa tesisinde zorluk yaşamaktadır.

Vergi sefaleti endeksi marjinal vergi yükü kapsamında kurumlar vergisi, gelir vergisi, servet vergileri, sosyal güvenlik vergilerinin işveren ve işçi payı ve dolaylı vergilerden oluşmaktadır. McGee (2008b) ve Kastan ve Machova (2010) tarafından ele alınan bu hususta endeks, söz konusu vergilerin nasıl değerlendirildiğini göstermediği için eleştirilmektedir. Bir diğer ifadeyle kamu kaynak tahsisinde etkinliği sağlamasına yönelik herhangi bir fikir vermemektedir. Bu eleştiri, Baltık ülkelerinin tablodaki yerine bakılarak da kabul edilebilir. Ancak vergi politikalarını belirlemede tamamlayıcı bir gösterge olan vergi sefaleti endeksine göre Estonya, Litvanya ve Letonya gibi Baltık ekonomileri geçiş ekonomileri arasında ilk sıralarda mali performansla sahip olsa da vergi sefaleti endeksinde nispeten negatif bir görünüme sahiptir. Vergi sefaletinde ilk sırada yer alan ve rasyonel vergi sistemi endeksinde ortalamanın üstünde olan Gürcistan ise Dünya Bankası'nın 2019 yılı İş Yapma Endeksi (Doing Business)'nde 6.sırada yer alan ve düşük vergi oranları ile düşük ücretler gibi nedenlerden dolayı ilk sırada yer almaktadır. Rasyonel vergi sistemi endeksinde ortalamanın üstünde yer alan Çin ise vergi sefaleti endeksinde son sırada yer almaktadır. Kurumlar vergisi oranı %45 ve Gelir vergisi oranı %25 Çin'de, vergi oranları diğer geçiş ekonomilerinden oldukça fazladır.

Bulguların, vergileme ile izlenen mali ve mali olmayan amaçlara uygunluk derecesi kapsamında değerlendirilmesinde ilk olarak tarihsel mirasın yoğun olduğu ekonomilerin geçiş sürecinde izlediği maliye politikalarında nispeten başarısız oldukları vurgulanmıştır. Orta Asya ve Kafkasya ülkeleri ile Doğu Avrupa ülkelerinden Ukrayna ve Belarus Sovyetler Birliği'nde uzun süre bulunmuş ve rasyonel vergi sistemi endeksinde de son sıralarda yer almıştır. Bunun yanında Bosna-Hersek, Moldova, Romanya ve Arnavutluk gibi ekonomiler ise merkezi planlamadan daha kısa sürede uzaklaşmış olsa da siyasi ve bölgesel istikrarsızlıklar ile kurumların rekabet odaklı gelişmemesi gibi etkenler nedeniyle üst sıralarda yer alamadıkları söylenebilir. Diğer taraftan bölgesel olarak ele alınan her ülke benzer bir süreçten geçmeyip geçiş reformlarıyla farklı bir yöne doğru ilerlemişlerdir. Özellikle Orta Asya bölgesinden önemli oranda farklılaşan Gürcistan'ın AB'ye üyelik motivasyonunun yüksek olması, vergi teşviklerinin yaygınlığına da yansımaktadır. Bu açıdan Gürcistan, geçiş ülkeleri arasında rasyonel vergi sistemi ortalamasının üstünde bulunan tek Orta Asya ülkesi olarak dikkat çekmektedir. Diğer taraftan Baltık ülkelerinin vergi sefaleti endeksinde orta sıralarda yer almasını, çalışmanın bulgularından olan yolsuzluk, kamu etkinliği ve ekonomik özgürlük endeksleriyle birlikte değerlendirilmesi gerekmektedir. Buna göre Baltık ekonomileri söz konusu endekslerin tümünde ilk sırada yer almakta; kamu gelirlerinin tahsisinde etkinliğin nispeten sağlandığı sonucuna bu haliyle ulaşılabilir.

4.5.2. İktisadi Sisteme Uygunluk Derecesi

Maliye literatüründe cebri olmayan kamu geliri sınıflandırılmasında yer alan özelleştirme gelirleri aynı zamanda geçiş ekonomileri için geçiş sürecinin önemli bir finansman kaynağıdır. Bunun yanında özelleştirme gelirleri vergileme ile izlenen amaçlara ve iktisadi sisteme olan uygunluk ile değerlendirilmesi gerekmektedir. Dolayısıyla geçiş ekonomilerinin ortak politikalarından olan özelleştirme süreci, ülkelerin özelleştirme politikalarına bakış açısının farklılığı nedeniyle ortak sonuçlara neden olmamaktadır.

Mali tekelin yerine özel sektörün geçmeye başladığı geçiş döneminde izlenen maliye politikası olarak özelleştirmeler önemli bir göstergedir. Merkezden planlanan ekonomilerin geçiş sürecinin en önemli finansmanlarından biri özelleştirmelerden elde ettikleri gelirlerdir. Serbest piyasaya geçiş sürecinde görülen yaygın politikalardan olan özelleştirmeler, dönüşümün bir finansmanı olarak önemli bir cebri olmayan kamu geliri olmuştur. Ancak özelleştirme politikaları serbest piyasa ekonomisinin önemli unsurlarından olan rekabeti teşvik ve özel sektörün sermaye birikimi amacıyla gelişimini desteklemek hedefiyle yürütülmesi gerekmektedir. Ancak bu hedef, merkezi bütçe açığını azaltma, eski bürokratların (içeridekiler) özelleştirilen kamu varlıklarını satın almasını önleme veya rekabeti artırmakla birlikte sektörel yeniden yapılanmanın da engellenmesi gibi farklı kapsamlarda değerlendirilmesi gerekmektedir. Bu açıdan özelleştirme politikalarının başarısı daha geniş kapsamlı değerlendirilmesi gerekmektedir.

Özelleştirmenin ekonomik büyümeyi iyileştirmesinin yanında yeni girişimcilerin veya yeni sektörlerin de ortaya çıkmasına katkıda bulunmaktadır. Dünya Bankasının (2002) raporuna göre yeni küçük işletmeler satış, ihracat, yatırım ve istihdam alanlarında eski büyük özel veya kamu işletmelerinden daha iyi performans göstermektedir. Emek verimliliği konusunda ise söz konusu yeni işletmelerin geride kaldığı ileri sürülmektedir. Ancak özel sektörün genişlemesi ile özelleştirme başarısı bu noktada farklılık arz etmektedir. Birçok özelleştirme hareketi geçiş sürecinden bu yana yaşansa da geçiş ekonomilerinin önemli bir kısmında kamu kesimi etkin bir rol oynamaya devam etmektedir. Bu açıdan geçiş sürecinde özelleştirme politikalarına kıyasla kamu ve özel sektör işletmelerin etkin yönetimi daha önemlidir (Andreff, 2003: 31). Nitekim Hayek vd. (1935), optimal planlamanın mümkün olmadığını ileri sürmekteyken Lange (1936) bu durumu iktisadi hayatın bürokratikleşmesi olarak ifade etmektedir. Dolayısıyla özelleştirme politikaları rasyonel vergi sisteminin önemli unsurlarından olan iktisadi sisteme uygunluk kapsamında bir rekabet yarattığı hususu önem taşımaktadır (Nivet, 2003: 97-100).

Kaufmann ve Siegelbaum (1997: 447), Rusya ve benzer durumlardaki ülkelerde özelleştirmelerin yakın siyasi parti çevrelerine yapılmasının kamu maliyesi açısından sorunlarına değinmektedir. Bu ülkelerde özelleştirilen kamu kurumunun yeni sahibinin siyasi partinin ajanı olmaya devam ettiğini ve böylece baskı ve çıkar grubu olma özelliğini kaybederek siyasi partinin gücünü azaltamayacağını ifade etmektedir. Ancak özelleştirmenin makroekonomi üzerindeki etkisi ise pozitif olmuştur. Kamu işletmelerinde sübvansiyonların azalması ve sübvansiyon alan kurumların siyasi parti yetkililerine rüşvet

verme gibi eğilimlerin azaldığı görülmektedir. Diğer taraftan Crivelli (2013: 219) tarafından yapılan 1991-2010 döneminde 29 geçiş ülkesini ele alan çalışmada özelleştirme ve yatırımların teşviki ile bazı sektörlerde vergi indirimleri sağlandığından vergi tabanı ve tahsilatının azaldığını ifade etmektedir. Bir diğer ifadeyle özelleştirme sonucu özel sektör teşviklerinden yararlanmaya başlayan işletmeler, vergi teşviklerinden yararlanmaya başlamaktadır. Böylece vergi tabanı zayıflamakta ve vergi teşvikleri neticesinde vergi tahsilatı azalmaktadır. Ancak böyle bir sonuç Gordon (2001)'e göre kurumlar vergisi oranı yüksek olan ekonomilerde kamu işletmelerinin varlığı vergi tahsilatını artıracak; vergi oranları nispeten düştüğünde ise özelleştirilmelerin yapılması, vergi tahsilatını artıracığını ifade etmektedir. Bunun nedeni firmaların vergi öncesi karını değil vergi sonrası karını maksimize etmeye yönelmesidir.

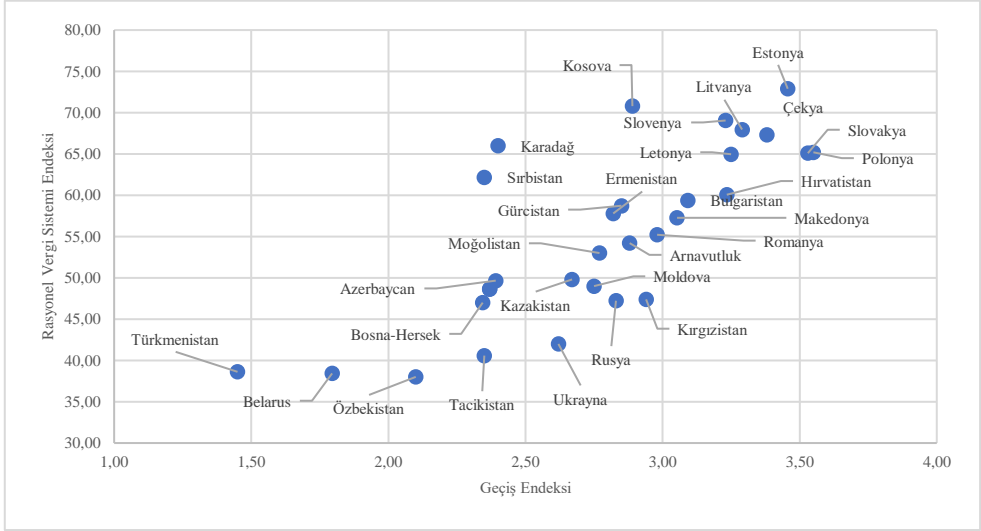
Stankovsky (1998); Neuhaus, (2006) ile Gezdim ve Zortuk (2018) tarafından geçiş ekonomileri açısından özelleştirmelerin devamı olarak doğrudan yabancı yatırımların söz konusu iktisadi ve politik koşulları da iyileştirildiği öne sürülmektedir. Buradaki artış beraberinde şeffaflık ve kurumsallık artışını da getirmektedir. Ek olarak merkezi bütçe vergi gelirlerinin de önemli kaynaklar olduğu ifade edilmektedir. Benzer şekilde Mickiewicz (2010) tarafından geçiş ekonomileri için fiyat liberalizasyonuna yönelik yapılan çalışmada, fiyat serbestleştirilmesi merkezi bütçe üzerinde pozitif bir etkiye neden olduğunu ileri sürmüştür.

Geçiş ekonomilerinde gelir eşitsizliğini ele alan Aristei ve Perugini (2015) tarafından yapılan çalışmada fiyat liberalizasyonu ve özelleştirme politikasına rekabet politikası da uyum içinde olması halinde gelir eşitsizliğinde azalmanın olacağı belirtilmiştir.

Özelleştirme politikalarının yukarıda bahsedilenlerin yanı sıra özelleştirme tek başına bir başarı olarak görülmemektedir. Vergi kaçırma başta olmak üzere geçiş ekonomilerinde yolsuzluk, geçiş sonrası daha mümkün hale geldiği öne sürülmektedir. Geçiş ekonomilerinin vergi devletleri olmasından ziyade mülk sahibi devletler olduğu göz önüne alındığında, vergilerin mali amacı aslında tüm amaçların da bir finansmanı olarak yer aldığı söylenebilir. Bu kapsamda vergi kaçırma ve yolsuzluk gibi unsurlar geçiş sonrası özelleştirmelerin yaygınlaşması neticesinde artmıştır (Aage, 1997: 19).

Şekil 3'te yukarıda bahsedilenler ile rasyonel vergi endeksi bulgularımızın değerlendirilmesine imkân tanıyan geçiş endekslerinin ortalamalarına yer verilmiştir. EBRD tarafından yayımlanan geçiş endeksleri 1989-2014 yıllarını kapsamaktadır. Bu endeksin bileşenleri büyük ve küçük ölçekli özelleştirmeler, yönetim ve kurumsal yapının tesisi, fiyat liberalizasyonu, finansal piyasaların tesisi ve rekabet politikalarından oluşmaktadır. Geçiş endeksi 0-4 puan arasında olup 4'e yaklaştıkça serbest piyasa ekonomisinin unsurlarına tamamen ulaşıldığı anlamına gelmektedir. Geçiş endeksinde ilk sırada Macaristan 3,62 ortalamaya sahipken Polonya, Slovakya ve Estonya yaklaşık 3,50 ortalamayla ardından gelmektedir. Bu açıdan geçiş endeksi aslında başta vergi politikaları olmak üzere maliye reformlarını ifade etmektedir. Geçiş endeksi 4'e yaklaştıkça, reformların başarılı olduğunu anlamına gelmektedir.

Şekil: 3
Geçiş Endeksi ve Rasyonel Vergi Sistemi Endeksi

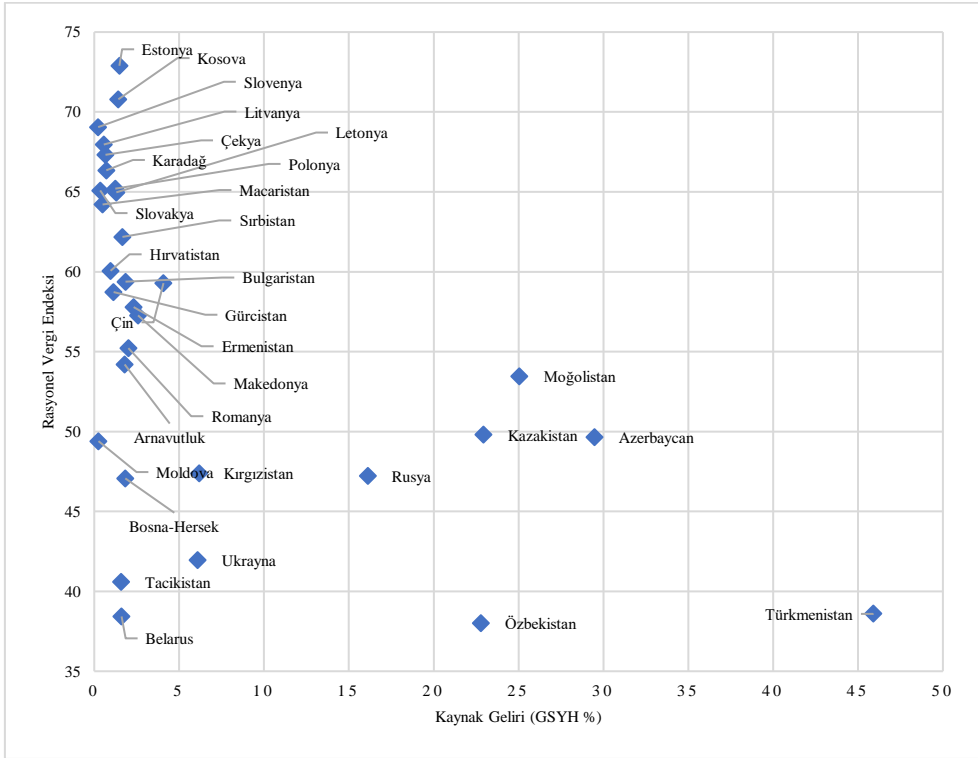


Kaynak: EBRD, *Transition Indicators (1989-2014)*.

Şekilde yer alan geçiş endeksi, yukarıda belirtilen geçiş endeksini oluşturan bileşenlerin bir ortalamasıdır. Dolayısıyla her ülkenin bileşenlerinin bu endekse katkısı farklılık göstermektedir: Bu endekte ilk sırada yer alan Macaristan söz konusu altı endeksin beşinde serbest piyasa ekonomisine sahip olduğuna yönelik puanlara (3,50 ve üstü) sahipken rekabet politikalarında merkezi planlı ekonomiye yakın bir ülke puanına sahiptir (2,50). Rasyonel vergi sistemi endeksinde ve diğer birçok sıralamada ilk sıralarda yer alan Estonya'da ise özelleştirmeler daha kısıtlı kalmış ve Macaristan'a benzer şekilde rekabet politikalarının katkısı daha az olmuştur. Diğer taraftan geçiş endeksinde son sıralarda yer alan Belarus, Türkmenistan ve Özbekistan gibi ekonomiler ise rasyonel vergi sistemi endeksinde yine son sırayı paylaşmaktadırlar. Belirtilen bu ekonomilerin tüm ölçütler ortalamasına bakıldığında son sıradaki Türkmenistan'ın 1,45 iken Belarus 1,79 ve son olarak Özbekistan'ın ise 2,10 olarak hesaplanmıştır. Bulgularımıza paralel şekilde geçiş endekslerine bakıldığında bu ekonomilerin geçiş sürecinin oldukça başarısız olduğu görülmektedir. Buna göre vergi sistemleri ile iktisadi sistemleri arasında önemli bir uyumsuzluğun olduğu; bir diğer ifadeyle vergileme sistemlerinin iktisadi yapıya uygunluk derecesinin oldukça düşük olduğu ileri sürülebilir.

Diğer taraftan vergi sisteminin kurumsallaşması açısından vergi gelirleri ile kamusal mal ve hizmet üretimi arasındaki bağın güçlü olması da önemlidir. Bu açıdan GSYH içinde doğal kaynak geliri yüksek olan ülkelerde, kaynak gelirleri ile vergi gelirleri arasında bir ikame ilişkisi olduğu görülmektedir. Aşağıda Şekil 4'te kaynak gelirleri ile rasyonel vergi endeksi arasındaki ilişki gösterilmektedir.

Şekil: 4
Kaynak Gelirleri ve Rasyonel Vergi Sistemi Endeksi



Kaynak: data.worldbank

Şekilde rasyonel vergi endeksi, kaynak zengini (resource-rich) ülkeler ile ilişkilendirilmiştir. Buna göre rasyonel vergi endeksinde son sıralarda olan ülkelerin aynı zamanda kaynak zengini olduğu ve GSYH içinde kaynak gelirlerinin önemli oranda olduğu görülmektedir.

Kaynak gelirleri ile vergi gelirleri arasındaki ilişkiyi analiz eden Crivelli ve Gupta (2014: 102-5)'ye göre vergi ve diğer kamu gelirleri kaynak gelirleri arttıkça azalmaktadır. Bir diğer ifadeyle kaynak gelirleri arttıkça cebri ve cebri olmayan kamu gelirleri azalmaktadır. Ek olarak kaynak zengini ülkelerin vergi indirimi, istisna ve muafiyetlere daha eğilimli olduğu ifade edilmektedir. Aynı çalışmaya göre doğal kaynak gelirlerinin vergi sistemine olan olası negatif etkilerinden biri vergi tabanının oluşturulmamasıdır. Kaynak gelirleri ile vergiler arasındaki ikame, vergi tabanının ve kurumsal bir vergi sisteminin tesis edilememesine neden olmaktadır. Doğal kaynakların zamanla tükenmesi, söz konusu vergi tabanını ve kurumsal bir vergi sistemini inşa edememiş ekonomiler için önemli bir mali sorun olacağı ifade edilmektedir.

Buna ek olarak doğal kaynak sektörünün istikrarsız olması, söz konusu ülkelerin bütçesinde de istikrarsızlığa neden olacaktır. Kaynak gelirlerinde küresel istikrarsızlığın olması durumunda ilgili ülkelerin mali sürdürülebilirliği de negatif etkilenmektedir (Cottarelli, 2011: 13-6).

Moore (2007: 8-9)'a göre vergilendirme sadece kamusal mal ve hizmet üretimini finansmanı değil aynı zamanda toplumun siyasi sürece katılımı açısından da önem arz etmektedir. Bu açıdan vergilendirme siyasi sürece katılımı teşvik etmekte, hesap verilebilirlik, yönetim ve hükümet harcamalarının verimliliğini artırmak açısından da denetim ve baskı görevini görmektedir. Ek olarak vergilendirme, vergi kurumlarının verimliliğini artırma ve böylece daha fazla kamu hizmeti sunma gibi teşvikleri de beraberinde getirmektedir.

Dolayısıyla kaynak zengini ülkelerde vergi gelirleri, kaynak zengini olmayan ülkelere nispeten daha az öneme sahip olup rasyonel vergi sisteminin kurulmasını negatif etkilemektedir.

Kaynak zengini ülkelerin kamu etkinliği ve yolsuzluk endeksinde de üst sıralarda olması göz önüne alındığında mevcut çalışmanın bulgularıyla benzer sonuçların olduğu ileri sürülebilir.

4.5.3. İdari ve Kültürel Yapıya Uygunluk Derecesi

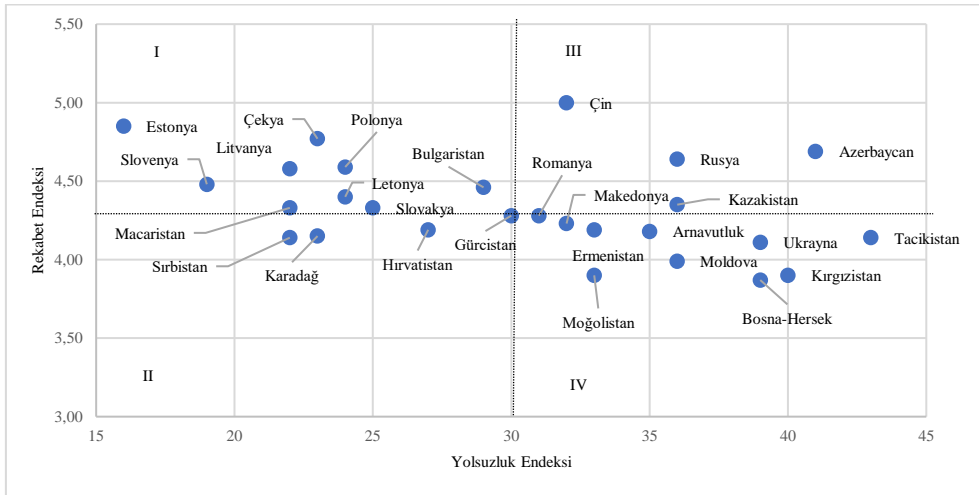
Rasyonel vergi sistemi ölçütleri, birbirinin ikamesi değil tamamlayıcısı olarak değerlendirilmektedir. Bu kapsamda idari ve kültürel yapıya uygunluk derecesi aynı zamanda geçiş ekonomilerinin iktisadi sisteme uygunluk derecesini belirten alternatif bir gösterge olarak düşünülmektedir. Bunun nedeni çalışmanın bu kısmında ele alınacak olan yolsuzluk ile rekabet arasındaki ilişkidir. Bu ilişki, rekabet ile idari ve kültürel yapıya uygunluğu temsil eden yolsuzluk arasındadır.

Geçiş ekonomileri arasında özellikle AB'ye üye olan ve/veya üye olmaya aday gösterilen ekonomilerin rekabet ve yolsuzluk konusunda nispeten daha pozitif olmalarını vurgulayan çalışmalar yer almaktadır. Acar (2018: 59) tarafından yapılan çalışmanın bulgusuna göre AB üyeliğini hedef olarak belirleyen geçiş ekonomileri genel olarak iktisat politikalarında Maastricht ölçütlerini çıpa olarak görmüş ve hedeflerini bu şekilde belirlemiştir. Başlangıç koşullarındaki farklılıklar geçiş ekonomileri için başarı düzeylerini etkilemiş ve bazı ülkelerde özelleştirme, beraberinde yolsuzluk ve yoksulluk gibi sosyal sorunlara neden olmuştur. Bu husus rasyonel vergi sistemi endeksinin hesaplanmasında önemli ölçütlerden olan yolsuzluk verileri vasıtasıyla belirtilmiştir.

Coricelli ve Marc (2010) tarafından yapılan bir başka çalışmaya göre AB üyesi olduktan sonra geçiş ekonomilerinin bankacılık sistemindeki yoğunlaşmanın (tekelleşme eğiliminin) azaldığı ve rekabetin arttığı bulgusuna ulaşılmıştır.

Baltık ekonomilerinde geçiş sonrası hızlı toparlanma ve küresel piyasalara entegrasyon, şirketlerin küreselleşmesiyle ilgilidir. Orta Asya ve Kafkasya bölgesinde ise Rusya ön planda olup az sayıdaki enerji şirketleriyle bu entegrasyon sağlanmakta ve dolayısıyla kısıtlı kalmaktadır. Çekya ve Macaristan ise sermaye birikimi hususunda daha çok komşu ülkelerin ekonomisine entegre olma yoluna gitmiştir (Lane, 2009: 50-3). Ek olarak AB üyelik sürecinde olan geçiş ekonomileri ile eski AB üyesi ülkeler arasında reel yakınsama söz konusudur (Kesici, 2009: 443). Bu husus Şekil 5'te gösterilmiştir.

Şekil: 5
Yolsuzluk ve Rekabet Endeksi



Kaynak: data.worldbank

Rekabet endeksinin 0-7 arasında olduğu göz önüne alındığında, I. bölgede hem yüksek rekabet ve hem düşük yolsuzluk özelliklerine sahip piyasa ekonomileri yer almaktadır. Ek olarak yolsuzluk ortalamasının altında ve rekabet endeksi ortalamasının üstünde olmayı aynı anda sağlayan ekonomiler bu bölgede gösterilmiştir. Rasyonel vergi sistemi endeksinde ilk sırada yer alan Estonya ve ardından Slovenya I. Bölgede gösterilen alanda yer almaktadır. Dolayısıyla rasyonel vergi sistemi endeksi 59-73 puan arasında olan ekonomiler bu bölgede yer almaktadır. Diğer taraftan II. bölgede, yolsuzluk ve rekabet ortalamasının altında olan ekonomiler yer almaktadır. Bu bölgede yer alan ekonomilerin rasyonel vergi sistemi endeksleri 58-66 puan arasındadır. Yolsuzluk ile rekabet arasındaki ilişkinin gösterildiği Şekil 5'te bulunan III. bölgede ise rekabette ortalamanın üstünde olan ancak yolsuzlukta ortalamasının altında bulunan ekonomiler yer almaktadır. Bu ekonomilerin rasyonel vergi sistemi endeksi ise 47-59 puan arasındadır. Şekil 5'te son olarak yer alan IV. bölümde yer alan ekonomiler ise hem rekabette hem de yolsuzlukta ortalamanın altında bulunmaktadır. Bu ekonomilerin rasyonel vergi sistemi endeksi ise 41-58 puan arasındadır. Çalışmanın bulgularına uygun bir şekilde rasyonel vergi sistemini tesis

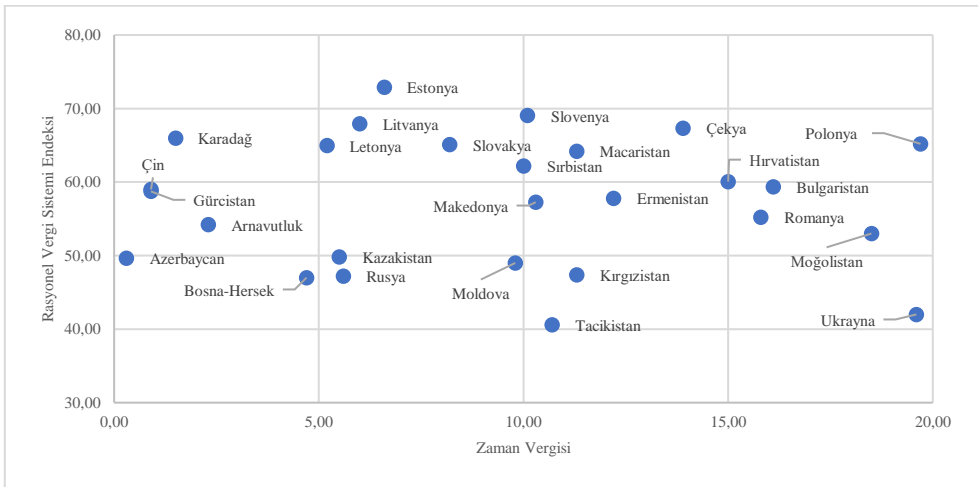
edemeyen ekonomilerin rekabetçi bir iktisadi yapıda olsalar da yolsuzlukla mücadelede başarılı olmadıkları görülmektedir. Bulgular, literatür kısmında belirtilen Engelschalk, (2005), Turana ve Yurdakulb (2014), Alm vd. (2006), Muraközy (2010), Aydın (2018) ve Zurnic (2018) çalışmaları ile paraleldir.

4.5.4. Vergi Türlerinin İç Düzeni

Geçiş ekonomilerinde yolsuzlukla ilişkilendirilebilecek birçok etken bulunmaktadır: Vergi bilinci, vergi ahlakı ve vergi kültürü gibi kavramlar, maliye politikalarının neden olduğu vergi tazyiki, vergi alerjisi ve genel anlamda işlem maliyeti olarak ifade edilebilecek vergiye uyum maliyetini doğrudan etkilemektedir.

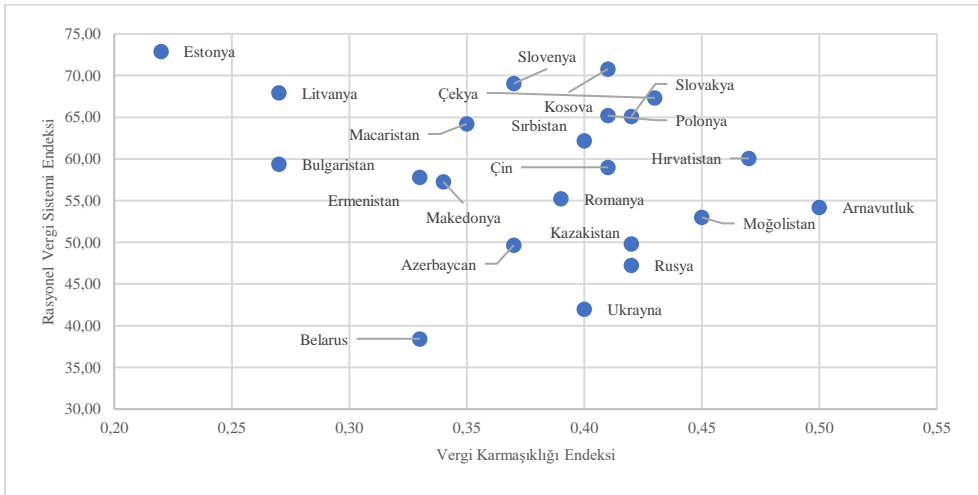
Vergi türlerinin iç düzeni, vergi politikalarının oluşturulma ve uygulama kalitesini de göstermektedir. Rasyonel vergi sisteminin önemli özelliklerinden olan piyasa aktörlerinin iyi bir ekonomik yönetim vasıtasıyla rekabetçi bir iş ortamının oluşturulması gerekmektedir. Bu hususta Dünya Bankası Kurumsal Anketler (Enterprise Survey Data) kapsamında 144.000'den fazla firmanın anket sonuçları kullanılabilir. Vergi türlerinin iç düzenini ifade edeceği düşünülen, politikaların kalitesini analiz edebilmek amacıyla kamusal regülasyonların yöneticilerin zaman maliyetini hangi yönde etkilediği hususuna değinilecektir. Diğer ölçütlerde vurgulandığı gibi vergi türlerinin iç düzeni ölçütü de rasyonel vergi isteminin diğer ölçütleriyle yakından ilişkilidir. Zaman vergisi (time-tax) olarak adlandırılan bu maliyet, özünde idari verimliliği barındırmaktadır. İdari verimlilik ise kamu kesiminin faaliyetlerini etkin ve verimli bir şekilde yürütebilme kabiliyeti ile rasyonel bir bürokrasinin de varlığını göstermektedir (Heredia & Schneider, 2003; Back & Hadenius 2008).

Şekil: 6
Zaman Vergisi ve Rasyonel Vergi Sistemi Endeksi



Şekil 6 aynı zamanda vergi idaresinin etkinliğini de göstermektedir. Vergi idaresinin etkinliği tarh, tebliğ, tahakkuk ve tahsilat süreçlerini kapsamakta ve rasyonel vergi sistemiyle oldukça paralel bir seyir izlediği görülmektedir. Bu sonuçlar literatürde yer alan Shaffer ve Turley (2000), Keen vd. (2006) Gehlbach (2008), Sabirianova Peter vd. (2010) Turana ve Yurdakulb (2014) çalışmaları ile benzerdir. Dolayısıyla vergi türlerinin iç düzeni, vergi politikalarının uygulanma kalitesi kapsamında vergi idaresinin etkinliğini göstermektedir. Bu etkinlik ise zaman vergisi olarak ifade edilen, idarelerin daha az bir zaman maliyetinin yanında özellikle vergi kanunlarının açık ve net olmasını da gerektirmektedir. Aşağıdaki Şekil 7’de vergi sisteminin karmaşıklığı⁴ ile rasyonel vergi sistemi ilişkilendirilmiştir.

Şekil: 7
Vergi Karmaşıklığı ve Rasyonel Vergi Sistemi Endeksi



Kaynak: taxcomplexity.org

Şekil 7’de vergi karmaşıklığı ile rasyonel vergi sistemi endeksi gösterilmiştir. Rasyonel vergi sistemi endeksinde 72,89 puan ile ilk sırada yer alan Estonya vergi karmaşıklığında ise son sırada yer almaktadır. Bir diğer Baltık ekonomisi olan Litvanya ise ikinci sırada yer almakta, Bulgaristan ise onu takip etmektedir. Vergi karmaşıklığında son sırada yer alan ekonomilere bakıldığında Arnavutluk, rasyonel vergi sistemi endeksi ortalamasının altında kalmakta ve vergi reformlarına ihtiyaç duymaktadır. Ekonomilerin vergi karmaşıklığı endeksleri aynı zamanda vergi çekiciliğini de göstermektedir. Bu ülkelerden Arnavutluk 0,50 puanla son sırada yer alırken Hırvatistan 0,47 ve Moğolistan

⁴ Vergi karmaşıklığı endeksi, çok uluslu şirketlerinin karşılaştığı kurumlar vergisi sisteminin karmaşıklığını ölçmektedir. Endeks 0 (karmaşık değil) ve 1 (son derece karmaşık) arasında değişmektedir. Vergi mevzuatının karmaşıklığını ve vergi sisteminin genel karmaşıklığını kapsamaktadır.

0,45 ile ardından gelmektedir. İlk sırada yer alan Estonya ise 0,22 iken Bulgaristan ve Litvanya 0,27 puanla ikinci sırayı paylaşmaktadır.

5. Sonuç

Çalışmanın amacı, rasyonel vergi sisteminin kapsamını ve uygulanabilirliğini geçiş ekonomileri örneğinde araştırmaktır. Bu amaçla yola çıkarak ilk bölümde rasyonel vergi sistemi ve böyle bir sistemi analiz edebilmek amacıyla literatürde yer alan ölçütler açıklanmıştır. İkinci bölümde ise rasyonel bir vergi sisteminin nasıl veya hangi ölçüde tesis edildiğini inceleyebilmek amacıyla seçilen örneklem ülke kesitleri olan geçiş ekonomileri ele alınmıştır. Çalışmada geçiş ekonomilerinin seçilme nedeni, bu ülkelerin merkezden planlanan bir iktisadi yapıdan serbest piyasa sistemine geçiş yapmaları başta olmak üzere iktisadi açıdan başlangıç koşulları ile siyasi olarak tarihsel miraslarının birbirine benzer olmasıdır. Böyle bir benzerlik, ülkeler arası kıyaslama yapmayı daha mümkün hale getirmektedir. Üçüncü bölümde rasyonel vergi sistemi endeksi ile ülkelerin vergi sistemi analiz edilmiştir. Ek olarak üçüncü bölümde analiz sonuçlarının literatürle kıyaslanmasına ve niceliksel analize de yer verilmiştir.

Literatürde rasyonel vergi sistemi endeksini geliştiren ve bu endeks vasıtasıyla geçiş ekonomilerinin vergi sistemlerini analiz eden bir çalışma, bildiğimiz kadarıyla, bulunmamaktadır. Çalışmada bu endeks ile ülkelerin maliye politikalarının iktisadi hedeflerine olan uyumu analiz edilmiş ve literatüre bu açıdan katkıda bulunmuştur.

Bulgulara göre AB üyesi olan geçiş ülkeleri ortalaması esas alındığında Çekya, Estonya, Karadağ, Kosova, Letonya, Litvanya, Polonya, Slovakya ve Slovenya ülkelerinin rasyonel vergi sistemine sahip olduğu bulgusuna ulaşılmıştır. Geçiş ülkelerinin rasyonel vergi endeksi ortalaması esas alındığında ise Bulgaristan, Çekya, Çin, Ermenistan, Estonya, Gürcistan, Hırvatistan, Karadağ, Kosova, Letonya, Litvanya, Macaristan, Makedonya, Polonya, Sırbistan, Slovakya ve Slovenya ülkelerinin vergi sistemleri, eksikliklere rağmen, rasyonelleşmiştir. Geçiş ekonomileri arasında rasyonel vergi sistemine nispeten sahip olan ilk beş ülke sırasıyla Estonya, Kosova, Slovenya, Litvanya ve Çekya iken son beş ülke ise sırasıyla Özbekistan, Belarus, Türkmenistan, Tacikistan ve Ukrayna'dır. Bu kapsamdaki bulgulara göre (i) Maastricht ölçütleri ve mali kural gibi mali ilkeler izlendiğinde maliye politikalarında keyfilik ve istikrarsızlık nispeten azaltmakta, bu ise vergi sistemini rasyonelleştirmektedir. (ii) Kaynak gelirlerine bağımlı bir ekonomide rasyonel vergi sistemi sınırlı kalmaktadır. (iii) Merkezi planlamada geçirilmiş süre arttıkça rasyonel vergi sistemi endeksi azalmaktadır. (iv) Vergi yasalarına uyum süresi ve vergi sisteminin karmaşıklığı arttıkça rasyonel vergi sisteminden uzaklaşmaktadır. (v) Liberalizasyon ile hukuki sistem uyumunu sağlayan ülkelerde vergi sistemi rasyonelleşmektedir.

Ülkelerin Sovyetler Birliği'nin merkezi olan Rusya'ya coğrafi ve kültürel yakınlığı günümüzdeki iktisadi bağımsızlıklarını da etkilemiştir. Bu kapsamda Sovyetler Birliği'ne daha geç katılan ve gelişmiş Avrupa ülkeleriyle yakın ilişkiler kuran Baltık ülkeleri günümüzde daha istikrarlı bir iktisadi yapı oluşturmuştur. Ek olarak Avrupa Birliği'ne

katılma hedefleri, Baltık ve bir kısım Doğu Avrupa ülkelerinin serbest piyasa deneyiminin olmaması sorununu da ortadan kaldırmıştır. Balkan ülkeleri ise bağımsızlıklarından itibaren iç savaş ve meşruiyet sorunlarıyla mücadele etmiştir. Bu durum Balkan ülkelerinin serbest piyasa reformlarından ziyade savaşa ve siyasi sorunlara odaklanmasına neden olmuş ve geçişi geciktirmiştir. Sovyetlerden kalan mirasın en ağır hissedildiği bölgelerden biri de Orta Asya ve Kafkasya ülkeleridir. Bu ülkelerin coğrafi ve kültürel olarak Rusya'ya yakınlığı ve stratejik açıdan önemleri, onların daha yoğun kontrol edilmelerine ve etkilenmelerine neden olmuştur. Dolayısıyla geçiş süreçlerinin günümüzde de devam ettiği ifade edilebilir. Diğer geçiş ülkelerinden olan Çin'de ise geçiş ekonomilerinin başlangıç koşullarından birçok farklılığı bulunmaktadır. Nüfusunun yapısı, bürokrasinin daha çok yerel yönetimlerde örgütlenmesi ve merkezileşmenin katı olmaması; geçiş reformlarının kademeli olması ve çift taraflı fiyat sistemi gibi unsurlar bu farklılıklarından en önemlileri olarak söylenebilir. Günümüzde üretimde ve ticaret hacminde dünyanın önde gelen ülkelerinden olan Çin, geçiş sürecini farklı bir piyasa türü olan piyasa sosyalizmi ile devam ettirmektedir.

Baltık ülkelerinin coğrafi ve kültürel özellikleri açısından Sovyetler birliğinden oldukça farklı ve uzak olmasının yanında Avrupa ülkeleriyle siyasi, kültürel ve coğrafi yakınlığı bu ülkelerin geçiş sürecinde önemli ilerlemeler sağlamasına neden olmuştur. Diğer taraftan Balkan ve Doğu Avrupa bölgesi geçiş ekonomileri ise tek tip bir vergi sistemi göstermemektedir. Bu bölgelerdeki ekonomilerin bir kısmı AB'ye üye olmayı bir maliye politikası çıpası olarak görmüş ve nihayetinde AB'ye üye olmuşlardır. Bunun bir nedeni olarak AB'nin Maastricht Ölçütlerini rasyonel bir iktisadi sistemin ölçütü olarak görmesinden kaynaklandığı ifade edilebilir.

Orta Asya ve Kafkasya ülkeleri ise tarihsel miras açısından ve Sovyetler Birliği'ne siyasi ve coğrafi yakınlığından dolayı Rusya ile paralel bir seyirde olmuştur. Söz konusu bölge ekonomilerinin kapsamlı reformlarına rağmen ekonomik özgürlük ve yolsuzluk endekslerinde oldukça negatif bir görünüme sahip olmasından dolayı rasyonel bir vergi sistemini tesis edememişlerdir. Bölge ekonomilerinden Gürcistan ise hızla azalan yolsuzluk ve artan kamu etkinliği nedeniyle önemli bir istisnayı oluşturmuştur. Ancak genel olarak Orta Asya ve Kafkasya ekonomilerinin rasyonel bir vergi sisteminden oldukça uzak olması, vergi sistemlerinin siyasallaşması ile ilişkilendirilebilir. Bir başka ifadeyle Orta Asya ve Kafkasya geçiş ekonomilerinde vergi sistemi rasyonelleşmemiş, aksine siyasallaşmıştır. Ancak başta Baltık ekonomileri olmak üzere Balkan ve Doğu Avrupa ülkelerinin büyük bir kısmı ve Çin evrensel ölçütler belirleyerek serbest piyasanın etkinliğine odaklanmışlardır. Bu ülkelerden Çin, diğer AB'ye üye olma istediğindeki ülkelerden farklı olarak, ihracat ve doğrudan yabancı yatırım odaklı iktisadi yapısını korumak ve bu şekilde oluşturduğu iktisadi gücünü geliştirmek amacını gütmektedir.

Geçiş ekonomilerinin vergi sistemlerinde tespit edilen sorunların çoğu Türk vergi sisteminde de görülmektedir. Vergi tabanının genişletilmesi, idari etkinlikteki zayıflık nedeniyle tahakkuk-tahsil ilişkisinin zayıflaması ve gelirlerin etkin harcanması gibi sorunlar ifade edilmektedir. Bu kapsamda araştırmacılar, Türkiye'de rasyonel bir vergi sisteminin analizini yapabilir ve çözüm önerileri getirebilir.

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Kurumsal Yönetim Derecelendirmesi ve Pay Değeri İlişkisi: Borsa İstanbul Örneği

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Relationship With Corporate Governance Rating and Share Value: Evidence from Borsa İstanbul

Abstract

This study aims to analyse the effect of corporate governance ratings on the stock values of publicly traded companies in the Corporate Governance Index (XKURY of Borsa İstanbul (BİST) operating in Turkey. In this context, the rating scores of the companies included in the Corporate Governance Index for the 2016-2020 periods were determined. In the study in which the Paired Dependent Sample t-Test was used as the research method, the differences in the shared values between the dates thirty days before and thirty days after the announcement of the ratings were examined. According to the results obtained, it was observed that there was a statistically significant effect on the stock values of companies that implemented corporate governance principles in 2016, 2017, and 2019, but no statistically significant effect was observed for these years due to the systematic risks that occurred at the macro level in 2018 and 2020.

Keywords : BİST, Corporate Governance Index, Corporate Governance Principles, Stocks Value, Listed Companies.

JEL Classification Codes : G30, G34.

Öz

Bu çalışmanın amacı; Türkiye’de faaliyette bulunan Borsa İstanbul (BİST) Kurumsal Yönetim Endeksi (XKURY) içerisinde yer alan halka açık şirketlerin hisse senedi değerleri üzerinde kurumsal yönetim derecelendirme notlarının etkisini analiz etmektir. Bu kapsamda 2016-2020 dönemlerinde Kurumsal Yönetim Endeksinin içerisinde yer alan firmaların, derecelendirme notları belirlenmiştir. Araştırma yöntemi olarak Eşleştirilmiş Bağımlı Örneklem t-Testi’nin kullanıldığı çalışmada derecelendirme notların açıklandıkları tarihlerden otuz gün önce ve otuz gün sonra zaman aralığında kalan tarihlerde oluşan hisse değerlerinin farkları incelenmiştir. Elde edilen sonuçlara göre 2016, 2017 ve 2019 döneminde kurumsal yönetim ilkelerini uygulayan şirketlerin hisse senedi değerleri üzerinde istatistiki olarak anlamlı bir etki olduğu görülürken, 2018 ve 2020 yıllarında makro düzeyde meydana gelen sistematik riskler nedeniyle bu yıllar için istatistiki bakımdan anlamlı bir etki görülemediği görülmüştür.

Anahtar Sözcükler : BİST, Kurumsal Yönetim Endeksi, Kurumsal Yönetim İlkeleri, Hisse Değeri, Halka Açık Şirketler.

1. Giriş

Küresel ölçekte yaşanan Covid-19 salgınının finansal etkileri, Borsa İstanbul (BİST) XKURY endeksinde yer alan firmaları da etkilemiş ve Türkiye’de COVID-19 Pandemisinin ilanından itibaren endekste yer alan şirketlerin yaklaşık yarısında hisse senedi değerinin olumsuz yönde etkilendiği tespit edilmiştir (Şeker, 2020: 79-94). Küresel boyutta yaşanan mali krizler ve muhasebe skandalları ile kurumsal yönetimin önemi daha iyi anlaşılmıştır. Maxell şirketinde 1991’de, Enron firmasında 2001’de ve Parmalat firmasında 2003 yılında yaşanan muhasebe skandalları ve küresel boyutta yaşanan mali krizler, yatırımcıları büyük ölçüde mali zarara uğratmış, finansal piyasaları olumsuz etkilemiş ve yatırımcılarda güveninin azalmasına neden olmuştur. Kurumların muhasebe skandalları ve finansal krizlerden korunması ile yatırımcı güveninin yeniden kazanılması amacıyla evrensel ve objektif kriterlere uygun olarak kurumsal yönetim uygulamalarının tesis edilmesi ve kurumsal yönetim gelişiminin hızlandırılması ihtiyacı ortaya çıkmıştır. Piyasalara güvenin yeniden tesis edilmesi ve kurumlara finansal itibar kazandırılması amacıyla küresel ölçekte OECD tarafından kurumsal yönetim kavram ve ilkeleri bu amaçla tanımlanmıştır. OECD tarafından yayınlanan kurumsal yönetim ilkelerinin tüm ülkeler tarafından uygulamaya alınması zorunlu bir durum değildir. Bu ilkeler her ülkelerin içinde bulunduğu koşullara göre uygulanabilir ve zaman içinde değişim ve gelişmeye açık ilkelere (Kömeçoğlu & Vuran, 2018: 704-713).

Türkiye’de kurumsal yönetimin gelişimine baktığımızda, ilk çalışmaların 1956 tarihli Türk Ticaret Kanunu ile başladığı görüyoruz. Daha sonra, Sermaye Piyasası Yasası 1981’de kabul edilerek 1999’ yılında kurumsal yönetim uygulamaları konusunda önemli bir adım atıldı ve OECD Kurumsal Yönetim İlkeleri yayınlandı. Ardından 2002 yılında TÜSİAD, "Kurumsal Yönetimde En İyi Uygulama Kodu: Kurulun yapısı ve işleyişi" başlıklı bir bildiri yayınlamıştır (Erdoğan, 2019: 63-79).

Takip eden süreçte Türkiye’de Sermaye Piyasası Kurulu (SPK) tarafından kurumsal yönetim anlayışını oluşturmak ve Türk sermaye piyasalarını küresel finans piyasalarını ahenkli bir biçimde işleyişini sağlamak için 2003 senesinde kurumsal yönetim ilkeleri tanımlanmıştır. Daha sonra 2005 senesinde yine SPK tarafından kurumsal yönetim ilkeleri gözden geçirilerek son haline getirilmiştir. SPK tarafından yayınlanan bu ilkeler, OECD’nin 1999 yılında yayınladığı ve sonra 2004 yılında tekrar revize ettiği kurumsal yönetim ilkeleri referans alınarak hazırlanmıştır. Böylece OECD ilkeleri, Türkiye’deki kurumsal yönetim ilkelerinin temelini oluşturmuştur (Ertuna & Tükel, 2008: 1-37).

Küresel boyutta yaşanan finansal krizlerin temelinde kurumsal yönetim anlayışının yeterince oluşmaması vardır. Bu nedenle, gelişmiş ülkeler ve küresel boyuttaki şirketler kurumsal yönetim kavramına giderek daha çok önem vermektedirler. Uluslararası finans kuruluşları yatırım kararı vermeden ve kredi ödeneği çıkarmadan önce şirketlerin ve kamu kurumlarının kurumsal yönetim kalitesine dikkat etmektedirler. Kamu kurumları ve şirketler için kurumsal yönetim anlayışının ulusal ve uluslararası boyutta öneminin artmasının başlıca gerekçeleri; yatırımcıların güvenli yatırım koşullarını araması, firmaların yaşanan yoğun

rekabette öne çıkma motivasyonu ve hak sahiplerinin çıkarlarını güvence altına almak istemeleridir (Yenice & Dölen, 2013: 199-213).

Kurumsal yönetim ilkelerinin ülkelere sağladığı faydalar; Ülkenin ekonomik açıdan itibarını yükseltmesi, yabancı sermayeyi yurt içine çekmesi, ekonominin rekabet gücünün artması, kriz etkilerinin daha kolay atlatılması, kaynak yönetiminin daha verimli yapılması ve ülke refahının sürdürülebilir bir şekilde sağlanması gösterilebilir. Firmalara sağladığı faydalar ise sermaye maliyetinin düşmesi, finansman ve likidite imkanlarına kolay erişim, kriz dönemlerini minimum zararlarla atlama ve sermaye piyasalarında istikrarlı bir konumda olmak sayılabilir. Uluslararası boyutta kurumsal yönetim uygulamalarındaki eksikliklerden kaynaklanan en ciddi sonuçlar Worldcom, Enron, Xerox, Global Crossing şirketlerinin iflas etmesidir. Sektörlerinde lider durumda olan bu şirketlerin iflas etmesi faaliyette oldukları ülkelerin ekonomilerine de olumsuz etki etmiştir (Oral vd. 2017: 126 -141).

Bu şirketlerin iflas etmesindeki en önemli gerekçeler arasında kurumsal yönetim uygulamalarının etkin olarak kullanılmaması vardır. Bu tecrübelerle istinaden, kurumsal yönetim kavram ve ilkelerinin önemi ilerleyen süreçte artarak devam etmektedir. Uluslararası boyutta yaşanan bu olumsuz tecrübeler, kurumsal yönetim kavram ve ilkelerinin önemini göstermekle beraber, yatırım kararları alınırken denetim ile birlikte kurumsal yönetim kalitesinin de dikkate alınmasına vesile olmuştur. Kötü yönetimden kaynaklanan iflasların önüne geçebilmek amacıyla devletler denetim, şirketler de kurumsal yönetim uygulamalarına yer vermeye başlamışlardır.

Türkiye’de bu konu ile ilgili gerçekleştirilen düzenlemelerde SPK, kurumsal yönetim ilkelerinin açıklık (şeffaflık), hesap verebilme, sorumluluk ve adillik olmak üzere dört prensipten oluştuğunu belirtmiştir. Bu ilkeler çerçevesinde, kurumsal yönetim uygulamalarının denetim kalitesini artırması amaçlanmaktadır. Şeffaflık ilkesinin şirket muhasebe kayıtlarının denetiminde, hesap verilebilirlik ve sorumluluk ilkeleri ile de sorumluluk sahibi bir yönetim anlayışının oluşmasında katkı sağlayacağı düşünülmektedir. Sonuç itibarıyla kurumsal yönetim uygulamalarının artması ile denetim kalitesinin artacağı düşünülmektedir (Baş & Uygun, 2020: 111-125).

Bu gelişmelere istinaden Türkiye’de kurumsal yönetim anlayışına yönelik olarak yapılan en ciddi girişim kurumsal yönetim endeksinin oluşturulmasıdır. Kurumsal yönetim endeksi Borsa İstanbul tarafından 31.08.2007 tarihinde oluşturulmuştur. Oluşturulan bu endeks ile kurumsal yönetim uygulamalarını doğru bir biçimde uygulayan ve bu ilkeleri benimseyen şirketlerin kamuoyuna duyurulması amaçlanmıştır. Kurumsal yönetim endeksi içerisinde işlem gören şirketlerin, kurumsal yönetim uygulama ve ilkelerini derecelendirmek amacıyla 1 ile 10 arasında bir not verilmektedir. Derecelendirme notunun 1’e yakın olması kurumsal yönetim ilkelerinin iyi uygulanmadığını, 10’a yakın olması bu ilkelerin iyi uygulandığını ifade etmektedir. Eski adıyla İMKB, yeni adıyla Borsa İstanbul yönetimi 23 Şubat 2005 tarihinde almış olduğu karar ile kurumsal yönetim endeksinde yer alacak şirketlerin kurumsal yönetime uygunluğunu ölçen derecelendirme notunun minimum 7

olmasını onaylamıştır. Kurumsal yönetim ilkelerine uyum notları SPK'nın yetki verdiği derecelendirme kuruluşları tarafından verilmektedir (Dizgil & Reis, 2020: 82-96).

Piyasa katılımcılarının derecelendirme notu alma sürecinde, derecelendirme kuruluşlarının derecelendirmelerinin bağımsız ve objektif olduğu varsayılır. Çıkar çatışmaları derecelendirme kalitesine karşı risk oluşturur (Küçükçolak, 2020: 193-194). Derecelendirme kuruluşları derecelendirme sonucunun derecelendirilen kuruluş, yatırımcı ve piyasa katılımcılarına potansiyel etkisini dikkate almadan derecelendirme notu kararını vermesi beklenir (Küçükçolak, 2020: 35-36). Derecelendirme kararlarının dikkatli ve profesyonel şekilde kendilerinin ve çalışanlarının bağımsızlığı ve objektifliğini devam ettirecek şekilde vermelidirler. Derecelendirme notlarını değiştirmekteki gecikmeler derecelendirme kuruluşlarının metodolojileri, geçmiş temerrüt modelleri ile yeni piyasa ürünlerini değerlendirmeleri, derecelendirme notlarını gözden geçirme ve gözetim süreçleri konusunda güveni sarsmakta ve endişeleri artırmaktadır. Oligopolistik yapının yol açtığı olumsuzluklar yanı sıra derecelendirme kuruluşlarının yetersiz kaldıkları alanlar görülmektedir (Küçükçolak, 2020: 199).

Finansal piyasaların giderek artan globalleşmesiyle beraber derecelendirme uygulamalarının alanı ve kapsamı giderek büyümüştür. Derecelendirme süreci ulusal ve uluslararası piyasalardan kaynak temin etmek isteyen işletmeler ile bu kaynağı sağlayan yatırımcılar arasında bilgi asimetrisinin azaltılması amacıyla hizmet eder (Küçükçolak, 2020: 11). Büyük veri havuzları sayesinde yatırımcılara ve kreditoörlere derecelendirme notları yoluyla bilgi sağlarlar. Ancak geçen zaman içinde sistemin bazı eksikleri olduğu ortaya çıkmıştır. Büyük ölçüde oligopol yapının oluşturduğu zayıflıklar özellikle kriz dönemlerinde verilen derecelendirme notları ile karşılaşılan sonuçların uyuşmadığı örneklerle karşılaşılmaya yol açmıştır. Derecelendirmeye ilişkin yapının başarılı şekilde işletilmesi halinde Türk reel ve finans sektörüne yapacağı önemli katkıların başında kaynakların etkin dağılımına yardımcı olması belirtilmelidir. Kaynakların daha iyi yönetilen, başarılı işletmelere ulaştırılmasında önemli bir araç rolü oynayacak ve bu nitelikteki işletmelerin daha uygun maliyetlerle finansmana erişimi temin edilmiş olacaktır. Derecelendirme süreci ayrıca işletmelerin kurumsal yönetim ve finansal yapılarının güçlendirilmesinin teşviki ile başta bankacılık sektörümüzün daha ziyade teminatlara dayalı kredilendirme modelinden ticari ve finansal başarıya odaklı kredilendirme modeline geçmesine katkıda bulunacaktır (Küçükçolak, 2020: 12).

Kurumsal Yönetim Endeksinin (XKURY) hesaplanmaya başlanmasından itibaren bu çalışmanın yapıldığı tarihe kadar yapılan araştırmalarda ağırlıklı olarak Kurumsal Yönetim Endeksi bünyesinde bulunan firmaların sermaye yapılarının, kurumsal yönetim ilkeleri ile arasındaki ilişki incelenmiştir. Bu çalışmada ise Kurumsal Yönetim İlkelerini uygulayan halka açık şirketlerin hisse değerleri üzerinde istatistiki bakımdan anlamlı bir etki olup olmadığı araştırılmıştır. Kurumsal Yönetim İlkelerini uygulayan firmaların sayısının her geçen yıl artarak devam etmesi kurumsal yönetim anlayışını da belirli bir standarda getirmiştir. Kurulduğu tarihten bu yana kurumsal ilkelere uyum notu alan firmaların artışına istinaden Kurumsal Yönetim Endeksi içindeki firmalara yönelik güncel bir araştırmanın

faydalı olacağı düşünülmüştür. Yapılan çalışmanın amacı, Kurumsal Yönetim İlkelerinin hisse değerleri üzerindeki etkisini incelemektir. Araştırmanın alternatif hipotezinde Kurumsal Yönetim İlkelerinin, şirket hisse değerleri üstünde istatistiki açıdan anlamlı olacağı ve olumlu yönde bir tesir yaratacağı iddia edilmektedir. Bu çerçevede çalışmada Kurumsal Yönetim Endeksi (XKURY) bünyesindeki halka açık şirketlerin 2016-2020 yılları arasında aldıkları beş yıllık dönemde Kurumsal Derecelendirme Notu öncesi ve sonrası dönemlerinde hisse senedi değeri üzerindeki değişimler Eşleştirilmiş Bağımlı Örneklem t-Testi ile analiz edilmiştir.

2. Literatür

Yerel ve küresel literatürde, firmaların kurumsal yönetim ilkeleri ile şirketlerin başarımları arasındaki bağlantıyı belirlemek için çeşitli araştırmalar yapılmıştır. Bu kapsamda kurumsal yönetim derecelendirmenin şirketlerin hisse senetleri değerleri üzerinde etkisini açıklamaya yönelik daha az sayıda ampirik araştırmanın yapıldığı tespit edilmiştir. Kurumsal yönetim derecelendirme notları yatırım yapmak isteyen yatırımcılar için dikkate alınan bir kriterdir ve bu bağlamda kurumsal yönetim derecelendirme sistemi faydalarının daha kapsamlı öğrenilmesine gerek vardır. Firmaların kurumsal yönetim ilkelerini benimsemesi ve bunları uygulamaya başlamasından sonra kurumsal yönetim ilkelerinin ve kurumsal derecelendirme notlarının, şirketlerin performansları ve sermaye yapıları üzerindeki etkisini araştıran çalışmalara literatürde rastlanmaktadır.

Kurumsal yönetim ilkelerine ilişkin literatür incelendiğinde, bazı çalışmalarda (Topaloğlu & Aslan, 2021; Türkmen, 2020; Yenice & Dölen, 2013; Ye Liu vd., 2012; Al-Haddad vd., 2011; Dağlar & Pekin, 2011) kurumsal yönetim uygulamalarının, firmaların finansal performanslarına olan etkisini ve finansal tablolarda manipülasyon riskini araştırdıkları çalışmalarında kurumsal yönetim derecelendirme notu ile firmaların finansal performansları ve finansal tablolarda manipülasyon riskinin azalması arasında istatistiki bakımdan anlamlı ve olumlu bir bağlantı olduğu belirlenmiştir. Bu kapsamda işletmelerin kurumsal yönetim derecelendirme notları arttığında finansal başarılarının arttığı ve finansal tablolarda manipülasyon risklerinin de azaldığı söylenebilir.

Yıldırım, Altan ve Gemici'nin 2018'de ve Kısakürek, Yaşar ve Aydınöğlü 'nün 2020'de yaptığı çalışmalarında ise işletmelerin kurumsal yönetim notları ile finansal performanslarının entropi ağırlıklandırma topsis yöntemi ile karşılaştırıldığı çalışmalarda yapılan analizler neticesinde belirlenen firmaların kurumsal yönetim notlarının finansal başarı notlarıyla karşılaştırmasında anlamlı ve pozitif yönde bir bağlantı olmadığı görülmüştür.

Oral ve arkadaşlarının 2017'de ve Dizgil ve Reis'in 2019'da yaptığı çalışmalarında kurumsal yönetim uygulamaları ile firmaların sermaye yapıları arasındaki ilişkinin irdelendiği çalışmalar neticesinde yabancı sahip, bağımsız üyeler, kadın üyeler, aktif karlılık oranları ve şirket büyüklükleri ile sermaye yapısı değişkenleri arasında istatistiksel olarak

anlamli bir iliřkinin varliđı belirlenmiř ve finansal kaldıraç oranı deęerinin hisse senetlerinin bileřik getirilerini yükselttiđi belirlenmiřtir.

Sermaye yapısı kararlarında kurumsal yönetim uygulamalarının etkisinin arařtırıldıđı diđer çalıřmalarda (Shahzad vd., 2015; Uwuigbe vd., 2014) yapılan analiz sonucunda kurumsal yönetim uygulamalarının yönetim kurulunun nitelik ve niceliksel yapısı ile řirketlerin sermaye yapılarının karřılařtırmasında negatif yönde iliřki olduđu görülmüřtür. İlave olarak kurumsal yönetim uygulamalarını verimli kullanan řirketlerin ise finansal riskler almadıkları ve kaldıraç oranı deęerlerini düşük tuttıkları görülmüřtür.

Ayrıca, Düzer 2020'de yaptıđı çalıřmada, kurumsal yönetim endeksinde lokomotif sektörlerin mali ve imalat sektörleri olduđunu ve sektörlerin karřılařtırmasında kurumsal yönetim ilkelerine uyum notları arasında istatistiksel açıdan anlamli olan farkların olduđunu belirtmiřtir. Bununla birlikte Kurumsal Yönetim Endeksi'nin yanında Sürdürülebilirlik Endeksi'nde de olan firmaların arasında yerli sahiplik oranı çok olan firmaların kurumsal yönetim açısından daha iyi derecelendirme notlarına sahip oldukları tespit edilmiřtir.

Dađlı, Ayaydın & Eyübođlu 2010'da ki çalıřmasında ise Kurumsal Yönetim Endeksi'ne dahil olan řirketlerin risk getiri oranı bakımından yatırımcılarına getiri sađlamadıđı ve yatırımcıların risk almayarak (řirket hisse senetlerine yatırım yapmadan) risksiz finansal enstrümanlara yönelmeleri sonucunda daha fazla getiri elde edebileceklerini ve bundan dolayı Kurumsal Yönetim Endeksi'nde olan firmalara yatırım yapmanın potansiyel olarak kar kaybına sebep olacađı neticesine ulařmıřlardır.

Literatür taraması sonucu olarak kurumsal yönetim ilkeleri ve derecelendirmesinin BİST'te halka açık řirketlerin hisse senetleri deęeri üzerinde etkisini gösteren sınırlı sayıda ampirik arařtırmanın olduđu görülmüřtür. BİST bünyesinde Kurumsal Yönetim Endeksi'nin (XKURY) oluřturulmasından itibaren her yıl kurumsal yönetim ilkelerini uygulayan birçok firma derecelendirme notu olarak bu endeks içerisinde yer almıřtır. 2020 yılı itibariyle de endeks bünyesinde 52 adet halka açık derecelendirilmiř firma vardır. Bu çerçevede kurumsal yönetim ilkelerinin hisse deęerleri üzerindeki etkisini gösteren güncel bir çalıřma faydalı olacaktır. Bu amaçla çalıřmada, Kolmogorov-Smirnov ve Shapiro-Wilk testlerine göre normal dađılım kořulunu sađlayan veriler üzerinde Eřleřtirilmiř Bađımlı Örnekleme t testi uygulanmıřtır. Ortaya çıkan sonuçlarda kurumsal yönetim ilkelerini 2016-2020 döneminde uygulayan endeks (XKURY) dahilindeki halka açık řirketlerin derecelendirme notlarının öncesinde ve sonrasındaki finansal durumlarının hisse deęerleri üzerindeki etkisi arařtırılmıřtır.

3. Türkiye'de Kurumsal Yönetim

Türkiye'de kurumsal yönetim anlayıřı, Türk Sanayicileri ve İř İnsanları Derneđinin (TÜSİAD) 2002 senesinde yayınladıđı "Kurumsal Yönetim En İyi Uygulama Kodu: Yönetim Kurulunun Yapısı ve İřleyiři" isimli raporu ile oluřmaya bařlamıř ve 2003 senesinde kurulan Türkiye Kurumsal Yönetim Derneđi (TKYD)'nin faaliyetleri ile

gelişmiştir. Kurumsal Yönetim İlkelerini ilk defa Sermaye Piyasası Kurulu (SPK) 2003 yılının 4 Temmuz tarihinde onaylanmış ve açıklanmıştır. Kurumsal Yönetim İlkeleri, SPK aracılığıyla günümüze kadar yayınlanan çeşitli tebliğler ile içerik olarak zenginleştirilmiş ve günümüzün şartlarına uyarlanmıştır (Önalın & Tan, 2018: 47-59).

3.1. Kurumsal Yönetim Tanımı

Türkiye Kurumsal Yönetim Derneğine göre; "Kurumsal Yönetim, şirketlerin hak sahiplerinin ve halkın çıkarlarını zedelemeyecek bir biçimde finansal ve insan kaynaklarını etkin bir şekilde kullanması neticesinde paydaşları için uzun vade de istikrarlı bir ekonomik ortamın oluşmasına imkan tanıyarak ekonomik getiri ve çıkar oluşmasına neden olan, her türlü kanun, yönetmelik, tüzük gibi hukuki uygulamalar ile özel sektörün gönüllü uygulamalarının bir bütünüdür" (<<http://tkyd.org/tr/sss-kurumsal-yonetim-nedir.html>>, 31.03.2021).

Ekonomik İş birliği ve Kalkınma Teşkilatı (OECD) kurumsal yönetimi, şirket yönetim kurulunun, paydaşları ile diğer hak sahipleri aralarındaki ilişkilerin düzenlenmesi olarak tanımlamıştır. Başka bir deyişle, kurumsal yönetim, yönetim kurulu, yöneticiler, hissedarlar, şirket müşterileri, şirkete borç verenler, devlet ve kamu kurumlarındaki diğer paydaşların arasında olan hak ve sorumlulukların paylaşımı ve taraflar arasındaki ilişkilerin düzenlenmesidir (Karayel, 2011: 7-8; Kısakürek vd., 2021: 79-102). Kurumsal yönetimi ekonomik kalkınma ve finansal istikrar için vazgeçilmez bir gereklilik olduğunu söyleyen (Aguilera, 2005: 16) kurumsal yönetimi, şirket sahipleri, hissedarlar ve çıkar grupları arasında kurulması gereken dengeye dayalı bir kültür olduğunu ve bunun "sürdürülebilir kurumsal yönetim modeli" biçiminde değerlendirilmesi gerektiğini ifade eder.

3.2. Kurumsal Yönetim İlkeleri

Kurumsal Yönetim 4 temel evrensel ilkeye sahiptir. Bunlar; şeffaflık, adalet, hesap verebilirlik ve sorumluluktur (Tetik, 2013: 43-58).

- **Şeffaflık:** Şeffaflık ilkesi, şirketlerin finansal açıdan durumunu, performansı, sahiplik yapısı ve yönetimi hakkında, firma ile ilgili tüm önemli hususlarda doğru ve vaktinde açıklama yapma gerekliliğini vurgulamaktadır. Bu ilke gereğince, kamu ile paylaşılacak bilgiler, hak sahiplerinin ve kurumların kararlarını vermelerine yardım edecek biçimde, düşük maliyetli ve erişilebilecek bir şekilde, firmanın web sayfasından kamu ile paylaşılır.
- **Adalet:** Şirket yönetim kurulunun tüm paydaşları ve hak sahiplerine eşit mesafede durması, çıkarlarını göz önünde bulundurarak adil davranmasıdır. Adalet ilkesi, azınlık pay sahipleri ve yabancı hissedarlar ile birlikte tüm paydaşlara eşit davranılması anlamına gelir. Adalet ilkesi, olası bir hak ihlalinin yaşanması halinde yeterli tazminatın alınmasını sağlar.
- **Hesap Verilebilirlik:** Şirketin yönetim kurulu üyeleri almış olduğu kararlar neticesinde tüm paydaşlara hesap vermelidir. Şirketin stratejik yol haritasını,

yönetim kontrolünün etkinliğini ve yönetim kurulu üyelerinin firmaya ve hissedarlarına hesap verebilirliğini içerir.

- **Sorumluluk İlkesi:** Şirket yönetiminin yasal mevzuatlara, sözleşmelere ve iç düzenlemelere uygunluğunun denetlenmesini içerir. Kurumsal yönetim anlayışı dahilinde şirket hissedarlarının hakları yasa ve sözleşmelerde belirtildiği biçimde tanımlanmalıdır (<<http://tkyd.org/tr/sss-kurumsal-yonetim-ilkeleri-nedir.html>>, 03.04.2021).

3.3. BİST Kurumsal Yönetim Endeksi

Bu gelişmeler neticesinde BİST Kurumsal Yönetim Endeksi (XKURY) 31.8.2007 tarihinde 48.082,17 borsaya giriş değeri ile hesap edilmeye başlanmıştır. Kurumsal Yönetim Endeksi, “Kurumsal Yönetim İlkelerine Uyum Notu” 10 puan üzerinden minimum 7 puan olan ve her bir temel konu başlığı için minimum 6,5 puan olan halka açık firmaların hisse fiyat ve getiri performanslarının değerlendirilmesi amacıyla kurulmuştur (Bektaş & Kırkbeşoğlu, 2020: 28-42). Kurumsal Yönetim Endeksi’nin oluşturulmasındaki en önemli motivasyon unsurları ulusal ve uluslararası yatırımcılara daha fazla güven sağlayan bir firmalar seti oluşturmak ve sermaye piyasalarına derinlik ve hacim sağlamaktır (Güleç vd., 2018: 17-44).

3.4. Kurumsal Yönetim Derecelendirme Faaliyeti

Kurumsal yönetim ilkelerine uygun hareket eden firmaların, kamuoyuna doğru ve hızlı bir biçimde vaktinde bildirilmesi çok önemlidir. SPK tarafından, seri 8, ve 51 numaralı “Sermaye Piyasasında Derecelendirme Faaliyeti ve Derecelendirme Kuruluşlarına İlişkin Esaslar Tebliği” 12.07.2007 tarihinde Resmî Gazete ‘de yayımlanarak yürürlüğe girmiştir. Bu tebliğ gereğince, derecelendirme çalışması; “Kredi Derecelendirmesi” ve “Kurumsal Yönetim İlkelerine Uyum Derecelendirmesi” faaliyetlerini kapsar (<<https://www.resmigazete.gov.tr/eskiler/2007/07/20070712-24.htm>>, 06.04.2021). Türkiye’de derecelendirme faaliyeti; Türkiye’de kurulmuş ve SPK’nın derecelendirme yapma yetkisini verdiği kuruluşlar ile SPK’nın kabul ettiği uluslararası derecelendirme kuruluşlarınca gerçekleştirilir (Toraman & Abdioğlu, 2008: 40).

Tablo: 1
Kurumsal Yönetim İlkelerine Uyumluluk Derecelendirmesi Yapmaya Yetkili Kuruluşlar

	Türkiye’de kurulmuş ve SPK’nın yetkilendirdiği derecelendirme kuruluşları	SPK’nın Türkiye’de derecelendirme faaliyetini yapmasını kabul ettiği uluslararası derecelendirme kuruluşları
‘Kurumsal Yönetim İlkelerine Uyum Derecelendirmesi’	1. ‘DRC Derecelendirme Hizmetleri A.Ş.’ 2. National Investor Services Derecelendirme A.Ş. 3. ‘JCR Avrasya Derecelendirme A.Ş.’ 4. ‘Kobirate Uluslararası Kredi Derecelendirme ve Kurumsal Yönetim Hizmetleri A.Ş.’ 5. ‘Saha Kurumsal Yönetim ve Kredi Derecelendirme Hizmetleri A.Ş.’	1. ‘Fitch Ratings Ltd.’ 2. ‘Moody’s Investor Service Inc.’ 3. ‘İstanbul Uluslararası Derecelendirme Hizmetleri A.Ş.’ 4. ‘Standards and Poor’s credit Market Services Europe Limited’

Kaynak: Yazar tarafından oluşturulmuştur.

4. Veri Seti, Araştırma Yöntemi ve Analiz

Çalışmada BİST Kurumsal Yönetim Endeksi (XKURY) bünyesinde olan şirketlerin kurumsal yönetim ilkelerine uyumunu gösteren derecelendirme notları Türkiye Kurumsal Yönetim Derneği (TKYD)'nin web sayfasından, şirketlerin hisse senetleri değerlerine yönelik veriler ise (<<https://tr.investing.com/equities/turkey>>, 31.03.2021) web sitesinden elde edilmiştir. Tüm analizler SPSS programı üzerinde yapılmıştır.

Veri seti incelendiğinde 2016 senesinde kurumsal yönetim endeksinde 50 adet halka açık şirket olduğu ve sırasıyla 2017 yılında 50 adet şirket, 2018 yılında 48 adet şirket, 2019 yılında 50 adet şirket ve 2020 yılında 52 adet şirket olduğu belirlenmiştir. Araştırma kapsamında Kurumsal Yönetim Endeksi içerisinde 2016-2020 yılları arasında incelenen şirketlerin listesi aşağıdaki tabloda gösterilmiştir.

Tablo: 2
2016-2021 yılları arası Kurumsal Yönetim Endeksindeki Şirketler ve Derecelendirme Notları

	Kurumsal Yönetim Endeksi İçinde Bulunan Halka Açık Firmalar	Kurumsal Derecelendirme Notu				
		2016	2017	2018	2019	2020
1	Vestel Elektronik	9,36	9,49	9,55	9,59	9,63
2	Yeşil Gayrimenkul Yatırım Ortaklığı A.Ş.	9,19				
3	Tofaş Türk Otomobil Fabrikası A.Ş.	9,14	9,15	9,2	9,26	9,26
4	Türk Traktör ve Ziraat Makineleri A.Ş.	9,15	9,21	9,22	9,24	9,37
5	Hüriyet	9,28	9,13	9,27	9,29	9,29
6	Tüpraş Türkiye Petrol Rafinerileri A.Ş.	9,42	9,47	9,48	9,5	9,58
7	Otokar Otomotiv ve Savunma Sanayi A.Ş.	9,32	9,33	9,1	9,4	9,47
8	Anadolu Efes Biraçılık ve Malt Sanayi A.Ş.	9,58	9,58	9,58	9,58	9,59
9	Yapı ve Kredi Bankası A.Ş.	9,34	9,43	9,58	9,62	9,62
10	Şekerbank	9,17	9,19	9,27	9,42	9,42
11	Coca Cola İçecek A.Ş.	9,45	9,45	9,45	9,46	9,46
12	Arçelik A.Ş.	9,52	9,52	9,53	9,58	9,6
13	TAV Havalimanları Holding A.Ş.	9,54	9,62	9,62	9,67	9,67
14	Türkiye Sınai Kalkınma Bankası A.Ş.	9,53	9,54	9,54	9,56	9,56
15	Doğan Şirketler Grubu Holding A.Ş.	9,4	9,41	9,42	9,5	9,51
16	Logo Yazılım Sanayi ve Ticaret A.Ş.	9,12	9,08	9,11	9,22	9,22
17	İş Finansal Kiralama A.Ş.	9,17				9,21
18	Türk Telekomünikasyon A.Ş.	9,02	9,18	9,29	9,4	9,4
19	Türk Prysmian Kablo ve Sistemleri	9,09	9,11	9,18	9,33	9,4
20	Turcas Petrol A.Ş.	9,35	9,48	9,57	9,58	9,58
21	Park Elektrik A.Ş.	9,08	9,08	9	9,02	9,02
22	Aygaz A.Ş.	9,36	9,36	9,4	9,42	9,42
23	Albaraka Türk Katılım Bankası A.Ş.	8,75	8,81	8,92	9,04	9,09
24	AG Anadolu Grubu	9,19	9,2	9,53	9,54	9,56
25	İhlas Holding	8,05	8,15	8,33	8,47	8,48
26	İhlas Ev Aletleri İmalat Sanayi ve Ticaret A.Ş.	8,08	8,2	8,38	8,51	8,54
27	Doğuş Otomotiv	9,51	9,63	9,64	9,65	9,67
28	Pınar Süt Mamulleri Sanayi A.Ş.	9,24	9,26	9,27	9,32	9,33
29	Türkiye Halk Bankası A.Ş.	9,3	9,38	9,4	9,43	9,43
30	İş Yatırım Menkul Değerler A.Ş.	9,36	9,38			
31	Global Yatırım Holding A.Ş.	8,99	9,05	9,06	9,06	9,12
32	Garanti Faktoring Hizmetleri A.Ş.	9,26	9,32	9,39	9,42	9,44
33	ENKA İnşaat ve Sanayi A.Ş.	9,18	9,18	9,18	9,28	9,28
34	Pınar Entegre Et ve Ürün Sanayi A.Ş.	9,26	9,29	9,31	9,35	9,36
35	Aselsan Elektronik Ticaret A.Ş.	9,15	9,2	9,2	9,29	9,29
36	İş Gayrimenkul Yatırım Ortaklığı A.Ş.	9,34	9,48			
37	Garanti Yatırım Ortaklığı A.Ş.	9,4	9,43	9,45	9,46	
38	Creditwest Faktoring A.Ş.	8,45	8,53	8,6	8,75	8,81
39	Pınar Su Sanayi ve Ticaret A.Ş.	9,38	9,46	9,5	9,53	9,53
40	Pegasus Hava Taşımacılığı A.Ş.	9,17	9,25	9,4	9,62	9,63

41	AKSA Akrilik Kimya Sanayi A.Ş.	9,6	9,63	9,7	9,72	9,72
42	Akiş Gayrimenkul Yatırım Ortaklığı A.Ş.	9,44	9,49	9,54	9,62	9,63
43	Türkiye Garanti Bankası A.Ş.	9,27	9,51	9,6	9,73	9,77
44	Türkiye Şişe ve Cam Fabrikaları A.Ş.	9,44	9,48	9,53	9,53	9,54
45	Lider Faktoring	9,09	9,1	9,1	9,14	9,14
46	Doğuş Gayrimenkul Yatırım Ortaklığı A.Ş.	8,92	9,17	9,28	9,29	9,34
47	Ereğli Demir ve Çelik Fabrikaları T.A.Ş.	9,02	9,22	9,27	9,49	9,52
48	Anadolu Sigorta	9,3	9,3	9,51	9,55	9,55
49	Migros	9,5	9,58	9,58	9,6	9,67
50	Akmerkez GYO	9,22	9,37	9,37	9,43	9,44
51	Halk Gayrimenkul Yatırım Ortaklığı A.Ş.		9,24	9,27	9,31	9,29
52	TAT Gıda		9,08	9,31	9,41	9,51
53	Batıçim				8,67	8,8
54	ENERJISA				9,45	9,46
55	Türkiye Sigorta A.Ş.					9,31
56	İskenderun Demir ve Çelik A.Ş.					9,45
	Toplam	50	50	48	50	52

Kaynak: <<http://tkyd.org.tr/tkyd-kurumsal-yonetim-komisyonlar-calisma-gruplari-sermaye-piyasasi-calisma-grubu-ve-bist-kurumsal-yonetim-endeksi-kurumsal-yonetim-endeksi-tum-firmalar.html>>, 31.03.2021.

Veri seti oluşturulurken Kurumsal Yönetim Endeksi dahilinde olan firmaların kurumsal yönetim ilkelerine uyum derecelendirme notları belirlenmiş ve notların açıkladıkları tarihlere göre her firmanın BİST kapanış değerlerine erişilmiştir. Kurumsal Yönetim Endeksi içerisindeki firmaların derecelendirme notları açıkladıkları tarihten önceki ve sonraki 30 günlük borsa kapanış değerlerinin ortalaması hesaplanmış ve bu firmaların önceki ve sonraki ortalamaları analize dahil edilmiştir.

İstatistiki varsayım testleri, parametrel ve parametrel olmayan testler biçiminde, ikiye ayrılır. Parametrik hipotezler geçerli olmaz ise, güvenilirliklerini kaybederler. Bu durumda parametrik olmayan testler kullanılmalıdır (Bircan vd., 2003: 69-73).

Parametrik hipotezlerin geçerli olması için gereken varsayımlar aşağıdaki gibidir (Kalaycı, 2008: 49-63).

- 'Veriler, aralıklı ya da oransal olmalıdır.'
- 'Veriler normal dağılıma uymalıdır.'
- 'Grup varyansları eşit (homojen) olmalıdır.'

Analizde kullanılan verilerin normal dağıldığını belirlemek için Kolmogorov-Smirnov ve Shapiro-Wilk normallik testleri yapılmıştır. Uygulanan normallik testleri; Teorik ve gözlenen birikimli dağılım fonksiyonları arasında fark yoktur (verilerin dağılımı normaldir). Ulaşılan test istatistiği sonucunun örneklem büyüklüğü için belirlenen anlamlılık seviyesinde (0,01, 0,05 ve 0,10) değerinden büyük ise H₀ reddedilir ve verilerin normal dağılmadığı ifade edilir (Kalaycı, 2008: 49-63).

Kurumsal yönetim ilkelerine uyum notlarının bildirilmesinden önceki ve sonraki, pay değerleri aynı şirketler üzerinde analiz edileceği için iki adet bağımlı örneklem oluşacaktır. Yapılacak olan analizde veri setinin bu özelliğinden dolayı bağımlı örneklem için t testi (Paired Samples t Test) uygulanmalıdır. Oluşacak iki adet bağımlı örneklem grubuna uygulanacak bu test ile (kurumsal yönetim endeksi içerisindeki firmalara) iki ölçüm yapılarak, sonuçların ortalamaları karşılaştırıldıktan sonra, ortalamalar arasındaki farkın

anlamli olup olmadıđına karar verilecektir. Bu çerçevede yapılan analizde verilerin normal dađıldıđı varsayımı gerçekteştiđi takdirde uygulanacak parametrik test eşleřtirilmiř bađımlı örneklem t testi olacaktır (Ural & Kılıç, 2006: 201).

5. Bulgular

Çalıřmada 2016-2020 yılları arasında Kurumsal Yönetim Endeksi içerisinde bulunan her firma için yıl bazında derecelendirme notunun açıklanmasından önceki ve sonraki 30 günlük hisse deđerlerinin ortalamaları hesaplanmıřtır. Bu yöntem ile ortaya çıkan zaman serisi deđerlerini normal dađılıma yaklařtırmak ve veri setini standardize etmek amacıyla serinin logaritması alınmıřtır. Böylece 2016-2020 yılları arasında Kurumsal Yönetim Endeksi içerisinde bulunan firmaların hisse deđerlerinin normal dađılımını gösteren Tablo 3 istatistikleri oluřmuřtur.

Tablo: 3
Kolmogorov-Smirnov ve Shapiro-Wilk Normallik Dađılım Testi Sonuçları

Yıl	Derecelendirme Notu	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	n	significant	Statistic	n	Significant
2016	Öncesi	0,106	50	0,200	0,968	50	0,193
	Sonrası	0,106		0,200	0,970		0,237
2017	Öncesi	0,081	50	0,200	0,971	50	0,265
	Sonrası	0,100		0,200	0,964		0,129
2018	Öncesi	0,071	48	0,200	0,979	48	0,549
	Sonrası	0,73		0,200	0,981		0,627
2019	Öncesi	0,102	50	0,200	0,968	50	0,191
	Sonrası	0,095		0,200	0,972		0,273
2020	Öncesi	0,078	52	0,200	0,977	52	0,420
	Sonrası	0,083		0,200	0,975		0,338

Uygulanan Kolmogorov-Smirnov ve Shapiro-Wilk normallik testleri sonuçlarına göre; 2016-2020 yılları arasında Kurumsal Yönetim Endeksi içerisinde bulunan firmaların derecelendirme notlarının açıklanmasından önce ve sonraki hisse deđerleri verilerinin normal dađılıma uygunluđunu göstermek amacıyla oluřturulan hipotezler řu řekildedir:

- **Bořluk Hipotezi:** Veriler normal dađılıma uygun deđildir.
- **Alternatif Hipotez:** Veriler normal dađılmıřtır.

Tablo 3'te her iki normallik testinin, önemlilik (significant) sonuçları 0,05'ten büyük olması nedeniyle; %5 anlamlılık düzeyine göre, bořluk hipotezi reddedilerek, alternatif hipotez olan verilerin normal dađıldıđı kabul edilir.

Bu sonuçlara istinaden normallik dađılımını ön kořul olarak isteyen 'Eřleřtirilmiř Bađımlı Örneklem t-Testi' çalıřmada kullanılan verilere uygulanabilir. Bu çerçevede kurumsal yönetim ilkelerinin, çalıřmada kullanılan hisse deđerleri üzerindeki etkisini ölçmek amacıyla uygulanacak Eřleřtirilmiř Bađımlı Örneklem t-Testinin hipotezleri řöyle olacaktır.

- **Bořluk Hipotezi:** Kurumsal yönetim endeksi içerisinde bulunan firmaların, kurumsal yönetim ilkelerine uyum notlarının ilan edilmesinden önceki hisse

fiyatları ile ilan edilmesinden sonraki hisse fiyatları arasında istatistiki bakımdan anlamlı fark yoktur.

- **Alternatif Hipotez:** Kurumsal yönetim endeksi içerisinde bulunan firmaların, kurumsal yönetim ilkelerine uyum notlarının ilan edilmesinden önceki hisse fiyatları ile ilan edilmesinden sonraki hisse fiyatları arasında istatistiki bakımdan anlamlı fark vardır.

Kurumsal yönetim endeksi (XKURY) içerisinde 2016, 2017, 2018, 2019 ve 2020 yılları arasında bulunan firmalar için, incelen aralıktaki her yıl bazında derecelendirme notu öncesi ve sonrası 30 günlük hisse değerlerinin ortalamasından oluşan standardize edilmiş veriye eşleştirilmiş bağımlı örneklem t testi SPSS programı üzerinde uygulanmıştır. Oluşan sonuçlar Tablo 4'te gösterilmiştir.

Tablo: 4
Eşleştirilmiş Bağımlı Örneklem t - Testi Sonuçları

Yıl	T- Testi İstatistiği	Significant (P) Olasılık Değeri
2016	-2,840	0,007
2017	-2,736	0,009
2018	1,943	0,058
2019	-5,511	0,000
2020	-1,979	0,053

Tablo 4'te görülen, eşleştirilmiş bağımlı örneklem t testi sonuçlarına göre; 2016, 2017 ve 2019 yılları için oluşan Significant (P), yani önem olasılık değerleri 0,01'den küçük çıkmıştır. Bunun anlamı bu yıllarda kurumsal yönetim endeksi içerisinde bulunan firmalara ait açıklanan derecelendirme notu öncesi ve sonrasında hisse değerlerinin karşılaştırılmasında %1 anlamlılık düzeyinde olumlu bir ilişki olduğu göstermektedir.

Diğer bir ifade ile bu yıllar için **Boşluk Hipotezi** %1 anlamlılık düzeyine göre reddedilerek, **Alternatif Hipotez** olan 'Kurumsal yönetim endeksi içerisinde bulunan firmaların, kurumsal yönetim ilkelerine uyum notlarının ilan edilmesinden önceki hisse fiyatları ile ilan edilmesinden sonraki hisse fiyatları arasında istatistiki açıdan anlamlı fark vardır hipotezi kabul edilir.

Tablo 4 sonuçlarında görülen, 2018 ve 2020 yıllarına ait bulgulara göre ise, eşleştirilmiş bağımlı örneklem t testi Significant (P) Olasılık değerleri (her ne kadar %10'a göre anlamlı görünse de) sırasıyla, 0,058 ve 0,053 değerleri 0,05 değerinin çok az üzerinde çıkarak %5 anlamlılık düzeyinin dışına çıkmıştır. Yine başka bir ifade ile %5 anlamlılık düzeyine göre, **Alternatif Hipotez** reddedilerek, **Boşluk Hipotezi** olan 'Kurumsal yönetim endeksi içerisinde bulunan firmaların, kurumsal yönetim ilkelerine uyum notlarının ilan edilmesinden önceki hisse fiyatları ile ilan edilmesinden sonraki hisse fiyatları arasında istatistiki açıdan anlamlı fark yoktur.' ifadesi kabul edilir. Tablo 4'te ortaya çıkan sonuçlara dayanarak elde edilen bulgular şöyledir:

- Kurumsal yönetim endeksinde 2016, 2017 ve 2019 yılları arasında bulunan firmaların derecelendirme notu açıklanma öncesi ve sonrası hisse senedi değerlerinde %1 düzeyinde anlamlı fark tespit edilmiştir.
- Kurumsal yönetim endeksinde 2018 ve 2020 yıllarında bulunan firmaların derecelendirme notu açıklanma öncesi ve sonrası hisse senedi değerlerinde çok az bir farkla %5 düzeyinde anlamlı bir fark tespit edilememiş ancak sonuçların %10 düzeyinde anlamlı olduğu görülmüştür.

6. Sonuç ve Genel Değerlendirme

Borsa İstanbul'da faaliyette olan 'Kurumsal Yönetim Endeksi' (XKURY) içerisindeki 2016-2020 yılları arasında bulunan firmaların hisse senedi değerleri üzerinde, kurumsal yönetim ilkelerine uyum notunun etkisinin araştırıldığı bu çalışmada, 2016, 2017 ve 2019 yıllarında kurumsal yönetim ilkelerine uyan firmaların hisse senedi değerleri üzerinde %1 seviyesinde anlamlı bir bağlantı olduğu tespit edilmiştir. Başka bir ifade ile kurumsal yönetim ilkelerine uyum notlarının ilan edilmesinden sonra bu firmaların hisse değerleri üzerinde, açıklanmasından önceki döneme kıyas ile yükseliş olduğu eşleştirilmiş bağımlı örneklem t testi sonuçlarında görülmüştür.

Kurumsal yönetim endeksinde 2018 ve 2020 yıllarında bulunan firmaların kurumsal yönetim ilkelerine uyum notlarının ilan edilmesinden önceki ve sonraki dönemde firmaların hisse senedi değerlerinde %5 anlamlılık seviyesine göre önemli bir fark yoktur. Yine başka bir ifade ile, 2018 ve 2020 yıllarında şirketlerin kurumsal yönetim ilkelerine uyum notlarının ilan edilmesinden sonra hisse senedi değerleri üzerinde, önceki döneme kıyas ile %5 seviyesine göre istatistiki anlamlı bir fark olmadığı eşleştirilmiş bağımlı örneklem t testi sonuçlarında görülmüştür.

Ancak kurumsal yönetim ilkelerini uygulayan firmaların, 2018 ve 2020 yıllarında hisse senedi değerleri üzerindeki (her ne kadar %10 düzeyinde anlamlı olsa da) değişimin %5 düzeyinde istatistiki anlamı olmamasının nedenleri arasında incelenen yıllarda yaşanan makro ekonomik koşulların etkisinin olduğu söylenebilir. Zira yatırımcıların piyasa değerlendirmelerinde, 2018 yılında yaşanan döviz kurundaki sert dalgalanmanın ve 2020 yılında tüm dünyada pandemi durumuna dönüşen Covid-19 salgını etkilerinin, kurumsal yönetim ilkelerine uyum notundan daha fazla risk taşıdığı yönündeki eğilimlerin etkili olduğu belirtilebilir.

Literatürde Kurumsal Yönetim İlkelerine yönelik olarak yapılan araştırmalarda bu çalışmanın 2018 yılı sonuçlarına benzer olarak, Bektaş ve Kırkbeşoğlu 'nun 2020 yılında yapmış oldukları çalışmalarında 2018 yılında XKURY endeksinde yer alan finans sektöründeki firmaların kurumsal yönetim ilkelerine uyum notları ile bu firmaların hisse senedi değerleri üzerinde abnormal bir getiri elde edilemediği görülmüştür.

Önder ve Kavak'ın 2019 yılında yaptıkları çalışmada, bu çalışmanın 2017 yılı sonuçlarına benzer olarak, 2008-2017 yıllarında Borsa İstanbul'da Sigorta sektöründeki

7şirketin finansal başarıları ile kurumsal yönetim yapıları arasında istatistiksel açıdan anlamlı ilişki olduğu belirtilmiştir.

Güngör ve Güney'in 2019 yılındaki çalışmalarında, bu çalışmanın 2016 ve 2017 yılı sonuçlarına benzer olarak, 2010-2017 dönemi için araştırma sonuçlarında iyi bir kurumsal yönetimin hisse senedi getirileri üzerinde pozitif ve anlamlı etkisi olduğunu belirtilmiştir.

Kömeçoğlu ve Vuran'ın 2018'de yaptıkları çalışmada, bu çalışmanın 2016 yılı sonuçlarına benzer olarak, Borsa İstanbul'da işlem gören ve kurumsal yönetim endeksinde çeşitli sektörlerde yer alan 72 firmanın 2012-2016 yılları arasında kurumsal yönetim ile şirketin piyasa değeri arasında anlamlı bir ilişki olduğu belirtilmiştir.

Literatürde bu araştırma sonuçlarının aksi yönünde sonuçlar elde eden çalışmalarda mevcuttur. Gergin ve Şen'in 2019 yılındaki çalışmalarında, 2012-2017 yılları arasında bankaların kurumsal yönetim endeksinde yer almalarının finansal performanslarına etkisinin olmadığı belirtilmiştir.

Erdoğan'ın 2019 yılındaki çalışmasının sonuçlarında 2007-2013 yılları arasında BİST-100'de faaliyet gösteren söz konusu şirketlerin kurumsal yönetim notları ile finansal performansları arasında bir ilişki tespit edilememiştir.

Turnacıgil'in 2018'de hazırladığı doktora tezinde 2009-2016 yılları arasında kurumsal yönetim endeksinde yer alan ve en az beş yıllık kurumsal yönetim notu olan 19 adet firmanın kurumsal yönetim uygulamalarının hisse senedi getirileri üzerinde negatif etkisi olduğu belirtilmiştir.

Yatırımcıların, yatırım yapacakları firmalar ile ilgili önceden bazı araştırmalar yapmaları rasyonel bir davranıştır. Yatırımcılar tarafından yatırım kararı alınmadan önce yatırım yapılacak firmanın değerlendirilmesi aşamasında finansal ve mali tablolar kadar kurumsal yönetim ilkelerine uyum notu da dikkate alınmaktadır. Bu bağlamda firmalar, kurumsal yönetim ilkelerini uygulamaya koyarak yatırımcılar için cazip bir yatırım fırsatı haline gelebilirler. Dolayısı ile firmalar, kurumsal yönetim ilkelerini başarılı bir biçimde uygulamaya koyabildikleri takdirde, süreç içerisinde piyasada firmalarının hisse senedi değerlerindeki artış ile doğru orantılı olarak yatırımcıların ilgilerini de üzerlerine çekmeyi başaracaklardır.

Bu çalışmanın yapıldığı tarih itibariyle 52 adet firma kurumsal yönetim endeksi içerisinde ve her geçen yıl kurumsal yönetim uygulamalarını benimseyen firma sayısı artmaktadır. Gerek literatürde gerekse bu çalışmanın sonuçları itibariyle kurumsal yönetim ilkeleri uygulamalarının firmaların hisse değerleri performansı üzerinde olumlu bir etkisi olduğu görülmüştür. Bu çerçevede yatırımcılar için yatırım kararı verme aşamasında bir cazibe kriteri olan kurumsal yönetim ilkelerinin piyasalara istikrar ve derinlik katacağını ifade edebiliriz. Çalışmanın bir sonraki aşamasında kriz dönemlerinde kurumsal yönetim endeksindeki şirketler ile diğer sektör şirketlerinin nasıl etkilendiklerinin incelenmesi

ülkemizde sık rastlanan benzer durumlarda şirketlerin rekabet güçlerinin korunması açısından yararlı olacaktır.

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Bütçe Dengesinin Büyüme Üzerindeki Etkisinde Yönetişimin Rolü: Panel Veri Analizi¹

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The Role of Governance in the Impact of Budget Balance on Growth: Panel Data Analysis²

Abstract

This study aims to reveal the role of governance in the relationship between budget balance and economic growth. For this purpose, unlike the previous studies in the literature, Hansen's (1999) panel threshold regression analysis was used as a method. A total of 28 countries covering the period 2006-2018 were selected as samples. Findings from the fixed effects model show a positive and non-linear relationship between budget balance and economic growth. Findings from the panel threshold method, on the other hand, show that governance is an important tool in determining the size of the effects of the budget balance on economic growth. Budget surplus both below and above the threshold value obtained from the analysis positively affects economic growth. However, the positive effect of the budget surplus in countries with poor governance (where governance is below the threshold) on economic growth is much more effective and significant than the budget surplus in countries with good governance (where governance is above the threshold).

Keywords : Budget, Economic Growth, Governance, Panel Threshold Method.

JEL Classification Codes : G30, H60, O10.

Öz

Bu çalışmanın amacı, bütçe dengesi ile ekonomik büyüme arasındaki ilişkide yönetişimin rolünü ortaya koymaktır. Bu amaçla, literatürde yer alan öncül çalışmalardan farklı olarak Hansen (1999) panel eşik regresyon analizi yöntem olarak kullanılmıştır. 2006-2018 dönemini kapsayan toplam 28 ülke örneklem olarak seçilmiştir. Sabit etkiler modelinden elde edilen bulgular, bütçe dengesi ile ekonomik büyüme arasında pozitif ve doğrusal olmayan bir ilişki olduğunu göstermektedir. Panel eşik yönteminden elde edilen bulgular ise, bütçe dengesinin ekonomik büyüme üzerindeki etkilerinin büyüklüğünün belirlenmesinde yönetişimin önemli bir araç olduğunu göstermektedir. Analiz neticesinde elde edilen eşik değerler hem altında hem de üstünde bütçe fazlası ekonomik büyümeyi pozitif yönde etkilemektedir. Ancak, yönetişimin iyi olmadığı (yönetişimin eşik değerinin altında olduğu) ülkelerdeki bütçe fazlasının, yönetişimin iyi olduğu (yönetişimin eşik değerinin üzerinde olduğu) ülkelerdeki bütçe fazlasına nazaran ekonomik büyüme üzerindeki pozitif etkisi çok daha etkili ve önemli olmaktadır.

¹ Bu makale Doç. Dr. Hale Akbulut danışmanlığında Mustafa Kurt tarafından hazırlanan "Bütçe Dengesinin Büyüme Üzerindeki Etkisinde İyi Yönetişimin Rolü" başlıklı doktora tezinden türetilmiştir.

² This article is derived from the doctoral dissertation titled "The Role of Good Governance in the Effect of Budgetary Balance on Growth", prepared by Mustafa Kurt, which Assc.Prof.Dr. Hale Akbulut supervised.

Anahtar Sözcükler : Bütçe, Ekonomik Büyüme, Yönetişim, Panel Eşik Yöntemi.

1. Giriş

Ekonomik büyümeyi etkileyen unsurların neler olduğu geçmişten günümüze iktisat bilimi ile ilgilenenlerin temel ilgi alanlarından biri olmuştur. Söz konusu unsurların tespiti için, ekonomik ve ekonomik olmayan pek çok farklı değişken ele alınmıştır. Bu değişkenler arasında kamu bütçesi de yer almaktadır. Bununla birlikte, bütçe dengesinin ekonomik büyümeyi ne yönde etkileyeceğine ilişkin görüş birliği halen mevcut değildir.

Kamu harcamaları ve vergilerin minimum seviyede tutulmasını savunan iktisatçılar olduğu gibi, kamu harcamaları aracılığıyla genişletici bütçe politikası uygulayarak ekonomik büyüme üzerinde pozitif etkilerin yaratılabileceğini savunan iktisatçılar da bulunmaktadır.

Toplumsal refahı ve kişi başına düşen geliri artırmak bütün ekonomiler için temel hedeflerdendir. Bu amaç doğrultusunda bütçe politikaları son derece önemli bir araçtır. Ancak ekonomik büyümeyi sağlamak için kullanılan bütçe politikalarının olası etkilerinin analiz edilmesi gerekmektedir. Bunun yanı sıra son zamanlarda yapılan çalışmalarda, ekonomik büyümeyi etkileyebilecek unsur olarak yönetişimin rolüne de odaklanılmaktadır.

Yönetişimin kalitesine bağlı olarak, belli amaçlar için kullanılan bütçe politikaları beklenenden farklı sonuçlara sebep olabilmektedir. Bu nedenle, bütçe politikalarının etkinliğinde yönetişimin rolünün belirlenmesi oldukça önemlidir. Yönetişim kalitesinin görece yüksek olduğu ülkelerde bütçe politikalarının ekonomik büyüme üzerinde etkilerinin iki farklı şekilde ortaya çıkması beklenmektedir. Birincisi; yönetişim kalitesinin yüksek olduğu ülkelerde bütçe fazlası verimli alanlarda değerlendirilerek ekonomik büyüme üzerinde görece olumlu etkiler yaratabilir. Diğer yandan; yönetişim kalitesinin yüksek olduğu ülkelerde özel sektör faaliyette bulunmak için daha güvenli bir ortam bulacak, böylelikle ekonomik büyüme temel olarak özel sektör kanalıyla gerçekleşirken bütçe politikalarının etkisi görece sınırlı kalacaktır. Etkilerin ne yönde olacağı belirsiz olsa da her iki durumda da yönetişim kalitesine bağlı olarak bütçe dengesinin ekonomik büyüme üzerindeki etkisinin farklılaşması beklenmektedir. Bu bağlamda, çalışmanın temel hipotezi şu şekilde ifade edilebilir: "Yönetişimin kalitesi, bütçe dengesi ile ekonomik büyüme arasındaki ilişki üzerinde istatistiksel olarak anlamlı bir etkiye sahiptir".

Hipotezin test edilmesinde, Türkiye ve 27 Avrupa Birliği üye ülkesine ait 2006-2018 dönemi verilerinden yararlanılmıştır. Daha önce yapılan çalışmalardan farklı olarak, çalışmamızda, Hansen (1999) tarafından geliştirilen panel eşik yöntemi, bütçe dengesi ile ekonomik büyüme arasındaki ilişkiyi analiz etmek için kullanılmaktadır. Söz konusu yöntem; olası doğrusal olmayan ilişkileri ve üçüncü bir değişkenin iki ana değişken arasındaki ilişki üzerindeki etkisini gözlemlememize imkân sağlar. Buradan hareketle, söz konusu yöntemi kullanarak tarafımızca yapılan bu çalışma, bütçe dengesinin büyüme

üzerindeki etkisinde yönetişimin etkisini gözlemlememize ve yönetişim için eşik bir değer belirlememize imkân tanımaktadır.

Çalışma dört temel bölümden oluşmaktadır. Birinci bölümde; konuya giriş yapılarak çalışmanın temel hipotezi ifade edilmiştir. İkinci bölümde; bütçe dengesi, ekonomik büyüme ve yönetişim ilişkisine yönelik teori ve literatürde yer alan ampirik çalışmalara yer verilmektedir. Üçüncü bölümde; ampirik analizde kullanılan veriler, yöntem ve model açıklanarak bulgular ortaya konulmuştur. Son bölümde ise ampirik bulgular değerlendirilerek yorumlanmış, politika önerileri sunulmuştur.

2. Literatür

Ekonomik büyüme, iktisat literatüründe üzerinde en çok durulan konulardan biridir. Klasik iktisatçılar azın önemine dikkat çekerken; temeli Keynesyen iktisada dayanan ekonomik büyüme teorileri kısa vadede toplam talebin önemini vurgulamışlardır. Öte yandan, söz konusu teorilerin uzun vadeli ekonomik büyümeyi açıklayamadıkları gözlemlenmiştir. Bu nedenle, özellikle 1980'lerden sonra uzun vadede ekonomik büyümenin ne şekilde gerçekleşeceğine ilişkin teoriler ortaya çıkmaya başlamıştır. Söz konusu değişim, maliye ve para politikalarına ek olarak kamu faaliyetlerinin bütün yönlerini içermektedir (Barro, 1998: 2).

Solow (1956) ve Swan'ın (1956) neo-klasik büyüme modellerinde, uzun vadede ekonomik büyümeyi etkileyen tek değişken teknolojik ilerlemedir. Ancak, teknolojik ilerleme dışsal bir değişken olarak kabul edildiği için ekonomik büyüme tam olarak açıklanamamıştır. Daha sonraki çalışmalarda ise, Romer (1986), üretkenlik kazanımlarını yönlendiren herhangi bir faktörün olası katkısını modele dâhil ederek içsel büyüme teorisini geliştirmiştir. İçsel büyüme teorilerine göre, beşerî sermayenin kalitesi, bilim ve teknolojik gelişimin sağlanması için devletin desteği, hükümetin yatırım ortamı sağlama ve son teknolojileri çekmedeki etkisi ve fikri mülkiyet hakların korunması amacıyla gerekli koşulların sağlanması gibi faktörler ekonomik büyümenin belirleyicileridir (Fine, 2004: 251-252). Dolayısıyla, içsel büyüme teorilerinde, kalkınma sürecinde devletin müdahalesi savunulmaktadır. Barro (1990) ve King ve Rebello (1990) ise; içsel büyüme teorisine kamu sektörünü dâhil etmek suretiyle katkıda bulunmuşlardır. Bununla birlikte hem modern hem de geleneksel iktisat teorilerindeki ekonomik büyümenin belirleyicileri olarak genellikle iktisadi faktörler ele alınmıştır. Kurumsal iktisat teorisinde ise, bir ülkenin kurumlarının ve kalitesinin elde ettiği teşvikler ile iktisadi faktörlerin etkinliğinin ölçülebileceği ifade edilmektedir (Acemoglu & Robinson, 2008: 2). Buradan hareketle kurumsallık ile ekonomik büyüme ilişkisi üzerine çok sayıda çalışma yapan North (1999), mülkiyet haklarını güvence altına alan ve teşvik unsuruna sahip siyasi otorite aracılığıyla etkin kurumların oluşabileceğini ifade etmekte ve yönetişim göstergelerine atıfta bulunarak kurumların yönetişim kalitesinin ekonomik büyüme üzerinde etkili olduğunu savunmaktadır. Nitekim kurumsal iktisat teorisi de kurumsal açıdan iyi olan ülkelerin, teknoloji, beşerî sermaye ve sanayileşmeye daha fazla yatırım yaparak ekonomik büyümeyi tetiklediğine işaret etmektedir.

Bütçe dengesi ve ekonomik büyüme ilişkisini ele alan farklı teorik görüşlerin yarattığı belirsizlik, ampirik çalışmalar yoluyla da giderilememiştir. Söz konusu çalışmaların bulguları; kullanılan veri seti, seçilen yöntemler ve ele alınan dönem farklılıkları nedeniyle oldukça farklılık göstermektedir. Ek olarak, kamu politikalarını ele alan çalışmaların büyük bir bölümünde kamu harcamalarının gösterge olarak kullanıldığı görülmektedir. Örneğin Barro (1991), ekonomik büyüme ile kamu yatırım harcamaları ilişkisinin düşük seviyede olduğuna dair bulgulara ulaşmıştır. Ayrıca kamu tüketim harcamalarının ekonomik büyümeye negatif bir etkide bulunduğu ve siyasi istikrar ile ekonomik büyüme ilişkisinin ise pozitif yönlü olduğuna dair sonuçlar elde etmiştir. Oktayer ve Susam'ın (2008) çalışmasında, toplam kamu harcamalarının ekonomik büyümeye etkisi istatistiksel olarak anlamsız çıkmıştır. Öte yandan kamu yatırım harcamalarının ekonomik büyümeye pozitif etkide bulunduğu tespit edilmiştir.

Literatürde, bütçe dengesi ile ekonomik büyüme arasındaki ilişkiye odaklanan çalışmalar da mevcuttur. Nelson ve Singh (1994), gelişmekte olan 70 ülke için bütçe açıklarının ekonomik büyümeyi etkilediğine ilişkin anlamlı bir neticeye ulaşamazken, Ghali (1997) de benzer şekilde Suudi Arabistan örneğini ele aldığı çalışmasında anlamlı bir ilişki tespit edememiştir. Öte yandan, bütçe dengesinin ekonomik büyüme üzerine etkide bulunduğunu ifade eden çalışmalara da rastlamak mümkündür. Fisher (1993), seçili Asya, Avrupa ve Latin Amerika ülkelerini ele aldığı çalışmada, bütçe fazlası ile ekonomik büyüme arasında istatistiksel olarak anlamlı ve güçlü bir pozitif ilişki olduğuna dair bulgulara ulaşmıştır. Ayrıca Fisher (1993); bütçe fazlasında %1 oranındaki iyileşmenin ekonomik büyümeyi %0,23 oranında arttıracakını ifade etmektedir. Nihayetinde Fisher (1993), daha büyük bütçe fazlası, daha fazla sermaye birikimi ve daha fazla verimlilik (üretkenlik) artışı aracılığıyla, daha hızlı ekonomik büyümenin sağlanabileceği sonucuna ulaşmıştır. Bunun yanı sıra, Easterly ve Rebelo (1993) 28 ülke için panel veri analizi yapmış oldukları çalışmada, ekonomik büyüme ve bütçe fazlaları arasında tutarlı bir pozitif ilişki tespit etmiştir. Benos (2005) da 16 OECD ülkesi için yapmış olduğu analizler neticesinde, bütçe fazlalarının ekonomik büyümeyi pozitif yönde etkilediğini tespit etmiştir.

Bütçe fazlası neticesinde elde edilen kaynakların kullanımına bağlı olarak ekonomik büyüme üzerindeki etkiler de farklılık gösterebilir. Nitekim Helms (1985) ABD'deki 48 eyalet için, vergiler yoluyla elde edilen kaynakların transfer harcamaları için kullanılması durumunda ekonomik büyümenin negatif yönde etkileneceğini tespit etmiştir. Öte yandan, kaynakların kamu sağlığı ve güvenliği, eğitim, otoyollar gibi kamusal hizmetleri geliştirmek için kullanıldığı durumda ise ekonomik büyümenin pozitif yönde etkileneceği sonucuna ulaşmıştır. Kneller vd. (1999), 22 OECD ülkesi için üretken kamu harcamalarının ekonomik büyümeye pozitif yönde etkide bulunduğunu, üretken olmayan kamu harcamalarının ise ekonomik büyümeyi arttırmadığını tespit etmiştir.

Son olarak, Adak (2010); Türkiye'de yıllık bütçe açıklarının aynı yılın ekonomik büyümesine olumsuz yönde etkide bulunduğunu gözlemlerken, Bektaş (2019); Türkiye ve Almanya'da bütçe dengesinin ekonomik büyüme üzerinde pozitif yönde etkili olduğunu tespit etmiştir.

Görüldüğü gibi yapılan çalışmalar bütçe dengesi ile ekonomik büyüme arasındaki ilişkiyi çok farklı açılardan incelemiş, birbirinden farklılaşan sonuçlara ulaşmıştır. Bunun yanı sıra son zamanlarda yapılan çalışmalarda, ekonomik büyümeyi etkileyebilecek unsur olarak yönetişimin rolüne de odaklanılmaktadır. Bu kapsamda yönetişim ve ekonomik büyüme ilişkisini ele alan çalışmalara da değinmek yerinde olacaktır.

Kurumsal kalite kavramı genellikle yönetişim kavramına atıfta bulunarak kullanılmaktadır. Yönetişim, yönetim kavramından türetilmiştir ve birlikte yönetmek anlamına gelmektedir (Toksöz, 2008: 17). Literatürdeki pek çok çalışma yönetişim ile ekonomik büyüme arasında anlamlı bir ilişkinin olduğunu göstermektedir. Ancak yönetişim ile ekonomik büyüme arasında hiçbir ilişkinin olmadığını veya zayıf bir ilişkinin olduğunu öne süren çalışmalar da bulunmaktadır. Söz konusu çalışmaların bazıları aşağıda sıralanmaktadır.

Adam vd. (2011), kamu sektörü verimliliğini hesaplamak için 19 OECD ülkesini ele aldıkları çalışmada, kamu sektörü verimliliğini belirlemede yönetişimin bireysel ülke özelliklerinden daha önemli olduğunu tespit etmişlerdir. Chan ve Karim (2012), Doğu Asya ülkeleri için politik ve ekonomik faktörlerin kamu sektörü verimliliği üzerindeki etkilerini analiz ettikleri çalışmada, ifade özgürlüğü ve hesap verebilirlikteki artışın hükümetlerin kamu harcaması yapma noktasında daha temkinli davranmasına neden olduğunu tespit etmiştir. Feeny ve Rogers (2008), daha iyi yönetişim düzeylerinin gelişmekte olan ada devletlerinde bütçe harcamalarının verimliliğini artırdığını gözlemlerken, Rayp ve Van de Sijpe (2007) düşük ve düşük orta gelirli 52 ülke için yapmış oldukları çalışmada, iyi yönetişimin bütçe harcamalarının verimliliği üzerinde pozitif bir etkisi olduğunu tespit etmiştir. Ayrıca, Rajkumar ve Swaroop (2008), gelişmiş ve gelişmekte olan 91 ülke için ele aldığı çalışmada, yönetişim kalitesinin sağlık ve eğitim alanındaki bütçe harcamalarının etkinliğini etkilediğini savunmaktadır.

Doğanay ve Değer (2020), az gelişmiş, gelişmekte olan ve gelişmiş 134 ülke için ele aldığı çalışmada, kurumların ekonomik büyüme için önemli olduğunu tespit etmiştir. Söz konusu çalışma, kurumların kalitesinin yanı sıra hükümet harcamaları, nüfus artış hızı, enflasyon gibi yapısal faktörlerin de ülkelerin ekonomik büyümesi üzerinde önemli etkisi olduğunu ortaya koymaktadır. Ağazade vd. (2020), kurumsal yapının ekonomik büyüme için önemli olduğunu tespit etmek amacıyla Doğu Avrupa geçiş ekonomilerini ele aldıkları çalışmada, kurumsal gelişmeler ile ekonomik büyüme ilişkisinin pozitif yönde olduğunu tespit etmiştir.

North ve Thomas (1973), mülkiyet haklarının güvence altına alınmamasının, fiziki ve beşerî sermaye yatırımlarını engellediğini ileri sürmektedir. Dolayısıyla ekonomik büyüme de söz konusu durumdan olumsuz yönde etkilenmektedir. Başka bir ifadeyle, mülkiyet hakları ve ekonomik büyüme arasında pozitif yönde bir ilişkinin varlığından bahsetmek mümkündür. Nitekim Hall ve Jones (1999), Knack ve Keefer (1995), yapmış oldukları çalışmalarda mülkiyet hakkı ile ekonomik büyüme ilişkisinin pozitif yönlü olduğunu tespit etmişlerdir. Ek olarak, Figankaplan (2017), 11 ülke için ele aldığı çalışmada,

mülkiyet haklarının korunması, hukukun üstünlüğü ve yolsuzluğun kontrolü değişkenleri ile ekonomik büyüme ilişkisinin pozitif yönlü olduğunu tespit etmiştir.

Çiçen ve Arslan (2020), eski ve yeni Kırılgan Beşli olarak nitelendirilen toplam 9 kırılgan ülke için ele aldıkları çalışmada, kurumsal yapılarıdaki iyileşmelerin ekonomik performansı olumlu yönde etkilediklerini tespit etmişlerdir. Koçak ve Uzay (2018), yüksek, orta ve düşük gelirli ülkeler için yapmış oldukları çalışmada, kurumların ekonomik büyüme üzerinde önemli bir etkisi olduğunu tespit etmişlerdir. Dolayısıyla, ilgili ülkelerin kurumlarında meydana gelebilecek bir iyileşmenin ekonomik büyüme üzerinde pozitif bir etkisi olacağından bahsetmek mümkündür.

Reynolds (1983), demokrasinin ana unsurlarından hükümetin yönetsel yetkisi ve siyasal örgütlenmenin, ekonomik büyümenin gerçekleşmemesinin en önemli açıklayıcı değişkeni olduğunu ifade etmektedir. Ek olarak, Barış (2015), evrensel yönetim göstergelerinden hukukun üstünlüğü, politik istikrar ve hükümetin etkinliği ile bütçe dengesi ilişkisinin istatistiksel olarak anlamlı ve pozitif olduğunu savunmaktadır. Acemoglu ve diğerleri (2008), Torsten ve Tabellini (2006) ve Cooray (2009); iyi yönetişimin ekonomik büyümeyi pozitif yönde etkilediğini savunurken, Demirtaş (2009) söz konusu değişkenler arasında anlamlı bir ilişki tespit edememiştir.

Görüldüğü gibi literatürde bütçe dengesi ve yönetim ile ekonomik büyüme ilişkisini direkt olarak ele alan çok sayıda çalışmaya rastlamak mümkündür. Bununla birlikte bütçe dengesinin ekonomik büyüme üzerindeki etkisini incelerken yönetişimin rejim değişikliği yaratabilecek rolünün dikkate alınmadığı gözlemlenmiştir. Tarafımızca yapılan bu çalışmada; bütçe dengesi ile ekonomik büyüme arasındaki ilişki incelenirken, öncül çalışmalardan farklı olarak iyi yönetişimin rolü dikkate alınacak ve rejim etkilerinin belirlenebilmesinde yönetim için uygun eşik değer tespit edilecektir. Bu bağlamda, çalışmanın bütçe ve ekonomik büyümeye ilişkin kamu politikalarının oluşturulmasında yol gösterici nitelikte olacağı beklenmektedir.

3. Bütçe Dengesi ve Ekonomik Büyüme: Ampirik Analiz

3.1. Veri ve Yöntem

Çalışmada bütçe dengesinin büyüme üzerindeki etkisinde iyi yönetişimin rolü, Türkiye ve 27 Avrupa Birliği ülkesi için panel veri yöntemi ile analiz edilmektedir. Analiz dönemi olarak 2006-2018 yıllık zaman aralığı ele alınmıştır. Söz konusu dönem, dengeli panel veri analizi yapılabilecek mümkün olan en geniş veri setini sunması bakımından tercih edilmiştir. Toplam gözlem sayısı 336'ya eşittir.

Panel veri analizi hem yatay kesiti hem de zaman serilerini birlikte ele aldığı için araştırmacılara daha geniş gözlem sayısı ile çalışma imkânı sunmakta, böylelikle parametre tahminlerinin daha güvenilir hale gelmesini sağlamaktadır. Panel veri yöntemi ayrıca, karmaşık davranışlara sahip modeller üzerinde çalışma imkânı sunmakta (Gujarati, 2004:

638) ve değişkenler arasındaki doğrusallığı azaltarak (Baltagi, 2001: 6) görece güvenilir sonuçlar elde edilmesini sağlamaktadır.

Literatürdeki çalışmaların yönetişimin göstergesi olarak farklı ölçümlerden yararlandıkları gözlemlenmektedir. Buna göre; Dünya Bankası veri tabanı (World Governance Indicators) ile Freedom House tarafından yıllık olarak yayımlanan Gastil Endeksi (Gastil Index), Uluslararası Ülke Risk Rehberi Yönetişim Endeksi (International Country Risk Guide Index), Uluslararası Şeffaflık Örgütü tarafından her yıl yayımlanan Yolsuzluk Algısı Endeksi (Corruption Perceptions Index- CPI) ve Yönetişim Kalitesi Enstitüsü, yönetişim kalitesinin ölçülmesinde kullanılabilir veri kaynaklarıdır.

Çalışmada önemli olan husus, analizin amacı doğrultusunda verilerin kapsayıcılığı ve güvenilir olup olmadığıdır. Bu çerçevede literatürde yapılan çalışmalara bakıldığında, Dünya Bankası veri tabanı yönetişim göstergelerinin son yıllarda sıklıkla kullanıldığı görülmektedir. Söz konusu veri tabanı, yönetişim göstergesi olarak; yolsuzluğun kontrolü, siyasi istikrar ve şiddetin (terörizmin) yokluğu, ifade özgürlüğü ve hesap verebilirlik, hukukun üstünlüğü, hükümetin etkinliği ve düzenleyici kalite olmak üzere altı göstergesi temel almakta ve verileri yıllık olarak yayımlamaktadır. Yönetişim göstergeleri, 0 ile +100 arasında bir değer almaktadır. Söz konusu göstergenin, sıfıra yaklaşması ilgili ülkenin yönetişim kalitesinin zayıf olduğunu; yüze yaklaşması ise ilgili ülkenin yönetişim kalitesinin güçlü olduğunu göstermektedir (World Bank, 2020b). Dolayısıyla yönetişim göstergesinin görece büyük olması her ülke için istenilen bir durumdur. Yapılan bu çalışmada, söz konusu altı göstergenin aritmetik ortalaması alınarak yönetişimin kalitesine ilişkin tek bir değişken (*yon*) tanımlanmıştır.

Analizi gerçekleştirmek amacıyla oluşturulan modelde bazı kontrol değişkenleri de bulunmaktadır. Buna göre, literatürden hareketle ekonomik büyümeye etkisinin olduğu düşünülen; fiziki sermaye oluşumu (*cap*), istihdam (*ist*) ve enflasyon (*enf*) değişkenleri, analize kontrol değişkenleri olarak dahil edilmiştir. Modelde kullanılan kontrol değişkenlerinden fiziki sermaye oluşumu ve istihdam ile ekonomik büyüme arasında literatürden hareketle genellikle pozitif yönlü bir ilişkinin olduğu gözlemlenirken; enflasyon ile ekonomik büyüme arasındaki ilişkinin yönü net değildir. Enflasyonun belirsizlik yaratmak suretiyle tüketim ve yatırım kararlarını sapıtacağı, böylelikle ekonomik büyümeyi de olumsuz yönde etkileyeceği savunulabilir. Bununla birlikte Mundell-Tobin Etkisi hipotezi; enflasyonist dönemlerde bireylerin reel gelirlerini korumak amacıyla daha fazla yatırıma yöneldiğini, böylelikle söz konusu değişkenler arasında pozitif yönlü bir ilişkinin ortaya çıktığını savunmaktadır.

Söz konusu çerçevede ele alınan değişkenlere ilişkin bilgiler Tablo 1’de sunulmuştur.

Tablo: 1
Modelde Kullanılan Değişkenler

Değişkenler	Tanım	Kaynak
Ekonomik büyüme (<i>g</i>)	Gayrisafi yurt içi hasıladaki yıllık artış (%)	Dünya Bankası
Bütçe dengesi (<i>but</i>)	Kamu net alacak borç dengesinin gayri safi yurtiçi hasılaya oranı (%)	Uluslararası Para Fonu
Yönetişim endeksi (<i>yon</i>)	0 (sıfır) ile +100 arasında yüzdelik bir değeri temsil etmektedir	Dünya Bankası
Fiziki sermaye oluşumu (<i>cap</i>)	Fiziki sermaye oluşumunun gayrisafi yurt içi hasılaya oranı (%)	Dünya Bankası
İstihdam (<i>ist</i>)	15-64 yaş aralığındaki toplam istihdam oranı (%)	Eurostat
Enflasyon (<i>enf</i>)	Uyumlaştırılmış TÜFE yıllık değişim oranı (%)	Eurostat

Analizin ilk aşamasında değişkenlere ilişkin seriler durağanlık açısından sınanmıştır. Panel birim kök testi sonuçlarına göre; *cap*, *yon*, *but* ve *g* değişkenleri düzey değerlerinde durağandır. *enf* ve *ist* değişkenleri ise birinci dereceden durağandır. Bu nedenle söz konusu değişkenler ileriki analizlere birinci farkları alınarak sırasıyla, *dist* ve *denf* isimleriyle dâhil edilmiştir. Durağanlık testlerine ilişkin bulgular Tablo 2’de özetlenmiştir.

Tablo: 2
Panel Birim Kök Testine İlişkin Bulgular

	Düzeltilmiş t ^a	Olasılık değeri
<i>g</i>	-11,2592	0,0000
<i>but</i>	-7,4580	0,0000
<i>cap</i>	-8,8036	0,0000
<i>yon</i>	-2,6236	0,0043
<i>enf</i>	-18,4843	0,0000
<i>ist</i>	-6,0094	0,0000

^a (Adjusted t)

3.2. Model

Çalışmada, Türkiye ve 27 Avrupa Birliği ülkesi için yönetişimin etkisini dikkate alarak bütçe dengesi ile ekonomik büyüme arasındaki ilişkinin sınanması amaçlanmaktadır. Bu amaçla kullanılacak temel model aşağıdaki gibidir:

$$g_{it} = \mu_i + \alpha X_{it} + \beta but_{it} + e_{it}, e_{it} \approx iid(0, \sigma^2) \quad (1)$$

(1) numaralı denklemde *X*; fiziki sermaye oluşumu, istihdam ve enflasyonu içeren kontrol değişkenlerini ifade etmektedir.

İkinci aşamada, yönetişimin eşik değerini bulmak için Hansen (1999) tarafından geliştirilen panel eşik modelinden yararlanılmıştır. Hansen (1999) panel eşik yöntemi, örnekleme her bir gözlemin eşik seviyesinin üstünde veya altında olmasına bağlı olarak iki veya daha fazla rejime bölmektedir. Çalışmamız kapsamında model; bütçe dengesinin büyüme üzerindeki etkisinde yönetişimin rolünü dikkate alarak, örnekleme içsel olarak alt gruplara ayırmak suretiyle eşik değerin tespit edilmesine imkân sağlayacaktır. Bireysel etkiler (*i*) ile zaman etkilerini (*t*) içeren ve dengeli panel veri seti ile ele alınan modelde; g_{it} ; gayrisafi yurt içi hasılanın yıllık yüzde artışına bağlı olarak ekonomik büyümeyi, yon_{it} ; yönetişim genel göstergesini, but_{it} ; bütçe dengesini, X_{it} ise; Tablo 1’de sunulan fiziki sermaye oluşumu, istihdam ve enflasyonu içeren kontrol değişkenleri vektörünü ifade etmektedir. Bu çerçevede, tek eşikli model aşağıdaki gibi ifade edilebilir:

$$\begin{aligned}
 g_{it} &= \mu_i + \alpha X_{it} + \beta \text{but}_{it} + e_{it}, e_{it} \sim iid(0, \sigma^2) \\
 g_{it} &= \begin{cases} \mu_i + \alpha X_{it} + \beta_1 \text{but}_{it} + e_{it}, \text{yon}_{it} \leq \lambda \\ \mu_i + \alpha X_{it} + \beta_2 \text{but}_{it} + e_{it}, \text{yon}_{it} > \lambda \end{cases} \\
 \alpha &= (\alpha_1, \alpha_2, \alpha_3)' X_{it} = (\text{cap}_{it}, \text{dist}_{it}, \text{denf}_{it})' \quad (2)
 \end{aligned}$$

Modeldeki g_{it} ; bağımlı değişkeni, but_{it} ; bağımsız değişkeni, yon_{it} ; zaman içinde sabit olmadığı varsayılan eşik değişkenini, λ ; eşik değerini, X_{it} ; kontrol değişkenler vektörünü, μ_i ; farklı yönetim düzeyine sahip ülkelerin heterojenliğini temsil eden sabit etkileri, e_{it} ise; bağımsız ve özdeş dağılmış hata terimini ifade etmektedir. Gözlemler yon_{it} değişkeninin λ değerinden küçük veya büyük olmasına bağlı olarak iki farklı rejime ayrılmaktadır. Modeldeki (β_1, β_2) değerleri ise farklı iki rejimin eğim parametreleridir. Bir başka deyişle (β_1, β_2) ; eşik değerin üstünde ve altında ayrışan büyüme etkisini ifade etmektedir.

(2) numaralı denklemdeki eşik regresyon modeli aşağıda yeniden düzenlenmiştir:

$$g_{it} = \mu_i + \alpha X_{it} + \beta_1 \text{but}_{it} I(\text{yon}_{it} \leq \lambda) + \beta_2 \text{but}_{it} I(\text{yon}_{it} > \lambda) + e_{it} \quad (3)$$

(3) numaralı denklemdeki $I(\cdot)$, gösterge fonksiyondur. Söz konusu denklem aşağıdaki gibi düzenlenebilir:

$$\begin{aligned}
 g_{it} &= \mu_i + \alpha' X_{it} + \beta' \text{but}_{it}(\lambda) + e_{it}, \beta = (\beta_1, \beta_2)' \\
 g_{it} &= \mu_i + [\alpha', \beta'] \begin{bmatrix} X_{it} \\ \text{but}_{it}(\lambda) \end{bmatrix} + e_{it} \\
 g_{it} &= \mu_i + \theta' m_{it}(\lambda) + e_{it} \\
 \text{but}_{it}(\gamma) &= \begin{bmatrix} \text{but}_{it} I(\text{yon}_{it} \leq \lambda) \\ \text{but}_{it} I(\text{yon}_{it} > \lambda) \end{bmatrix} \quad (4)
 \end{aligned}$$

(4) numaralı denklemde $\theta = [\alpha', \beta']$ ve $m_{it} = (X_{it}', \text{but}_{it}(\lambda))'$ olarak tanımlanmıştır. Söz konusu denklemde verilen model, gözlemleri eşik değere (λ) bağlı olarak iki rejime ayırır ve eğim parametreleri (β_1, β_2) rejimler arasında farklılık gösterir.

3.3. Eşik Değeri ve Parametre Katsayılarının Tahmini

Genel büyüme modelimizi oluşturan (4) numaralı denklemden yararlanarak, denklemin zaman içindeki ortalamasını alındığında (5) numaralı denkleme ulaşılmaktadır:

$$\bar{g}_i = \mu_i + \theta' \bar{m}_i(\lambda) + \bar{e}_i \quad (5)$$

burada,

$$\bar{g}_i = T^{-1} \sum_{t=1}^T g_{it}, \bar{m} = T^{-1} \sum_{t=1}^T \bar{m}_{it}, \bar{e}_i = T^{-1} \sum_{t=1}^T e_{it}$$

olarak tanımlanmıştır. (4) ve (5) denklemleri arasındaki farkı almaya devam ettiğimizde ise (6) numaralı denkleme ulaşımaktadır:

$$g_{it}^* = \theta' m_{it}^* (\lambda) + e_{it}^* \quad (6)$$

(6) numaralı denklemde; $g_{it}^* = g_{it} - \bar{g}_i$, $m_{it}^* (\lambda) = m_{it} (\lambda) - \bar{m}_i (\lambda)$ ve $e_{it}^* = e_{it} - \bar{e}_i$ olarak tanımlanmıştır.

g_i^* , $m_i^* (\gamma)$ ve e_i^* değişkenlerini aşağıdaki gibi tanımlarsak;

$$g_i^* = \begin{bmatrix} g_{i2}^* \\ \cdot \\ \cdot \\ \cdot \\ g_{it}^* \end{bmatrix}, m_i^* (\gamma) = \begin{bmatrix} m_{i2}^* (\lambda) \\ \cdot \\ \cdot \\ \cdot \\ m_{it}^* (\lambda) \end{bmatrix}, e_i^* = \begin{bmatrix} e_{i2}^* \\ \cdot \\ \cdot \\ \cdot \\ e_{it}^* \end{bmatrix}.$$

ve tüm yatay kesit birimleri için G^* , $M^* (\lambda)$, ε^* 'yi aşağıdaki gibi tanımlarsak:

$$G^* = \begin{bmatrix} g_1^* \\ \cdot \\ \cdot \\ \cdot \\ g_n^* \end{bmatrix}, M^* (\lambda) = \begin{bmatrix} m_1^* (\lambda) \\ \cdot \\ \cdot \\ \cdot \\ m_n^* (\lambda) \end{bmatrix}, \varepsilon^* = \begin{bmatrix} e_1^* \\ \cdot \\ \cdot \\ \cdot \\ e_n^* \end{bmatrix}$$

denklem (6)'yı aşağıdaki gibi ifade edebiliriz:

$$G_{it}^* = \theta' M_{it}^* (\lambda) + \varepsilon_{it}^* \quad (7)$$

Denklem (7), eşik etkisi için ana tahmin modelimizdir. Verilen herhangi bir λ için eğim katsayıları EKK kullanılarak tahmin edilebilir:

$$\hat{\theta}(\lambda) = (M^*(\lambda)'M^*(\lambda))^{-1}M^*(\lambda)'G^* \quad (8)$$

Bu durumda kalıntı vektörü şu şekilde ifade edilir:

$$\hat{\varepsilon}^*(\lambda) = G^* - M^*(\lambda)\hat{\rho}(\lambda) \quad (9)$$

Hata kareleri toplamı ise aşağıdaki gibidir:

$$SSE_1(\lambda) = \hat{\varepsilon}^*(\lambda)\hat{\varepsilon}^*(\lambda)' = G^{*'}(I - M^*(\lambda)'(M^*(\lambda)'M^*(\lambda))^{-1}M^*(\lambda)')G^* \quad (10)$$

Chan (1993) ve Hansen (1999), eşik değerini (λ) en küçük kareler kullanılarak tahmin edilmesini önermektedir. Böylece, yoğunlaşmış EKK'ler (11) minimize edilmekte ve eşik değeri (λ) en küçük kareler tahmin edicisi şu şekilde elde edilmektedir:

$$\hat{\lambda} = \underset{\lambda}{\operatorname{argmin}} SSE_1(\lambda) \quad (11)$$

Eşik değeri tahmin edildikten sonra, eğim katsayısı tahmini; $\hat{\theta} = \hat{\theta}(\lambda)$, kalıntı vektörü; $\hat{\varepsilon}^* = \hat{\varepsilon}^*(\lambda)$ ve kalıntı varyansının tahmincisi;

$$\hat{\sigma}^2 = \frac{1}{n(T-1)} \hat{\varepsilon}^{*'} \hat{\varepsilon}^* = \frac{1}{n(T-1)} SSE_1(\hat{\lambda}) \quad (12)$$

olarak ifade edilmektedir. Buradaki n; örneklemdaki ülke sayısını T ise, zaman boyutunu ifade etmektedir.

3.4. Ampirik Bulgular

Panel eşik değer analizine geçmeden önce bütçe dengesi ve ekonomik büyüme arasındaki ilişki sabit etkiler modeli ile sınanmış, elde edilen bulgular Tablo 3'te sunulmuştur. *but* değişkeni %1 düzeyinde istatistiksel olarak anlamlı bulunmuştur. Katsayının işareti ise pozitifdir. Buradan hareketle, bütçe dengesinin ekonomik büyüme üzerinde pozitif yönde etkili olduğu savunulabilir. Ek olarak, Tablo 4'te *but* değişkeninin karesinin (*but_sq*) de ekonomik büyüme üzerinde %1 düzeyinde istatistiksel olarak anlamlı olduğu görülmektedir. Bu sonuç; bütçe dengesi ve ekonomik büyüme arasındaki ilişkinin doğrusal olmayan bir yapıda olduğu hipotezini desteklemektedir.

Tablo 3 ve Tablo 4'ten hareketle, *cap* kontrol değişkeni %5 düzeyinde; *denf* ve *dist* kontrol değişkenleri ise %1 düzeyinde istatistiksel olarak anlamlı bulunmuştur. Buradan hareketle, fiziki sermaye oluşumu, enflasyon ve istihdamın ekonomik büyüme üzerinde etkili olduğu savunulabilir. Bu sonuç, fiziki sermaye oluşumu ve istihdamdaki artışın ekonomik büyüme üzerinde pozitif etkili olduğu hipotezini desteklemektedir. Ek olarak, enflasyonun ekonomik büyümeyi pozitif yönde etkilemesi, "Mundell-Tobin Etkisi" hipotezi ile tutarlıdır.

Tablo: 3
Sabit Etkiler Modeli Tahmin Bulguları 1

Bağımlı değişken: g			
Değişken	Katsayı	Standart sapma	Olasılık
<i>but</i>	0.186	0.058	(0,002) ***
<i>cap</i>	0.106	0.047	(0,026) **
<i>denf</i>	0.424	0.076	(0,000) ***
<i>dist</i>	1.180	0.127	(0,000) ***

Nor: ***, ** ve * sırasıyla %1, %5 ve %10 seviyelerinde istatistiksel anlamlılığı göstermektedir.

Tablo: 4
Sabit Etkiler Modeli Tahmin Bulguları 2

Bağımlı değişken: g			
Değişken	Katsayı	Standart sapma	Olasılık
<i>but</i>	0.350	0.084	(0,000) ***
<i>but_sq</i>	0.009	0.003	(0,008) ***
<i>cap</i>	0.102	0.047	(0,032) **
<i>denf</i>	0.414	0.075	(0,000) ***
<i>dist</i>	1.118	0.128	(0,000) ***

Nor: ***, ** ve * sırasıyla %1, %5 ve %10 seviyelerinde istatistiksel anlamlılığı göstermektedir.

Bir sonraki adımda, bütçe dengesi ve ekonomik büyüme arasındaki doğrusal olmayan ilişkide yönetişimin rolü ele alınmıştır. Bu amaçla tek eşik ile tahmin edilecek yapısal model aşağıdaki gibi oluşturulmuştur:

$$g_{it} = \mu_i + \alpha X_{it} + \beta_1 but_{it} I(yon_{it} \leq \lambda) + \beta_2 but_{it} I(yon_{it} > \lambda) + e_{it} \quad (13)$$

Analiz bulguları, Tablo 5'te gösterilmektedir.

Tablo: 5
Yönetişim Katsayısı Eşik Değer Analizi Sonuçları

Bağımlı Değişken: g			
Değişken	Katsayı	Standart sapma	Olasılık
cap	0,117	0,047	(0,014) **
denf	0,433	0,075	(0,000) ***
dist	1,186	0,126	(0,000) ***
but (yon≤λ)	0,892	0,288	(0,002) ***
but (yon>λ)	0,170	0,058	(0,004) ***
λ	57,65	5,795 ^a	(0,010)**
Güven aralığı	49,569-58,239	F istatistiği	17,48

^a Ortalama standart hata (mean squared error).

Not: ***, ** ve * sırasıyla %1, %5 ve %10 seviyelerinde istatistiksel anlamlılığı göstermektedir.

Tahmin bulguları *but* ve *yon* değişkenlerinin yanı sıra; *cap*, *denf* ve *dist* olarak tanımlanan kontrol değişkenlerini de kapsamaktadır. Tablo 5'te görüldüğü üzere, yönetim kalitesine ilişkin eşik değer 57,65 olarak bulunmuştur. Eşik etki testi olasılık değeri ise %5 düzeyine anlamlıdır. Ek olarak, *yon* değişkeninin eşik değerinin altında ve üstünde olduğu durumlarda bütçe dengesinin ekonomik büyüme üzerindeki etkisi pozitif yönlüdür ve %1 düzeyinde anlamlıdır. Başka bir ifadeyle, bütçe dengesi (fazla) ekonomik büyümeyi pozitif yönde etkilemektedir. Ancak, yönetim kalitesinin eşik değere eşit ya da altında olması durumunda bütçe dengesindeki %1 düzeyindeki iyileşme ekonomik büyümeyi %0,892 arttırmakta iken, yönetim kalitesinin eşik değerinin üzerinde olması durumunda bütçe dengesindeki %1 düzeyindeki iyileşme ekonomik büyümeyi yalnızca %0,170 oranında arttırmaktadır. Bu bağlamda, ülkede yönetim kalitesi iyi ise, ekonomik büyümenin sağlanması için bütçe fazlası vermek görece önemini yitirmektedir.

Kontrol değişkenlerinden fiziki sermaye oluşumunun ekonomik büyüme üzerindeki etkisi pozitif yönlüdür ve %1 düzeyinde istatistiksel olarak anlamlıdır. Fiziki sermaye oluşumunda %1 düzeyinde bir iyileşme ekonomik büyümeyi %0,117 oranında arttırmaktadır.

Bir diğer kontrol değişkeni olan enflasyon değişkeninin ekonomik büyüme üzerindeki etkisi pozitif yönlüdür ve %1 düzeyinde istatistiksel olarak anlamlıdır. Enflasyonun değişim oranındaki %1'lik artış ekonomik büyümeyi %0,433 oranında arttırmaktadır.

Kontrol değişkenlerden sonuncusu ise, istihdam değişkenidir. İstihdam değişkeninin ekonomik büyüme üzerindeki etkisi pozitif yönlüdür ve %1 düzeyinde istatistiksel olarak

anlamlıdır. İstihdam değişiminde %1 oranında bir artış ekonomik büyümeyi %1,186 oranında artırmaktadır.

3.5. Bulguların Değerlendirilmesi

Kontrol değişkenlerinin etkisine bakıldığında, fiziki sermaye oluşumu ve istihdam ile ekonomik büyüme arasında teorik beklentilerle uyumlu olacak şekilde pozitif yönlü ilişki gözlemlenmiştir. Sermaye oluşumu yatırımlar kanalıyla üretimi desteklerken, istihdamın artırılması neticesinde bireylerin satın alma güçleri artmakta ve özellikle marjinal tüketim eğilimlerinin fazla olduğu ülkelerde tüketim harcamaları ile birlikte üretimin de artması neticesinde ekonomik büyüme pozitif yönde etkilenmektedir. Bu bakımdan, sermaye birikimi ve istihdamın artırılması ekonomik büyümenin sağlanmasına hizmet edecektir.

Bir diğer kontrol değişkeni ise enflasyondur. Enflasyon değişkeni ile ekonomik büyüme ilişkisi pozitif ve istatistiksel olarak anlamlıdır. Literatürde, "Mundell-Tobin Etkisi" adıyla bilinen yaklaşıma göre, enflasyonun arttığı dönemlerde elde para tutmanın maliyeti artacaktır. Bu durumda bireyler, reel düzeylerini korumak için, sermaye birikime yönelecek ve yatırımların artmasıyla ekonomik büyüme pozitif yönde etkilenecektir. Çalışmamızın sonuçları Mundell-Tobin hipotezi ile uyumludur. Söz konusu bulgu, enflasyonun seçili ülkelerde belirli bir eşik değere kadar (%20-25) ekonomik büyümeyi pozitif yönde etkilediğini savunan Bruno'nun (1995) çalışması ile de paraleldir.

Çalışmanın esas değişkeni ise; bütçe dengesidir. Yapılan analizler neticesinde, bütçe fazlasının ekonomik büyümeyi pozitif yönde etkilediği tespit edilmiştir. Bu bakımdan elde edilen bulgular, Fisher (1993), Easterly ve Rebelo (1993) ve Benos (2005) tarafından yapılan çalışmaların bulguları ile uyumludur.

Ek olarak Hansen (1999) testi sonucunda elde edilen bulgular; eşik değer altında bütçe fazlasının ekonomik büyümeyi daha çok etkilediği; eşik değer üzerinde ise bütçe fazlasının ekonomik büyümeyi daha az etkilediğini vurgulamaktadır. Bu bağlamda, ilgili ülkede yönetim iyi değilse özel sektör de gelişmek için yeterli koşulları bulamayacak, ekonomik büyüme için kamuya düşen rol artacak ve dolayısıyla bütçe fazlası vermek daha önemli bir duruma gelecektir.

4. Sonuç

Ekonomik büyümenin sağlanması önemli makroekonomik hedeflerden biridir. Bu bağlamda, ekonomik büyümeyi etkileyen değişkenlerin tespit edilmesi de önem arz etmektedir. İktisadi ve iktisadi olmayan pek çok unsurun ekonomik büyüme üzerindeki etkilerini sınyan geniş bir literatür bulunmaktadır. Bununla birlikte değişkenler arasındaki olası doğrusal olmayan ilişkiler genellikle göz ardı edilmiştir. Bu çalışmanın; bir ülkenin mali pozisyonunun önemli göstergelerinden biri olan bütçe dengesi ile ekonomik büyüme arasındaki ilişkiyi analiz ederken, yönetişimin rolünü dikkate alması ve rejim farklılaşmasını ortaya koyan belirli bir eşik değer sunması bakımından literatüre özgün bir katkı verdiği düşünülmektedir.

Çalışmada sabit etkiler panel veri analizi yapıldıktan sonra, Hansen (1999) panel eşik yönteminden yararlanılmıştır. Ele alınan modelde yönetim kalitesi eşik değişken olarak; enflasyon, istihdam ve fiziki sermaye oluşumu ise kontrol değişkenleri olarak ele alınmıştır.

Teorik beklentilerle uyumlu şekilde fiziki sermaye oluşumu ve istihdam değişkeni ile ekonomik büyüme arasında pozitif yönlü bir ilişkinin varlığı tespit edilmiştir. Bu bakımdan karar alıcılar ekonomik büyüme için fiziki sermaye oluşumu ve istihdamı artırmalıdır. Bir diğer kontrol değişkeni ise enflasyon değişkenidir. Literatürde enflasyon ile ekonomik büyüme ilişkisini ele alan çalışmaların çoğu, söz konusu ilişkinin negatif yönlü olduğunu savunmaktadır. Ancak enflasyon ve ekonomik büyüme ilişkisinin pozitif yönlü olduğu sonucuna ulaşan çalışmalar da bulunmaktadır. Literatürde, "Mundell-Tobin Etkisi" adıyla bilinen yaklaşıma göre, enflasyonun arttığı dönemlerde elde para tutmanın maliyeti artacaktır. Bundan dolayı, reel düzeylerini korumak için bireyler, sermaye birikime yönelecek ve böylece yatırımların artmasıyla ekonomik büyüme pozitif yönde etkilenecektir. Nitekim ele almış olduğumuz çalışmadaki bulgular, Mundell-Tobin Etkisi hipotezini desteklemektedir. Ek olarak, enflasyonun belirli bir eşik değere kadar (%20-25) ekonomik büyümeyi arttırdığını savunan Bruno'nun (1995) çalışması da ele almış olduğumuz çalışmadaki bulguları desteklemektedir. Dolayısıyla, herhangi bir ülkede enflasyonun olması ekonomik büyümeyi her zaman olumsuz etkileyeceği anlamına gelmemelidir. Tam aksine belirli bir seviyeye kadar olan enflasyon ilgili ülkenin ekonomik büyümesine katkı sağlayabilir. Bundan dolayı siyasi otorite, enflasyonun ekonomik büyüme üzerindeki pozitif etkisini de göz önünde bulundurarak ekonomi politikalarını belirlemelidir.

Çalışmada, bütçe fazlasının ekonomik büyümeyi pozitif yönde etkilediği tespit edilmiştir. Bu bakımdan elde edilen bulgular, Fisher (1993), Easterly ve Rebelo (1993) ve Benos (2005) tarafından yapılan çalışmalar ile uyumludur. Dolayısıyla karar alıcılar, ekonomi politikalarını bütçe fazlasını koruyacak şekilde uygulamalıdır. Bunun yanı sıra, bütçe fazlası neticesinde elde edilen kaynakların kullanımına bağlı olarak ekonomik büyüme üzerindeki etkisi de farklılık gösterebilir. Nitekim eldeki kaynaklar, verimsiz harcamalara yönlendirildiğinde ekonomik büyüme üzerindeki etkisi pozitif yönde olmayabilir. Öte yandan söz konusu kaynaklar, verimli harcamalara yönlendirildiğinde, ekonomik büyüme üzerindeki etkisi pozitif yönde olacaktır. Helms (1985) ve Kneller vd. (1999) de yapmış olduğu çalışmalarda, eldeki kamu kaynaklarının ekonomik büyüme üzerinde kullanım şekillerine göre farklı etkiler göstereceğini savunmaktadır. Bu bakımdan bütçenin fazla vermesi neticesinde oluşan kaynakların verimli (üretken) harcamalara yönlendirilmesi gerekmektedir. Ek olarak, bütçe dengesi ve ekonomik büyüme ilişkisinde yönetişimin kalitesi de istatistiksel olarak anlamlı etkiye sahiptir.

Analiz neticesinde, bütçe fazlasının ekonomik büyüme üzerinde pozitif ve istatistiksel olarak anlamlı bir etkisinin olduğu daha önce ifade edilmişti. Ancak söz konusu etkinin yönetişimin iyi olduğu ülkelerde görece düşük olduğu gözlemlenmiştir. Dolayısıyla, yönetim kalitesinin iyi olmadığı ülkelerde ekonomik büyüme için bütçe fazlası vermek daha önemli olmaktadır. Diğer yandan, yönetim kalitesi arttıkça, kamu bütçe fazlasının ekonomik büyüme üzerindeki etkisi 0,89 seviyesinden yaklaşık %80 oranında düşerek 0,17

seviyesine gerilemektedir. Bilindiği gibi, kamu kesimi ve özel kesim kıt olan ortak kaynakları kullanmak suretiyle üretim faaliyeti gerçekleştirir. Gerçekleşen üretim faaliyeti neticesinde de ekonomik büyüme etkilenmektedir. Ele aldığımız çalışmada, bütçe dengesi değişkeni kamu kesimini temsil etmektedir. Ancak ekonomi içerisinde özel sektör de faaliyet göstermektedir. Söz konusu sektör; piyasada faaliyet gösterebilmek için mülkiyet hakkı, hukukun üstünlüğü, hükümetin özel sektör gelişimine izin veren ve teşvik eden politikalar uygulaması, ilgili ülkede şiddetin (terörizmin) olmaması gibi bazı güvencelere ihtiyaç duymaktadır. Bu güvencelerin oluşması halinde özel sektör piyasada daha fazla rol alacak ve özel ekonomik faaliyetler ekonomik büyümeyi pozitif yönde etkileyecektir. Böylelikle kamu sektörüne ekonomik büyümeyi gerçekleştirmesi için daha az yük yüklenmiş olacaktır. Aksi takdirde, yani söz konusu güvencelerin olmaması neticesinde özel sektörün piyasada yer almak istememesi, ekonomik büyümeyi gerçekleştirmek için bütçe dengesini daha fazla önemli bir duruma getirmektedir.

Yönetişimin iyi olduğu; yani şiddet olaylarının minimize edildiği, hukukun üstün olduğu, hükümetin özel sektör gelişimine izin veren ve teşvik eden politikalar uyguladığı, yolsuzluğun olmadığı, ifade özgürlüğü ve hesap verebilirliğin olduğu, kamu hizmetlerinin kaliteli olduğu ve siyasi baskıların olmadığı ülkelerde, özel sektör piyasada daha aktif rol alacaktır. Böylece, ekonomik büyüme için bütçe fazlası vermek daha az önemli bir duruma gelecektir ki söz konusu durum elde edilen bulgular ile uyumludur. North (1999) da benzer şekilde; mülkiyet haklarının güvence altına alan ve teşvik unsuruna sahip siyasi otorite aracılığıyla etkin kurumların oluşabileceğini ve etkin kurumlar yoluyla da ekonomik performansın artırılabilirliğini savunmaktadır. Bu bakımdan karar alıcılar, yönetim göstergelerini iyileştirecek politikalara yönelmelidir. Bunun için siyasi otoriteye büyük görevler düşmektedir.

Eğer ülkelerin siyasi otoriteleri ekonomik büyümeyi gerçekleştirirken kamu bütçesi üzerindeki yükü hafifletmek istiyorlar ise özel kesimin piyasada daha aktif rol almasını teşvik edecek politikalar uygulamalıdır. Söz konusu politikaların en önemlilerinden biri ilgili ülkenin kurumsal kalitesini arttırmak olacaktır. Nitekim kurumsal kalitenin artması, yönetim göstergelerinin iyileşmesi anlamına gelmektedir ki bu durum özel sektörün piyasada daha aktif rol alması bakımından teşvik edici olacaktır. Öte yandan, eğer ilgili ülke yönetim kalitesi bakımından istenilen düzeyde değil ise, ekonomik büyümeyi gerçekleştirmek için kamu bütçesi daha fazla önemli olmaktadır. Bu durumda siyasi otorite bütçe fazlası verecek politikalara daha fazla önem vermelidir. Başka bir ifadeyle, karar alıcılar, politika üretirken ülkenin yönetim kalitesi açısından içinde bulunduğu durumu göz önünde bulundurmalıdır. Eğer ilgili ülkenin yönetim kalitesi istenilen düzeyde değil ise karar alıcıların izleyeceği iki yol bulunmaktadır. Birincisi, karar alıcılar ülkenin yönetim kalitesini artıracak politikaları uygulayarak ekonomik büyümeyi görece özel kesim aracılığıyla yapabilir. İkincisi ise, karar alıcılar ülkede bütçe fazlası verecek ekonomi politikalarına daha fazla önem vererek görece kamu kesimi aracılığıyla ekonomik büyümeyi gerçekleştirebilir.

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Doğrusal Bulanık Regresyon Modeli ile Türkiye'deki Belediye Atığı Miktarının Tahmini¹

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Estimating The Amount of Municipal Waste in Turkey with the Linear Fuzzy Regression Model²

Abstract

Waste management in both Turkey and the World has been of great importance in the 21st century. As a developing country, Turkey wants to reach an adequate waste management system like developed countries and tries to harmonize its laws on waste. This study aims to reveal the relationship between municipal waste generation and socioeconomic indicators and estimate the amount of municipal waste generated in Turkey between 2005 and 2019 by using Tanaka's linear fuzzy regression model. This study has revealed indicators affecting the municipal waste generation and generation projection between specific years. Population growth rate, GDP per capita, and literacy rate indicators that were thought to be more effective and easier to reach the data were used as independent variables. The total amount of municipal waste in Turkey was the dependent variable in the modelling. It is expected that the established projection model will benefit the development of forecasts about waste generation in the future and thus will contribute to the investments and planning for waste recovery and safe disposal.

Keywords : Municipal Wastes, Tanaka's Linear Fuzzy Regression Model, Estimation.

JEL Classification Codes : C53, Q53.

Öz

Atık yönetimi hem Türkiye'de hem de dünyada 21. yüzyıl itibari ile önem kazanan bir konudur. Türkiye gelişmekte olan bir ülke olarak, gelişmiş ülkeler gibi yeterli atık yönetimi sistemine ulaşmak istemekte ve atık konusunda yasalarını uyumlaştırmaya çalışmaktadır. Etkin bir atık yönetimi için atık miktarlarının tahmini önemlidir. Bu çalışmanın amacı, Türkiye'deki toplam belediye atığı miktarı ile sosyoekonomik göstergeler arasındaki ilişkinin varlığını ortaya koymak ve Tanaka'nın doğrusal bulanık regresyon modelini kullanarak Türkiye'nin 2005-2019 yılları arasındaki belediye atığı miktarını tahmin etmektir. Uygulamayla, belediye atıklarının miktarının belli yıllar arasındaki tahmini ve hangi göstergelere bağlı olduğu ortaya konmaya çalışılmıştır. Çok sayıda gösterge içinden daha fazla etkili olabileceği düşünülen ve verisine ulaşılabilen nüfus artışı hızı, kişi başına düşen

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² This study is derived from the master's thesis entitled "Projection of Municipal Waste Generation in Turkey with Linear Fuzzy Regression Model", Department of International Trade and Logistics Management, Institute of Social Sciences, Niğde Ömer Halisdemir University.

GSYİH ve okur-yazarlık oranı bağımsız değişken olarak, Türkiye’deki toplam belediye atığı miktarı ise bağımlı değişken olarak modelde kullanılmıştır. Kurulan tahmin modelinin gelecekteki atık miktarları hakkında öngörülerin geliştirilmesine fayda sağlaması ve böylece atık geri kazanımı ve güvenli bertarafına yönelik yatırım ve planlamalara katkı sağlaması beklenmektedir.

Anahtar Sözcükler : Belediye Atıkları, Tanaka’nın Doğrusal Bulanık Regresyon Modeli, Tahminleme.

1. Giriş

İnsanların ihtiyaçlarını karşılamak ve hayatlarını sürdürmek amacıyla kullandıkları kaynakların; kullanım sonunda işe yaramayan, atılan kısmı “atık” olarak adlandırılır. Atık istenmeyen, kullanılmış ve çevre için her türlü tehdit oluşturan maddelerdir (Öktem, 2016: 135). Oxford Sözlüğünde (1995: 1581) atık “artık bir amaca hizmet etmeyen”, “reddedilen”, “istenmeyen veya kullanılamayan kalıntılar veya yan ürünler” olarak tanımlanır.

Atık yönetimi hem Türkiye’de hem de dünyada 21. yüzyıl itibarı ile önem kazanan bir konudur. Buna rağmen Türkiye’nin de aralarında bulunduğu çoğu gelişmekte olan ülkede, atık yönetimi stratejileri geliştirmek için anahtar faktör olan atık miktarları hakkındaki veri sistematik olarak toplanmamaktadır. Oysa geri kazanımı sağlanan malzemeler ülke ekonomileri için maddi birer kaynak, geri kazanım süreci ise önemli bir gelir ve istihdam alanıdır.

Belediye atıkları da ekonomiler için adeta birer hazinedir. Belediye atıkları; hane halklarının evsel faaliyetlerinden kaynaklanan atıkları, küçük ticari faaliyetlerden, ofis binalarından, okul ve hükümet binaları gibi kurumlardan ve aynı tesislerde atıkları işleyen veya ortadan kaldıran küçük işletmeden kaynaklanan benzer atıkları içerir ve belediyeler tarafından veya belediyeler için toplanan ve işlenen atık olarak tanımlanmaktadır (OECD Indicators, 2015). Belediye atıkları üretilen toplam atıkların sadece bir parçası olmasına rağmen bu atıkların yönetimi, kamu sektöründe kirliliği azaltma ve kontrol çabaları açısından oldukça önemlidir. Belediye atıkları hakkında artan temel kaygılar; uygun olmayan atık yönetiminin insan sağlığı, toprak ve su kirliliği, hava kalitesi, iklim, arazi kullanımı ve peyzaj üzerindeki potansiyel etkisi ile ilgilidir (OECD Indicators, 2015). Belediye atıkları ile ilgili işlemler; düzenli depolama, kompostlama/parçalama, geri dönüşüm ve yakma (enerji geri kazanımı veya sadece yok etme amacıyla) işlemlerinden oluşur (Eurostat-2017, 2020). Bu işlemlerin yürütüldüğü tesislerin kapasitesinin belirlenebilmesi için atıkların miktarlarıyla ilgili bilgiler gerekmektedir. Bu kapsamda Türkiye’de belediye atık miktarının tahminlemesinin; geri dönüştürülebilecek atık miktarının belirlenmesinde, verimli kaynak kullanımı ve döngüsel ekonomi oluşturulmasında, yeşil büyüme ve sürdürülebilir kalkınma sağlanmasında önemli olduğu düşüncesi bu çalışmanın önemli bir motivasyonu olmuştur.

Çalışmanın amacı, Türkiye’deki toplam belediye atığı miktarı ile sosyoekonomik göstergeler arasındaki ilişkinin varlığını göstermek ve doğrusal bulanık regresyon modeli

kullanarak Türkiye'nin 2005-2019 yılları arasındaki belediye atığı miktarını tahmin eden bir model oluşturmaktır. Çalışmayla, belediye atıklarının miktarının belli yıllar arasındaki tahmini ve hangi göstergelere bağlı olduğunu ortaya konmaya çalışılacaktır. Atıkların geri kazanımı ve geri kazanılmayanların çevreye en az zararla yok edilmesinde özellikle "miktar" konusunda, tahminde bulunabilecek modeller önemli birer araçtır. Tahmin yöntemleri; uzman sistemler, bulanık sistemler, evrimsel programlama, yapay sinir ağları gibi teknikleri ve bunların çeşitli kombinasyonlarını içerir. Bulanık modeller klasik tahmin yöntemlerinden daha esneklerdir. Bu çalışmada kullanılan Tanaka'nın Doğrusal Bulanık Regresyon Modeli ise açık modeli, kolay uygulaması ve iyi performansı nedeniyle ilgi görmektedir. Türkçe literatürde enflasyon tahmini (Erilli vd., 2012), kayıt dışı ekonomi tahmini (Yücel, 2005), işsizlik oranı (İçen & Günay, 2015), ev fiyatları tahmini (Düzyurt, 2008; Aydoğdu, 2020) gibi çeşitli ekonomik faktörlerin tahminlenmesinde kullanılmış olsa da Türkiye'de atıklar kapsamında bu model kullanılarak yapılan bir tahminleme çalışmasına rastlanmamıştır. Önerilen modelin kullanımı ile yapılacak belediye atık miktarı tahminlerinin gelecekte atık geri kazanımı ve güvenli bertarafına yönelik yatırımlar ve planlamalar için ışık tutması beklenmektedir.

Çalışma dört ana bölümden oluşmaktadır. Girişten sonraki bölümde belediye atıklarına ilişkin kavramsal çerçeve verilmiş, dünyadaki ve Türkiye'deki durum sayısal veriler ve şekillerle desteklenerek ortaya konmuştur. Üçüncü bölümde ampirik uygulamanın detaylarına yer verilmiştir. Tahmin yöntemi olarak kullanılan Tanaka'nın Doğrusal Bulanık Regresyon Modeli, tarihsel gelişimi ve literatürdeki kullanımını ile beraber anlatılmıştır. Arkasından tahmin modeli sunulmuştur. Modelleme ile elde edilenler ise dördüncü ve son bölüm olan sonuç ve öneriler kısmında değerlendirilmiştir.

2. Dünyada ve Türkiye'de Belediye Atıkları

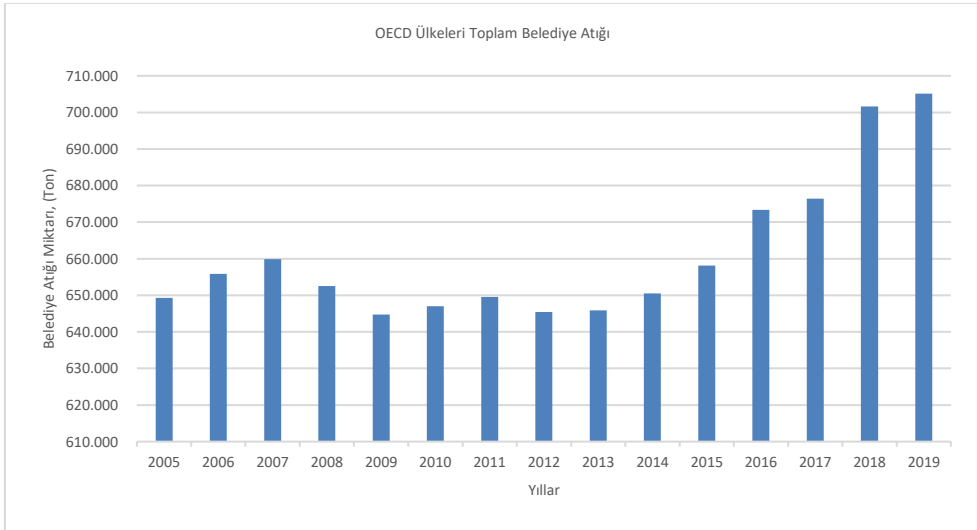
Belediye atıkları; ofis binaları, kurumlar ve küçük işletmelerden çıkan atıkları, bahçe ve açık alandaki atıkları, sokak süpürmelerini, çöp konteynerlerinin içeriğini (gıda atıkları, bahçe atıkları, ahşap, plastik, kağıtlar, metaller, kauçuklar, atıl malzemeler, tekstil atıkları vb.) ve tüm evsel atıkları kapsar (OECD, 2020). Değişken insan faaliyetlerinin sebep olduğu çok çeşitli kaynaklardan ve farklı sosyoekonomik alanlardan üretilen belediye atıkları oldukça heterojendir (Miezah vd., 2015: 15). Bu çeşitlilik nedeniyle de belediye atıkları değişken, kaynağa bağımlı ve hammadde olarak kullanımını zorlaştıran fiziksel özelliklere sahiptir.

Belediye atıklarının geri kazanım ve yok etme işlemleri düzenli depolama, kompostlama/parçalama, geri dönüşüm ve yakma şeklindedir (Eurostat-2017, 2020). Düzenli depolama atıkların toprağın altına düzenli bir biçimde gömülmesi olarak ifade edilebilir. Ekonomik olarak maliyetinin az olmasından dolayı çoğu zaman tercih edilen bir yöntemdir. Düzenli depolama sahaları oluşturularak düzensiz depolamanın yarattığı zararlı etkiler azaltılarak kontrollü olarak atık yönetimi sağlanabilmektedir. Kompostlama, katı haldeki atıkların organik bölümlerinin (sebze, meyve, yemek artıkları, selüloz, bahçe atıkları) mineral içerikli humusa benzer yapıdaki maddeye dönüştürülme işlemidir (Saraç,

2015). Organik temelli belediye atıkları kompostta dönüştürülerek toprağı ıslah edici olarak orman ve tarım alanlarının iyileştirilmesi amacıyla kullanılır. Yakma yöntemi, atıkları sağlıklı bir şekilde zararsız duruma getirmek, hacimlerini küçültmek ve eğer ekonomikse onlardan enerji üreten bir yöntemdir. Geri dönüşüm, atıkların fiziksel ve/veya kimyasal işlemlerden geçirilmesinden sonra ikinci bir hammadde olarak üretime kazandırılmasıdır (Çetin, 2019). Böylece üretim maliyetleri düşürülebilmektedir. Ekonomik olarak sağlanan bu faydanın yanı sıra geri dönüşüm; küresel iklim değişikliği sürecini yavaşlatmakta, enerji geri kazanımı sağlamakta, çevre kirliliğini azaltmakta, kıt kaynakları korumakta ve biyoçeşitlilik üstündeki baskıyı azaltmaktadır.

Dünyada ülkeler arasında belediye atığı miktarı ve bileşimi; tüketim seviyeleri ve kalıpları, kentleşme oranı, yaşam tarzları ve ulusal atık yönetimi uygulamalarıyla ilişkili olarak büyük farklılıklar bulunmaktadır. Avrupalılar ortalama olarak Amerika'da yaşayan insanlardan yaklaşık 130 kg daha az, ancak OECD Asya-Okyanusya Bölgesinde yaşayan insanlardan 80 kg daha fazla atık üretmektedir (OECD Indicators, 2015). OECD üyesi ülkelerin toplam belediye atıkları da yıllara göre artış göstermektedir (Grafik 1).

Grafik: 1
OECD Ülkeleri Toplam Belediye Atığı Miktarının Yıllara Göre Değişimi

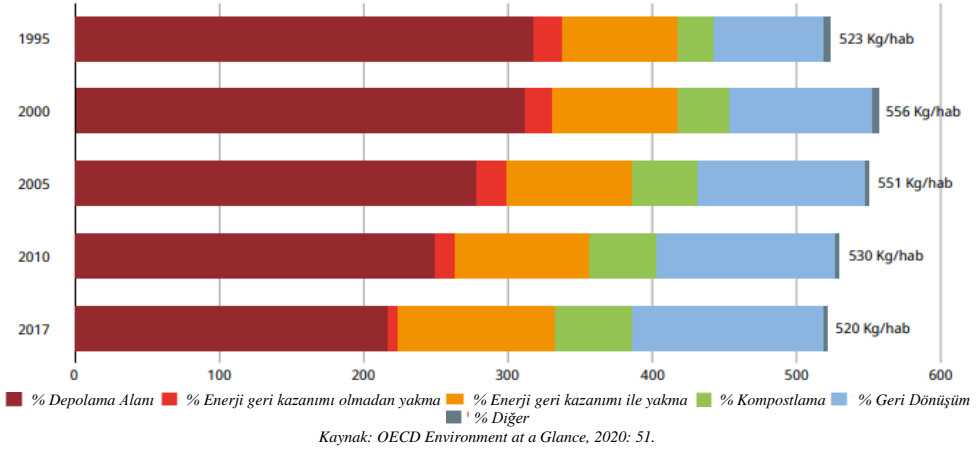


Kaynak: OECD Stad., 2021.

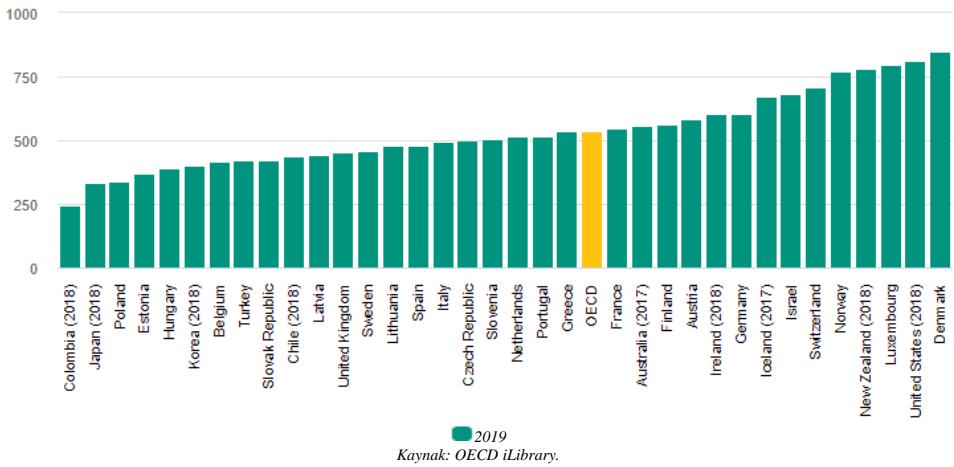
Son yirmi yılda Türkiye'nin de içinde olduğu OECD ülkeleri, belediye atık üretimini azaltmak ve atık yönetimini geliştirmek için önemli çaba sarf etmiştir. Bu çabalar sonuç vermeye başlamış, atık depolama alanlarında giderek daha fazla atık ayrıştırılmakta ve geri dönüşüm, kompostlama ve enerji geri kazanımı ile yakma yoluyla ekonomiye geri kazandırılmaktadır. AB Ülkeleri ve Japonya geri kazanım hedefleri belirlemiş ve göstergeler

yoluyla izleme yapmıştır. Avustralya, Belçika, Almanya, İrlanda, Kore, Slovenya gibi ülkeler ise yönettikleri belediye atıklarının üçte birinden fazlasını geri dönüştürmektedir. Bununla birlikte, Şekil 1'de görüldüğü gibi düzenli depolama bazı OECD ülkelerinde başlıca bertaraf yöntemi olmaya devam etmektedir.

Şekil: 1
Belediye Katı Atıklarının Bertarafı



Şekil: 2
OECD Ülkelerinde Kişi Başına Düşen Belediye Atığı Miktarı (kg)

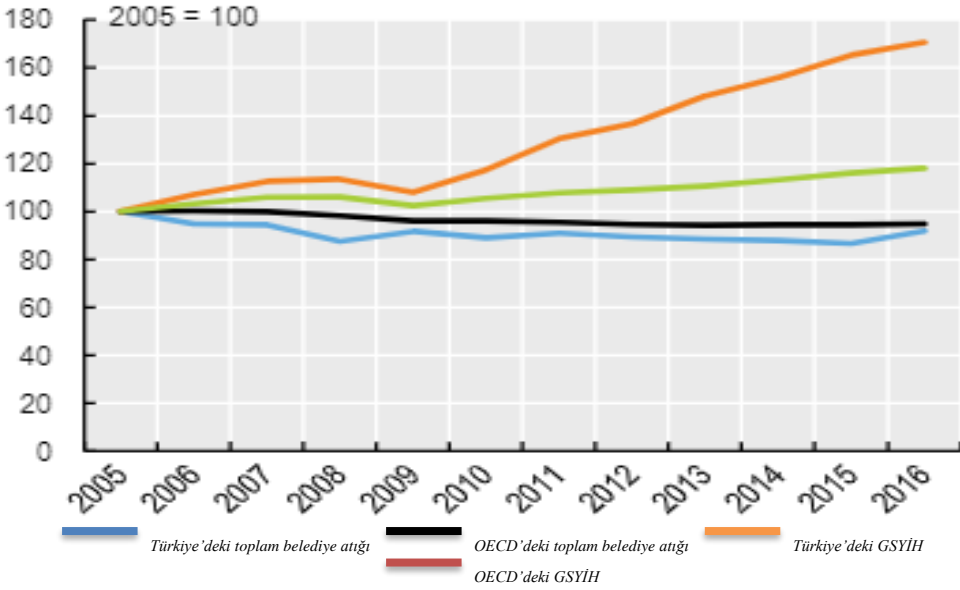


Belediye atıklarının miktarı ve bileşimi OECD ülkeleri arasında büyük farklılıklar göstermektedir. Şekil 2'de görüldüğü gibi 2019'da kişi başına en yüksek belediye atığı

miktarı Danimarka'da oluşmuştur. OECD bölgesinde yaşayan bir kişi yılda ortalama 538 kg atık üretmektedir.

Kişi başına düşen belediye atığı miktarı Şekil 3'te verildiği gibi Türkiye'de 425 kg olup, OECD ortalaması olan 538'in altındadır. 2005'ten sonra OECD'de ortaya çıkan belediye atıklarında yaklaşık %5'lik bir düşüş oluşmuş, Türkiye'de ise GSYH'nin artışına rağmen %8 oranında daha yüksek seviyede bir düşüş sağlanmıştır.

Şekil: 3
Türkiye ve OECD'deki Toplam Belediye Atığı Miktarı ve GSYİH (2005-2016)



Türkiye'de Atık Yönetimi Yönetmeliği (02.4.2015-29314) atık üretiminden yok edilmelerine kadar atık yönetimi çerçevesinin belirleyicisidir. Uygulamada bazı eksiklikleri olmasına karşın, belediye atık yönetim sistemi yeni düzenlemelere dayanılarak iyileştirilmiş ve çalışmalarla desteklenmiştir. Türkiye'de belediye atık yönetimi gün geçtikçe iyileşmektedir. Lisanslı geri dönüşüm ve geri kazanım tesislerinin sayısı son on yılda hızla artmıştır. Düzenli depolama alanına gidecek olan belediye katı atığının payı 2001 ve 2014 yılları arasında %114 artmış, 2015 yılında lisanslı tesis sayısı 1226'ya ulaşmıştır (Municipal Waste Management in Turkey, 2016).

3. Ampirik Uygulama

Bu kısımda, önce çalışmada Türkiye'deki belediye atığı miktarının tahminini yapacak model için kullanılan yöntem ve modelde yer alan değişkenler hakkında bilgi

sunularak metodoloji ortaya konmuştur. Ayrıca, çalışma ile ilgili literatüre de bu kısımda yer verilmiştir. Daha sonra modelin çıktıkları olan tahmin değerleri sunulmuştur.

3.1. Model ve İlgili Literatür

Bu çalışmada tahminleme için Tanaka'nın Doğrusal Bulanık Regresyon Modeli kullanılmıştır. Bulanık Doğrusal Regresyon ilk kez Tanaka vd. (1982) tarafından çalışılmıştır. Bu çalışmada bağımsız değişkenlere göre bağımlı değişkeni tahmin etmek ve oluşturulan modelde parametreleri tahmin etmek amacıyla, klasik regresyon modelini esneterek Japonya'daki prefabrik evlerin fiyat mekanizmasının tahmini için bulanık doğrusal modeli kullanmıştır. Sonradan bu konu birçok araştırmacı tarafından incelenmiş ve Tanaka'nın Bulanık Regresyon Modeli geliştirilmiştir.

Bulanık regresyon modellerinin ikinci temel taşı Diamond (1988) ortaya koymuş, aralıksız (bulanık verilere dayalı) tip model önermiştir. Bulanık değerli verinin basit en küçük karelere uyması için çeşitli modeller geliştirilmiştir. Modellere bulanık veri setlerinin uyarlanabileceği ve normal denklemlerin analoglarının türetildiği kriterler verilmiştir. Moskowitz ve Kim (1993) H değeri arasındaki ilişki, üyelik fonksiyonu şekli ve bulanık doğrusal regresyonda bulanık parametrelerin yayılımlarını belirlemiş ve yayılımın H değeri ve üyelik fonksiyonu şekline duyarlılığını incelemiştir. Chang ve Lee (1996), en küçük kareler yaklaşımına dayanan genel bir bulanık regresyon modeli önermiş, bu yeni modelin adı "bulanık ağırlıklı en küçük kareler regresyonu yaklaşımı" olmuştur. Normal aralığın dışında kalan veri noktaları düzeltilip etkileri azaltılmıştır.

İlerleyen zamanlarda yapılan çalışmaların bazılarında bulanık doğrusal regresyon modelleri farklı yöntemlerle bütünleştirilerek kullanılmış, bazılarında ise yöntemi geliştirmeye yönelik yeni açılımlar geliştirilmiştir. Örneğin Bell ve Wang (1997), bulanık doğrusal regresyon modeli ile Analitik Hiyerarşi Prosesinin (AHP) ikili karşılaştırılmalarını kullanarak nihai bulanık doğrusal model oluşturmuşlardır. Wang ve Tsaur (2000), Tanaka tarafından net girdi ve bulanık çıktı kullanılarak modellenen bulanık en küçük kare yöntemini önermişlerdir. Bu yaklaşımla yeni modeldeki öngörülebilirliğin Tanaka'dan daha iyi olduğu ve hesaplama verimliliğinin ise geleneksel en küçük kare yönteminden daha iyi olduğu gösterilmiştir. Chang ve Ayyub (2001), bulanık regresyon ve normal regresyon arasındaki temel farklılıkları araştırmışlardır. Çalışmada bulanıklığın üç yaklaşımını özetlemişler ve hem rastgelelik hem de belirsizlik türlerini bir regresyon modeline entegre etmek için, melez bulanık en küçük kareler regresyon analizini önermişlerdir. Tran ve Duckstein (2002) ise çok amaçlı bir bulanık regresyon modeli geliştirmişlerdir. Bu çalışmalardan hareketle yabancı literatürdeki araştırmaların çoğunlukla Tanaka'nın modelini geliştiren, yeni model önerileri şeklinde teorik çerçevede olduğu söylenebilir.

Türkiye'deki araştırmacılar ise uygulamaya dönük olarak bulanık regresyon modelini kullanarak çeşitli tahminler yapmıştır. Örneğin, Yücel (2005) Türkiye'de 1980-2004 yılları arasındaki kayıt dışı ekonominin bulanık yöntemlerle tahminini gerçekleştirmiştir. Başaran (2007) çok değişkenli bulanık regresyonda parametre tahmininde bulunmuştur. Düzyurt

(2008) klasik ve bulanık regresyon modellerini incelenmiş, ev fiyatları tahminini bu modellerle yapmıştır. Kaya (2010) bulanık regresyon ve lojistik regresyon modelini bütünleştirerek kullanmıştır. Erilli vd. (2012) bulanık regresyon modelini kriz dönemlerindeki enflasyon tahminleri yapmak için; İçen ve Günay (2015) ise Türkiye'deki işsizlik oranını tahmin etmek için kullanmışlardır.

Literatürdeki çalışmalara bakıldığında bulanık regresyon modellerinin pek çok farklı alanda tahmin yapmak için kullanıldığı görülmektedir. Ancak, Türkiye'de ve dünyada atıklar kapsamında bu model kullanılarak yapılan bir tahminleme çalışmasına rastlanmamıştır. Bu kapsamda çalışmada, belediye atığı miktarının belirlenmesinde kullanılan kriterlerin yeterli düzeyde tanımlanmamış olması sebebiyle ortaya çıkan belirsizlik durumu da göz önüne alınarak Tanaka'nın Doğrusal Bulanık Regresyon Modeli ile Türkiye'de toplanan belediye atığı miktarını tahmin eden bir model oluşturulmuştur. Ayrıca, belediye atığı miktarı sadece belirtilen kriter ve göstergelere bağlı bulunmayabilir ve bu miktarı etkileyen birçok bağımsız değişken olabilir. Belediye atığı miktarının belirlenmesi için kriterlerin kesin tanımlanmamış olması sebebiyle ortaya çıkan belirsizlik, yöntemde bulanıklığa neden olmaktadır.

3.2. Değişkenler ve Veri Seti

Atık miktarlarının doğru tahmini atık yönetimi açısından kritik önemdedir. Ancak, atık miktarını etkileyen çok çeşitli faktör söz konusudur. Literatürdeki çalışmalar, belediye atık miktarı ile çok sayıda sosyoekonomik gösterge (gelir seviyesi, eğitim seviyesi, yaş, cinsiyet, çalışma oranları vb.) arasında ilişki bulunduğunu göstermektedir (Batiniç vd., 2011: 513-518). Örneğin Ghinea vd. (2016), katı atık miktarı ve çeşitliliğini tahmin etmek için nüfusun sayısı ve yaşı, kentsel yaşam beklentisi, toplam belediye katı atığı gibi göstergeleri kullanmıştır. Younes vd. (2016) katı atık üretiminin genellikle ekonomik, demografik ve sosyal faktörlerle ilişkili olduğunu ancak, bu faktörlerin nüfus ve ekonomik büyüme nedeniyle sabit olmadığını ifade etmiştir.

Bu çalışmada literatürde belirtilen çok sayıda gösterge içinden daha fazla etkili olabileceği düşünülen ve Türkiye için verisine ulaşılabilen göstergeler kullanılmıştır. Bunlar modelin bağımlı değişkeni olan belediye atığı miktarını etkileyen; Türkiye'de nüfus artış hızı, kişi başına düşen GSYİH ve okur-yazarlık oranıdır. Nüfus ile ilgili temel parametreler, üretilen atık miktarı üzerinde etkili olan önemli faktörlerdir (Batiniç vd., 2011: 513). Çalışmada nüfus artış hızı ilk bağımsız değişken olarak kabul edilmiştir. Çalışmanın başlangıcında nüfus artış hızı yerine toplam nüfus kullanılmış, fakat model anlamlı çıkmadığı için değişkende farklılığa gidilmiştir. Modelde ikinci bağımsız değişken olarak kişi başına düşen GSYİH kullanılmıştır. Farklı GSYİH'ye sahip ülkeler, atık çeşitliliği ve miktarlarında da farklı paya sahiptir. Türkiye gelişmekte olan bir ülke olarak, her yıl artan bir gelire sahiptir. Ortalama gelir ile atık miktarı arasında bağımlılık bilindiğinden, diğer bir bağımsız değişken olarak reel ekonomik gösterge olan kişi başına düşen GSYİH alınmıştır. Üçüncü bağımsız değişken ise eğitim yapısı olarak alınmıştır. Bilgi, eğitim ve kültür kalıplarının seviyesi, üretilen atığın miktarını önemli ölçüde etkilemektedir ve yapılan

araştırmalara göre, yüksek eğitilmiş kişilerin atık miktarındaki payı daha düşüktür (Batinic vd., 2011: 518). Buradan hareketle üçüncü değişken olarak okuryazarlık oranı alınmıştır.

Verinin toplanmasına ilişkin yapılan ön incelemede belediye atıklarıyla ilgili Türkiye'de 2005 yılından önceki yıllara ait sistematik verinin internet ortamında olmaması ulaşılabilirliği engellemiştir. İnternet ortamında 2005-2019 yılları arasındaki verinin ulaşılabilir olması nedeniyle bu aralıktaki 15 yıla ait veri kullanılmıştır. Ayrıca, atık miktarları mevsimsel olarak değişse de Türkiye'de yeterli verinin bulunamaması nedeniyle sadece yıllık ortalama değerleri hesaplanarak modelde kullanılmıştır. İlgili veri Eurostat, OECD ve TÜİK veri tabanlarından Nisan 2020-Mayıs 2020 tarihleri arasında toplanmıştır.

3.3. Tanaka'nın Doğrusal Bulanık Regresyon Modeli ile Türkiye'deki Belediye Atığı Miktarının Tahmin Uygulaması

Modelde kullanılan bağımlı değişken ve bağımsız değişkenler:

$i = 1, 2, \dots, 15$ (2005-2019 yılları için)

$Y_i = i$. yıldaki belediye atığı miktarı (bin ton)

$X_{i1} = i$. yıldaki nüfus artış hızı (%)

$X_{i2} = i$. yıldaki GSYİH (bin TL)

$X_{i3} = i$. yıldaki 6 yaş ve üzeri okuryazarlık oranı (%)

OECD, Eurostat ve TÜİK veri tabanlarından elde edilen veri seti Tablo 1'de gösterilmiştir. Tabloda, farklı yıllarda ortaya çıkan toplam belediye atığı miktarı Y_i ve bu miktarı etkileyen değişkenler X_{i1} , X_{i2} , X_{i3} olarak gösterilmiştir.

Tablo: 1
Türkiye'deki Farklı Yıllarda Ortaya Çıkan Belediye Atığı Miktarları ve Bu Miktarları Etkileyen Değişkenler Çizelgesi (Veri Seti)

i	Y_i	X_{i1}	X_{i2}	X_{i3}
1 (2005)	25147	1,3	9	88,1
2 (2006)	25280	1,2	11	88,2
3 (2007)	24820	1,2	12	88,7
4 (2008)	24361	1,2	14	91,8
5 (2009)	24819	1,3	13	92,5
6 (2010)	25277	1,4	15	94,0
7 (2011)	25561	1,5	18	95,1
8 (2012)	25845	1,6	20	95,8
9 (2013)	26928	1,7	23	96,0
10 (2014)	28011	1,7	26	96,1
11 (2015)	29797	1,7	29	96,2
12 (2016)	31584	1,6	32	96,5
13 (2017)	31896	1,6	38	96,7
14 (2018)	32209	1,5	45	97,0
15 (2019)	32500	1,4	51	98,0

Önerilen model için her veri ikişer kısıta dönüştürülmüştür. Buna göre, Tablo 1'deki 15 yıla ait veri seti kullanılarak 30 kısıt oluşturulmuştur.

Denklem (3.1) tipik bir bulanık doğrusal regresyon modelini göstermektedir (Ross, 2004: 556):

$$\tilde{Y} = f(x, \tilde{A}) = \tilde{A}_0 + \tilde{A}_1 X_1 + \tilde{A}_2 X_2 + \dots + \tilde{A}_n X_n \quad (3.1)$$

Burada \tilde{A}_i , i ' nin bulanık katsayısıdır. Bulanık fonksiyon \tilde{A} , merkezi değer p ve yayılım olarak bilinen c olmak üzere iki parametrenin bir fonksiyonudur. Bulanık parametreler, $\tilde{A} = \{\tilde{A}_1, \dots, \tilde{A}_n\}$ vektör formunda gösterilebilir. $\tilde{A} = \{p, c\}$ koşuluyla $p = (p_0, \dots, p_n)$ ve $c = (c_0, \dots, c_n)$. Bu nedenle, çıktı Denklem 3.1' in revize versiyonu (Ross, 2004: 557):

$$\tilde{Y} = (p_0, c_0) + (p_1, c_1) x_1 + (p_2, c_2) x_2 + \dots + (p_n, c_n) x_n \quad (3.2)$$

Tanaka vd. (1982), doğrusal bir programlama problemine dönüştürerek regresyon modelinin çözümünü belirlemiştir. Bulanık olmayan veriler için regresyon modelinin amacı, y_i içeren bulanık çıktı setinin h 'den büyük bir üyelik değeri ile ilişkili olacağı şekilde optimum parametreler \tilde{A} belirlemektir (Ross, 2004: 557).

Veri seti ve regresyon modeli arasındaki uyumun ölçüsü h terimidir. h derecesi kullanıcı tarafından belirlenir ve h arttıkça çıktının bulanıklığı artar (Ross, 2004: 557). h terimi $[0,1]$ aralığında değer alır (Yücel, 2005). h değeri 0'a yaklaştıkça, üyelik değerinin düşmesine ve inanç derecesinin azalmasına sebebiyet vermektedir. h inanç derecesi o kümeye ait üyelik derecesini belirlemektedir. Ortalama inanç derecesi ise (\bar{h}) ortalama üyelik derecesini bildirmektedir ve ortalamaları alınarak hesaplanır (Erilli vd., 2012). Bu hesaplama (Denklem 3.3):

$$h_{\text{inanç}} = h_i = 1 - \frac{|p_i - y_i|}{c_i} \quad (3.3)$$

Klasik doğrusal regresyon modelinde yapılması olası hatalar hata teriminde toplanırken, bulanık doğrusal regresyonda tüm model katsayılarına hata dağıtılır. Böylece parametrelerin her birinin tahmini belli bir bulanık seviyesinde olmaktadır. Bulanık katsayı $\tilde{A}_i = (c_i, s_i)$ 'yi hesaplamak için Tanaka vd. (1982) geliştirdiği doğrusal bulanık regresyon modeli aşağıdaki gibidir:

Amaç fonksiyonu: $(0 = \min \{ mc_0 + \sum_{j=1}^m \sum_{i=1}^n c_i x_{ij} \})$ bulanık çıktının yayılımını minimize eden bulanık katsayıların bulunması içindir. Kısıtlar ise (Denklem 3.4):

$$\begin{aligned} [y_j \geq \sum_{i=1}^n p_i x_{ij} - (1 - h) \sum_{i=1}^n c_i x_{ij}] \text{ ve} \\ [y_j \leq \sum_{i=1}^n p_i x_{ij} + (1 - h) \sum_{i=1}^n c_i x_{ij}] \end{aligned} \quad (3.4)$$

regresyon katsayılarının merkezi değerini ve yayılımlarını oluşturmak içindir.

İncelenen diğer uygulamalara bakılarak minimum bulanıklık kriteri $H=0.00$, $H=0.50$ ve $H=0.70$ olarak 3 durum için elde edilen doğrusal programlama modelleri kurulmuştur.

Kurulan bulanık doğrusal regresyon modelleri LINGO 11.0 paket programı kullanılarak çözülmüştür. Her bir farklı minimum bulanıklık kriteri için elde edilen bulanık regresyon modelleri aşağıda açıklanmıştır.

H=0.00 Seviyesinde Minimum Bulanıklık Analizi

Tanaka'nın Bulanık Regresyon Modelinde H=0.00 için:

$$\text{MIN} = 15*c_0+21.9*c_1+356*c_2+1410.7*c_3;$$

$$p_0+1.3*p_1+9*p_2+88.1*p_3-c_0-1.3*c_1-9*c_2-88.1*c_3 \leq 25147;$$

$$p_0+1.3*p_1+9*p_2+88.1*p_3+c_0+1.3*c_1+9*c_2+88.1*c_3 \geq 25147;$$

...

$$p_0+1.4*p_1+51*p_2+98*p_3+c_0+1.4*c_1+51*c_2+98*c_3 \geq 32500;$$

$$p_0+1.4*p_1+51*p_2+98*p_3-c_0-1.4*c_1-51*c_2-98*c_3 \leq 32500;$$

LINGO 11.0 paket programındaki bu sonuçlar doğrultusunda bulanık katsayı parametrelerinin en küçük bulanıklığa bağlı tahmin değerleri aşağıdaki gibidir (Tablo 2).

Tablo: 2
H=0.00 Bulanıklık Seviyesinde Hesaplanan Modele Ait Katsayı Değerlerinin Merkez ve Yayılım Değerleri

Değişkenler	Katsayılar	Merkez değeri (μ_n)	Yayılım (c_n)
Sabit	\tilde{A}_0	60862,03	0,00
X_1	\tilde{A}_1	5331,67	0,00
X_2	\tilde{A}_2	337,04	43,90
X_3	\tilde{A}_3	-518,12	0,00

$$\tilde{Y}_i = \tilde{A}_0 + \tilde{A}_1 X_{i1} + \tilde{A}_2 X_{i2} + \tilde{A}_3 X_{i3}$$

$$= (60862,03 ; 0) + (5331,67 ; 0) X_{i1} + (337,04 ; 43,90) X_{i2} + (-518,12 ; 0) X_{i3}$$

(60862,03 ; 0) merkezi değeri 60862,03 ve yayılım değeri 0 olan bulanık eğimdir. Diğerlerinin bulanık eğimlerinin gösterimi bu şekildedir. Buna göre tahmin edilen belediye atığı değerleri Tablo 3'te gösterilmiştir.

Tablo: 3
H=0.00 için Tanaka'nın Bulanık Regresyon Modeli Kullanılarak Tahmin Edilen \tilde{Y} (Belediye Atığı) Değerleri

i	Gerçek Y Değerleri	H=0.00 için				İnanç Derecesi
		Tahmin Edilen \tilde{Y}_i Alt Sınır ve Üst Sınır Değerleri		Tahmin Edilen $\tilde{Y}_i = (p_i, c_i)$ Merkezi Değerleri ve Yayılımı		
		Alt Sınır	Üst Sınır	p_i	c_i	
1	25147	24785,08	25575,28	25180,18	395,10	0,91
2	25280	24786,39	25752,19	25269,29	482,90	0,97
3	24820	24820,47	25874,07	25347,27	526,80	0,00
4	24361	23800,57	25029,77	24415,17	614,60	0,91
5	24819	23677,92	24819,32	24248,62	570,70	0,00
6	25277	24020,18	25337,18	24678,68	658,50	0,09
7	25561	24862,84	26443,24	25653,04	790,20	0,88
8	25845	25619,60	27375,60	26497,60	878,00	0,25
9	26928	26928,56	28947,96	27938,26	1009,70	0,00
10	28011	27756,17	30038,97	28897,57	1141,40	0,22
11	29797	28583,73	31129,98	29856,88	1273,10	0,95
12	31584	28774,60	31584,20	30179,40	1404,80	0,00
13	31896	30429,81	33766,21	32098,01	1668,20	0,87
14	32209	31793,19	35744,19	33768,69	1975,50	0,21
15	32500	32500,74	36978,54	34739,64	2238,90	0,00

Belediye atığı miktarının bulanık ortalama değeri $Y_i = (p_i, c_i)$ şeklindedir. Belediye atığı miktarının belirsizliği \tilde{A}_2 kişi başına düşen GSYİH'nın belirsizliği ile ifade edilebilir. H değerinin 0 olması sistem için bir inanç seviyesi düşüklüğüne ve üyelik değerinin düşmesine sebep olmaktadır.

Sistem Bulanıklığı = 15630,76

$$\bar{h} = \sum_{i=1}^{15} h_i / 15 = 0,41$$

Sistemin ortalama inanç derecesi (\bar{h}) seçilen H değerinden büyük olması gerekmektedir. H=0.00 için ortalama inanç derecesi 0,41 çıkmıştır. Bu durum uygulamanın H= 0.00 için doğru tahmin yaptığını göstermektedir.

H=0.50 Seviyesinde Minimum Bulanıklık Analizi

Tanaka'nın Bulanık Regresyon Modelinde H=0.50 için:

$$MIN = 15 * c_0 + 21.9 * c_1 + 356 * c_2 + 1410.7 * c_3;$$

$$p_0 + 1.3 * p_1 + 9 * p_2 + 88.1 * p_3 - 0.5 * c_0 - 1.3 * 0.5 * c_1 - 9 * 0.5 * c_2 - 88.1 * 0.5 * c_3 \leq 25147;$$

$$p_0 + 1.3 * p_1 + 9 * p_2 + 88.1 * p_3 + 0.5 * c_0 + 1.3 * 0.5 * c_1 + 9 * 0.5 * c_2 + 88.1 * 0.5 * c_3 \geq 25147;$$

...

$$p_0 + 1.4 * p_1 + 51 * p_2 + 98 * p_3 + 0.5 * c_0 + 1.4 * 0.5 * c_1 + 51 * 0.5 * c_2 + 98 * 0.5 * c_3 \geq 32500;$$

$$p_0 + 1.4 * p_1 + 51 * p_2 + 98 * p_3 - 0.5 * c_0 - 1.4 * 0.5 * c_1 - 51 * 0.5 * c_2 - 98 * 0.5 * c_3 \leq 32500;$$

LINGO 11.0 paket programındaki bu sonuçlar doğrultusunda bulanık katsayı parametrelerinin en küçük bulanıklığa bağlı tahmin değerleri aşağıdaki gibidir (Tablo 4).

Tablo: 4
H=0.50 Bulanıklık Seviyesinde Hesaplanan Modele Ait Katsayı Değerlerinin Merkez ve Yayılım Değerleri

Değişkenler	Katsayılar	Merkez değeri (p_n)	Yayılım (c_n)
Sabit	\tilde{A}_0	60862,03	0,00
X_1	\tilde{A}_1	5331,67	0,00
X_2	\tilde{A}_2	337,04	87,81
X_3	\tilde{A}_3	-518,12	0,00

$$\tilde{Y}_i = \tilde{A}_0 + \tilde{A}_1 X_{i1} + \tilde{A}_2 X_{i2} + \tilde{A}_3 X_{i3}$$

$$= (60862,03 ; 0) + (5331,67 ; 0) X_{i1} + (337,04 ; 87,81) X_{i2} + (-518,12 ; 0) X_{i3}$$

(60862,03 ; 0) merkezi değeri 60862,03 ve yayılım değeri 0 olan bulanık eğimdir. Diğerlerinin bulanık eğimlerinin gösterimi bu şekildedir.

Tahmin edilen belediye atığı değerleri Tablo 5' te gösterilmiştir.

Tablo: 5
H=0.50 için Tanaka'nın Bulanık Regresyon Modeli Kullanılarak Tahmin Edilen \tilde{Y} (Belediye Atığı Miktarı) Değerleri

H=0.50 için						
i	Gerçek Y Değerleri	Tahmin Edilen \tilde{Y}_i Alt Sınır ve Üst Sınır Değerleri		Tahmin Edilen $Y_i = (p_i, c_i)$ Merkezi Değerleri ve Yayılımı		İnanç Derecesi h_i
		Alt Sınır	Üst Sınır	p_i	c_i	
1	25147	24389,79	25970,47	25180,18	790,79	0,95
2	25280	24303,38	26235,20	25269,29	965,91	0,98
3	24820	24293,55	26400,99	25347,27	1053,72	0,49
4	24361	23185,83	25644,51	24415,17	1229,34	0,95
5	24819	23107,09	25390,15	24248,62	1141,53	0,50
6	25277	23361,53	25995,83	24678,68	1317,15	0,54
7	25561	24072,46	27233,62	25653,04	1580,58	0,94
8	25845	24741,40	28235,80	26497,60	1756,20	0,62
9	26928	25918,63	29957,89	27938,26	2019,63	0,49
10	28011	26614,51	31180,63	28897,57	2283,06	0,61
11	29797	27310,39	32403,37	29856,88	2546,49	0,97
12	31584	27369,48	32989,32	30179,40	2809,92	0,50
13	31896	28761,23	35434,79	32098,01	3336,78	0,93
14	32209	29817,24	37720,14	33768,69	3951,45	0,60
15	32500	30261,33	39217,95	34739,64	4478,31	0,49

Belediye atığı miktarının bulanık ortalama değeri $Y_i = (p_i, c_i)$ şeklindedir. Belediye atığı miktarının belirsizliği \tilde{A}_2 kişi başına düşen GSYİH'nın belirsizliği ile ifade edilebilir.

Sistem Bulanıklığı = 31261,52

$$\bar{h} = \sum_{i=1}^{15} h_i / 15 = 0,70$$

Sistemin ortalama inanç derecesi (\bar{h}) seçilen H değerinden büyük olması gerekmektedir. H=0.50 için ortalama inanç derecesi 0,70 çıkmıştır. Bu durum uygulamanın H=0.50 için doğru tahmin yaptığını göstermektedir.

H=0.70 Seviyesinde Minimum Bulanıklık Analizi

Tanaka'nın Bulanık Regresyon Modelinde H=0.70 için:

$$\text{MIN} = 15 \cdot c_0 + 21.9 \cdot c_1 + 356 \cdot c_2 + 1410.7 \cdot c_3;$$

$$p_0 + 1.3 \cdot p_1 + 9 \cdot p_2 + 88.1 \cdot p_3 - 0.3 \cdot c_0 - 1.3 \cdot 0.3 \cdot c_1 - 9 \cdot 0.3 \cdot c_2 - 88.1 \cdot 0.3 \cdot c_3 \leq 25147;$$

$$p_0 + 1.3 \cdot p_1 + 9 \cdot p_2 + 88.1 \cdot p_3 + 0.3 \cdot c_0 + 1.3 \cdot 0.3 \cdot c_1 + 9 \cdot 0.3 \cdot c_2 + 88.1 \cdot 0.3 \cdot c_3 \geq 25147;$$

...

$$p_0 + 1.4 \cdot p_1 + 51 \cdot p_2 + 98 \cdot p_3 + 0.3 \cdot c_0 + 1.4 \cdot 0.3 \cdot c_1 + 51 \cdot 0.3 \cdot c_2 + 98 \cdot 0.3 \cdot c_3 \geq 32500;$$

$$p_0 + 1.4 \cdot p_1 + 51 \cdot p_2 + 98 \cdot p_3 - 0.3 \cdot c_0 - 1.4 \cdot 0.3 \cdot c_1 - 51 \cdot 0.3 \cdot c_2 - 98 \cdot 0.3 \cdot c_3 \leq 32500;$$

LINGO 11.0 paket programındaki bu sonuçlar doğrultusunda bulanık katsayı parametrelerinin en küçük bulanıklığa bağlı tahmin değerleri aşağıdaki gibidir (Tablo 6).

Tablo: 6
H=0.70 Bulanıklık Seviyesinde Hesaplanan Modele Ait Katsayı Değerlerinin Merkez ve Yayılım Değerleri

Değişkenler	Katsayılar	Merkez değeri (μ_n)	Yayılım (c_n)
Sabit	\tilde{A}_0	60862,03	0,00
X_1	\tilde{A}_1	5331,67	0,00
X_2	\tilde{A}_2	337,04	146,35
X_3	\tilde{A}_3	-518,12	0,00

$$\tilde{Y}_i = \tilde{A}_0 + \tilde{A}_1 X_{i1} + \tilde{A}_2 X_{i2} + \tilde{A}_3 X_{i3}$$

$$= (60862,03 ; 0) + (5331,67 ; 0) X_{i1} + (337,04 ; 146,35) X_{i2} + (-518,12 ; 0) X_{i3}$$

(60862,03 ; 0) merkezi değeri 60862,03 ve yayılım değeri 0 olan bulanık eğimdir. Değerlerinin bulanık eğimlerinin gösterimi bu şekildedir.

Tablo: 7
H=0.70 için Tanaka'nın Bulanık Regresyon Modeli Kullanılarak Tahmin Edilen \tilde{Y} (Belediye Atığı Miktarı) Değerleri

H=0.70 için						
i	Gerçek Y Değerleri	Tahmin Edilen \tilde{Y}_i Alt Sınır ve Üst Sınır Değerleri		Tahmin Edilen $\tilde{Y}_i = (\mu_i, c_i)$ Merkezi Değerleri ve Yayılımı		İnanç Derecesi h_i
		Alt Sınır	Üst Sınır	μ_i	c_i	
1	25147	23863,03	26497,33	25180,18	1317,15	0,97
2	25280	23659,44	26879,14	25269,29	1609,85	0,99
3	24820	23591,07	27103,47	25347,27	1756,20	0,69
4	24361	22366,27	26464,07	24415,17	2048,90	0,97
5	24819	22346,07	26151,17	24248,62	1902,55	0,70
6	25277	22483,43	26873,93	24678,68	2195,25	0,72
7	25561	23018,74	28287,34	25653,04	2634,30	0,96
8	25845	23570,60	29424,60	26497,60	2927,00	0,77
9	26928	24572,21	31304,31	27938,26	3366,05	0,69
10	28011	25092,47	32702,67	28897,57	3805,10	0,76
11	29797	25612,73	34101,03	29856,88	4244,15	0,98
12	31584	25496,20	34862,60	32098,01	5561,30	0,70
13	31896	26536,71	37659,31	32098,01	5561,30	0,96
14	32209	27182,94	40354,44	33768,69	6585,75	0,76
15	32500	27275,79	42203,49	34739,64	7463,85	0,69

Tahmin edilen belediye atığı değerleri Tablo 7' de görülmektedir.

Belediye atığı miktarının bulanık ortalama değeri $Y_i = (p_i, c_i)$ şeklindedir. Belediye atığı miktarının belirsizliği \tilde{A}_2 kişi başına düşen GSYİH'nin belirsizliği ile ifade edilebilir.

Sistem Bulanıklığı = 52102,53

$$\bar{h} = \sum_i^{15} h_i / 15 = 0,82$$

Sistemin ortalama inanç derecesi (\bar{h}) seçilen H değerinden büyük olması gerekmektedir. H=0.70 için ortalama inanç derecesi 0,82 çıkmıştır. Bu durum uygulamanın H=0.70 için doğru tahmin yaptığını göstermektedir.

Tanaka'nın Bulanık Regresyon Modelleri kullanılarak farklı minimum bulanıklık kriteri değerleri H=0.00, H=0.50 ve H=0.70 için elde edilen bulanık modellerin orta çizgi denklemi aynı olmuştur ve denklem aşağıdaki gibidir:

$$\hat{Y}_i = 60862,03 + 5331,67 X_{i1} + 337,04 X_{i2} - 518,12 X_{i3}$$

Modelin çözümü sonucunda görüldüğü gibi, her bir verinin inanç derecesi (h), H değerine göre H ile 1 arasında yayılım göstermektedir. H'nin derecesi arttıkça modelin bulanıklığı artmaktadır. H=0.00 olduğunda en düşük inanç derecesine sahip olur ve h'lar en dar bulanık büyüklüğe 0 ile 1 arasında sahip olurlar. Kısacası; ortalama inanç derecesi (\bar{h}) artışı H değerinin ve sistem bulanıklığının artmasına bağlıdır. Model, kullanılan her bir verinin h inanç derecesinin kullanıcının seçtiği H derecesinden büyük veya H derecesine eşit olmasına neden olur (Düzyurt, 2008: 47).

OECD, Eurostat ve TÜİK'den alınarak hazırlanan gerçek Y değerleri (toplam belediye atık miktarları) ile tahmin edilen \hat{Y} toplam belediye atık miktarı hesaplamaları arasında büyük ölçüde bir farklılık bulunmamaktadır. h inanç derecesi bunu doğrular bir şekilde göstermiştir. Seçilen 3 farklı H değerine göre model 3 farklı sonuç üretmiştir. H derecesi ne kadar artarsa, yani tahmin edilen \hat{Y} değerinin gerçek Y değerine ne kadar yakın olması istenirse o bağlamda tahmin edilen \hat{Y} yayılımı ve sistemin bulanıklığı artmaktadır.

4. Sonuç ve Öneriler

Belediye atık yönetimi, yöneticiler için insan sağlığını, çevreyi ve doğal kaynakları koruma açısından büyük bir endişe kaynağıdır. Etkili bir atık yönetim sisteminin tasarımı ve işletimi için atık üretim miktarlarının doğru tahmin edilmesi gerekmektedir. Atıklarının miktarlarıyla ilgili tahminler, atık yönetiminin sürdürülebilirliği için çok önemlidir.

Bu çalışmada, tahmin edilen toplam belediye atık miktarı ile uygulamada belirtilen göstergeler arasındaki ilişkinin varlığını ve doğruluğunu göstermek, gelecekte Türkiye'de belediye atıklarının miktarına ilişkin çıkarımlar yapmak için Tanaka'nın Bulanık Regresyon Modeli kullanılmıştır. Bu model, Türkiye'de 2005-2019 yılları arasındaki belediye atık

miktarının tahmini için kullanılmıştır. Tanaka'nın modeline dayalı olarak net girdi kullanılarak bulanık çıktı ile oluşturulan bulanık doğrusal regresyon modeli ile belediye atık miktarı tahmin edilmiştir. Daha önce Türkiye'de belediye atıklarının tahminine yönelik bir çalışma bulunmamaktadır. Atık yönetimi konusunda özellikle de atıkların miktarı hakkında belirsizlik durumlarının çözümlenmesi için Tanaka'nın Bulanık Regresyon Modeli uygulamasının sonucunda modelin minimum sapmayla hesapladığı tahmin değerleri başarılı olmuştur. Gerçek toplam belediye atık miktarları ile tahmin edilen toplam belediye atık miktarı hesaplamaları arasında büyük ölçüde bir farklılık bulunmamaktadır. h inanç derecesi bunu doğrular bir şekilde göstermiştir. Model üç farklı durum için ele alınmış olup H düzeyleri farklılaştıkça sistem bulanıklığı da farklılaşmıştır. Kullanıcı tarafından belirlenen H ne kadar büyük alınırsa tahmin edilen belediye atığı oranı yayılımı ve sistem bulanıklığı da aynı doğrultuda artar. H derecesi ne kadar artarsa, yani tahmin edilen değer gerçek değere ne kadar yakın olması istenirse o bağlamda tahmin edilen belediye atık miktarı yayılımı ve sistemin bulanıklığı artmaktadır. Bu model, gelecekteki atık miktarını da öngörülen girdiler kullanarak tahmin edebilir.

Yapılan araştırmaların anlamlı bir şekilde sonuç vermesi için uygulanan analiz yöntemi ve modelinin doğru bir şekilde seçilmesinin oldukça önemli olduğu bu çalışma yürütülürken bir kez daha görülmüştür. Bu modelde; Türkiye'deki nüfus artış hızı, kişi başına düşen GSYİH tutarı ve okur-yazarlık oranı 3 bağımsız değişken olarak ele alınmış ve sonuç olarak modeldeki belediye atığı miktarının belirsizliğinin GSYİH'nin belirsizliği ile ifade edilebileceği görülmüştür. Ayrıca, bulanık regresyon analizi, veri kaynaklarına güvenin azaldığı ya da değişkenler arası ilişkilerin net sınırlarla çizilemediği durumlarda kullanılan bir yöntem (İçen & Günay, 2015) olması nedeniyle klasik regresyon modelinden farklı olarak esnek düşünme sağlamıştır.

Bu model, gelecekteki atık miktarını benzer girdiler kullanarak tahmin edebilir. Türkiye'deki resmi istatistik sitelerinde modelde kullanılan girdilere yönelik tahminlemelere yer verilmemiştir. Türkiye gibi gelişmekte olan ülkelerde geleceğe dair hem tahminleme çalışmalarında önemli eksikler hem de bu tip çalışmalara araştırmacıların erişiminde çeşitli sıkıntılar bulunmaktadır. Bu çalışma kapsamında yapılan ön araştırmalarda Türkiye'de geleceğe dair nüfus artış hızı, GSYİH, okur-yazarlık oranına ilişkin herhangi bir projeksiyon geliştirilmediği görülmüştür. Dolayısıyla, bu çalışmada sadece elde bulunan veri kullanılarak 2005-2019 yılları arasında yönelik tahminlerde bulunulmuş ve küçük bir veri seti ele alınabilmektedir. Ancak, gelişmiş ülkelerde pek çok parametreyle ilgili tahmin verileri geliştirilmekte ve bu parametreler de girdi parametresi olarak kullanılarak farklı alanlardaki tahminlemelere zemin oluşturabilmektedir.

Türkiye'deki belediyeler ve bakanlıklar gibi ilgili kurumlardaki yöneticiler için bu çalışmayla elde edilen bilgiler, çevre koruma ilkelerine uygun olarak gelecekteki kararlar ve atık yönetimi geliştirme çabaları açısından bir temel oluşturabilir. Çalışmada belediye atık miktarı belirsizliğinin GSYİH'nin belirsizliğe bağlı olduğu görüldüğünden, ekonomik gelişme ile birlikte gelecekte atık miktarlarının artacağı düşünülerek belediyelerin atık yönetimi konusu ciddiye almaları önerilebilir. Gelecekteki çalışmalar her bir il için

belediyeler özelinde de yapılabilir, temsili belediyeler seçilerek sahadan elde edilen verinin tüm ülkeye projeksiyonu da sağlanabilir. Yapılan atık analizi ve modellemesiyle, olası finansal yatırımların yönlendirilmesine destek olunabilir. Bu kapsamda, atık miktarlarının analizi ve tahminine yönelik yapılacak yeni çalışmalarla hem literatürdeki sınırlı bilginin gelişmesine katkı sağlanabilecek hem de karar vericilerin oluşturacakları atık politikaları için sağlam bir zemin oluşturulabilecektir.

Diğer yandan, çevre ve atık yönetimi çalışmaları yapan analistlere Tanaka'nın Bulanık Regresyon Analizi belirsizlik teşkil eden durumlar için açık modeli, kolay uygulaması ve iyi performansı nedeniyle önerilebilir. Aynı veri seti kullanılarak bulanık regresyonun diğer modelleri de kullanılabilir. Veri seti çoğaltılarak ve model geliştirilerek yapay sinir ağları ya da makine öğrenmesi algoritmaları kullanılarak gelecekteki atık miktarları ve atıkların bileşimlerinin değerlendirilmesi de mümkündür.

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Avrasya Ekonomik Birliğine Üye Ülkeler ve Türkiye’de CO₂ Emisyonu Belirleyicilerinin İncelenmesi: 2000-2018

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Investigation of CO₂ Emission Determinants in the Member Countries of the Eurasian Economic Union and Turkey: 2000 2018

Abstract

In this study, taking into account the data of the Eurasian Economic Union member countries (Russian Federation, Kazakhstan, Belarus, Kyrgyzstan, and Armenia) and Turkey between the years 2000-2018, the relationship between carbon dioxide emissions, per capita income, and electrical energy consumption has been analysed by applying a random effect, fixed effect and generalised method of moments, which are the panel data methods. This study, which examines the Eurasian Economic Union and Turkey, which is expected to be a member in the future, is guided by its empirical results in terms of directing the energy policies of the selected country group. According to the empirical findings obtained from the analysis, the increase in electrical energy consumption increases carbon dioxide emissions.

Keywords : CO₂ Emission, Electric Energy Consumption, Panel Data Method.

JEL Classification Codes : C23, Q43, Q50.

Öz

Bu çalışmada Avrasya Ekonomik Birliğine üye ülkeler (Rusya Federasyonu, Kazakistan, Belarus, Kırgızistan ve Ermenistan) ile Türkiye'nin 2000-2018 yılları arasındaki verileri dikkate alınarak; karbondioksit emisyonu, kişi başına düşen milli gelir ve elektrik enerjisi tüketimi arasındaki ilişki panel veri yöntemlerinden olan tesadüfi etkiler, sabit etkiler ve genelleştirilmiş momentler ile analiz edilmiştir. Avrasya Ekonomik Birliği ve gelecekte üyesi olması beklenen Türkiye'nin birlikte incelendiği bu çalışma seçili ülke grubunun enerji politikalarına yön vermesi noktasında ampirik sonuçlarıyla yol gösterici niteliktedir. Analizden elde edilen ampirik bulgulara göre; elektrik enerjisi tüketimindeki artış karbondioksit emisyonunu artırmaktadır.

Anahtar Sözcükler : CO₂ Emisyonu, Elektrik Enerjisi Tüketimi, Panel Veri Yöntemi.

1. Giriş

İnsanoğlu ilk çağlardan bu yana çevre ile etkileşim halinde olmuştur. Yaşam standartlarını yükseltmek için gerçekleştirdiği faaliyetler zaman içerisinde çeşitlilik kazanmış ve bu durum çevrenin kıt kaynakları üzerinde önemli bir baskı yaratmıştır. Özellikle II. Dünya Savaşı'ndan sonraki hızlı kalkınma süreci, kontrolsüz nüfus artışı, hızlı yapılanma ve endüstriyel gelişmeler doğal kaynakların bilinçsizce tüketimini artırmıştır. Buna bağlı olarak çevresel tehditler arasında önemli bir yer tutan karbondioksit emisyon seviyesi de artış göstermiştir. Ekonomik büyüme, kentleşme, hızlı nüfus artışı ve sanayileşmeyle birlikte artan enerji tüketimi karbondioksit emisyonunun başlıca nedeni olarak karşımıza çıkmaktadır.

Toplumların nihai amacı olan refah düzeyini yükseltmek için mal ve hizmet kapasitesinin niceliksel olarak artırılması gerekmektedir. Mal ve hizmet üretimi için gerekli olan üretim girdileri emek, sermaye, doğal kaynaklar ve enerjiden oluşmaktadır. Serbest mal¹ olarak tanımlanan doğal kaynaklar diğer üretim girdilerinin aksine doğada hazır halde bulunmaktadırlar. Üretim faaliyetleri içerisinde maliyetsiz şekilde yer alan söz konusu doğal kaynakların aşırı ve bilinçsiz tüketimi kaynak dağılımında dengesizlikler yaratarak çevresel sorunların ortaya çıkmasına zemin hazırlamaktadır. Sınırsız insan ihtiyaçlarının kıt kaynakları optimum şekilde kullanarak karşılanması noktasında ekonomik faaliyetler çevreden bağımsız bir şekilde değerlendirilemez. Söz konusu kaynakların optimum şekilde kullanımı Sanayi Devrimi sonrasında gelişen teknoloji ve sermaye yoğun üretimle birlikte daha verimli hale gelmiştir. Ancak bu durum doğal kaynak kullanımını azaltırken enerjiye olan ihtiyacı artırmıştır. Nitekim sermaye yoğun üretimin gelişmeye başladığı dönem olan sanayi devrimi çevresel sorunların da artmaya başladığı dönem olarak kabul edilmektedir. Sanayi devrimi ile artan makineleşme enerji tüketimini artırmakta ve bu durum hava, su ve toprak kirliliği gibi temel çevre sorunlarını beraberinde getirmektedir. Özellikle 1970'lerde yaşanan petrol krizine kadar önemi ihmal edilen enerji ekonomik büyümenin ön koşulu olarak karşımıza çıkmakta ve günümüzde önemli bir üretim girdisi olarak kabul edilmektedir. Dünya enerji görünümü raporuna göre 2040 yılı itibarıyla küresel ekonomide %150 oranında büyüme ve enerji talebinde ise %30 oranında bir artış öngörülmektedir (EIA, 2015: 6).

Enerji talebindeki artış özellikle Türkiye gibi enerji açısından dışa bağımlı olan ülkelerin ekonomilerini olumsuz yönde etkilemektedir. Enerji konusundaki dışa bağımlılık bu ülkelerin enerji üretim ve tüketim tercihlerini fosil yakıtlardan yana kullanmalarına neden olmaktadır. Fosil yakıt kullanımına bağlı olarak ortaya çıkan zararlı maddeler başta hava, su ve toprak kirliliği olmak üzere uzun vadede küresel ısınma ve iklim değişikliği gibi birçok çevresel problemin ortaya çıkmasında önemli rol oynamaktadır. Fosil yakıtların yaygın bir şekilde kullanılmasıyla elde edilen enerjinin ulaşım, ısı ve endüstri başta olmak üzere pek çok sektörde üretim girdisi olarak kullanılması ile artış gösteren karbondioksit emisyonunun

¹ *Doğada serbestçe ve bol miktarda bulunan, sahip olmak için herhangi bir bedel ödenmesine ya da çaba harcanmasına gerek duyulmayan mallardır.*

küresel ısınma üzerindeki etkisi azımsanamayacak düzeydedir. Yine EIA verileri doğrultusunda 2030 yılına kadar enerji kaynak kullanımına dayalı karbondioksit miktarının yaklaşık %50 oranında artması beklenmektedir (EIA, 2015: 7).

Karbondioksit emisyonuna yola açan belirleyicilerin tespit edilmesi ve aralarındaki ilişkinin hangi boyutta olduğunun saptanması karbondioksit emisyonunu azaltma noktasında büyük önem arz etmektedir. Bu çalışmada Türkiye ve Avrasya Ekonomik Birliği üye ülkelerinin 2000-2018 dönemi verileri kullanılarak elektrik enerjisi tüketimi ve kişi başına düşen milli gelir ile karbondioksit emisyonu arasındaki ilişki panel veri yöntemi ile analiz edilmiştir. Bu çerçevede çalışma iki bölümden oluşmaktadır. Birinci bölümde karbondioksit emisyonu, elektrik enerjisi tüketimi ve kişi başına düşen milli gelir ilişkisi ulusal ve uluslararası alan yazını ile detaylandırılarak ele alınmaktadır. Çalışmanın ikinci bölümünde ise seçili ülke verileri kullanılarak yapılan ampirik analiz ve sonuçlarına yer verilmektedir.

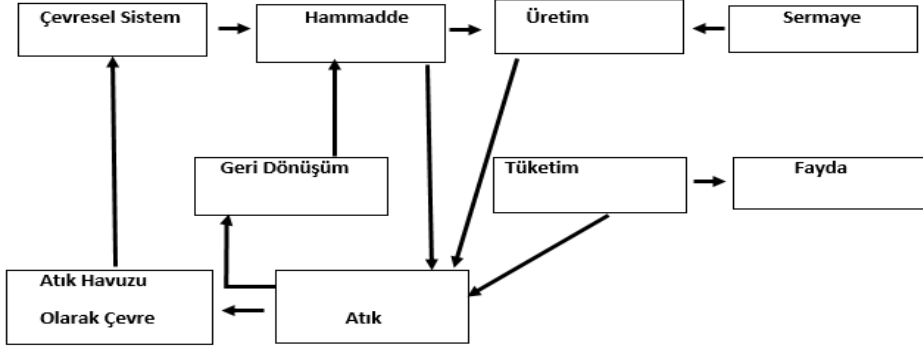
2. Çevre, Gelir ve Enerji İlişkisi

Çevresel sorunlara yol açan nedenler arasında insanların üretim ve tüketim faaliyetlerinde doğayı ve doğal kaynakları bilinçsizce kullanımı öne çıkmaktadır. Doğal kaynakların sınırsız olarak görülmesi ve maliyet minimizasyonu amacıyla doğanın tahrip edilmesi ekonomik açıdan ülkelerin çevresel sorunlarla karşı karşıya kalmasındaki sebepler arasında gösterilebilir. Ancak her ülkenin karşılaştığı çevresel sorunların sebebi aynı değildir. Gelişmiş olan ülkeler sanayileşme, hızlı kentleşme ve buna bağlı olarak aşırı üretim ve tüketim faaliyetlerinden dolayı bu sorunla karşılaşırken gelişmekte olan ülkelerin çevresel problemler yaşamalarındaki neden ise eski teknoloji kullanımından kaynaklanan hava ve su kirliliği olarak gösterilebilir. (Sencar, 2007: 10-11).

Günümüzde üretim artışının ve bununla birlikte maliyet minimizasyonunun ana hedef haline gelmesiyle çevresel sorunlara yol açan etkiler ilk olarak girdi sürecinde kendisini göstermektedir. Nitekim üretimin artırılıp maliyetlerin düşürülmesi amacıyla üretim girdilerinin temini için yoğun çaba gösterilirken, bu sürecin doğaya ve doğal kaynaklara olan yan etkileri göz ardı edilmektedir. Tarımda kullanılan kimyasal gübreler ve bitkilerin korunması amacıyla kullanılan pestitler üretim sürecinin girdi aşamasındaki tehditler olarak karşımıza çıkarken (Şekil: 1), üretim aşamasında ortaya çıkan üretim artıkları olarak adlandırılacak olan maddeler ise çıktı aşamasında karşılaşılan tehdit unsurları olarak örneklenebilir (Yaman & Muşmul, 2018: 70).

Her geçen gün artan dünya nüfusu ve teknolojik ilerlemeye bağlı olarak gelişen sanayileşme süreci enerjiye olan ihtiyacın da artmasına neden olmaktadır. Günümüzde dünya nüfusunun büyük çoğunluğu az gelişmiş veya gelişmekte olan ülkelerde yaşamını sürdürmektedir. Az gelişmiş veya gelişmekte olan ülke gruplarında nüfus artış oranlarının gelişmiş ülkelere oranla daha yüksek oluşu bu ülkelerin enerji talebini çoğaltarak hali hazırda bulunan enerji kaynaklarının noksanlığı nedeniyle de enerjide dışa bağımlılıklarını artırmaktadır.

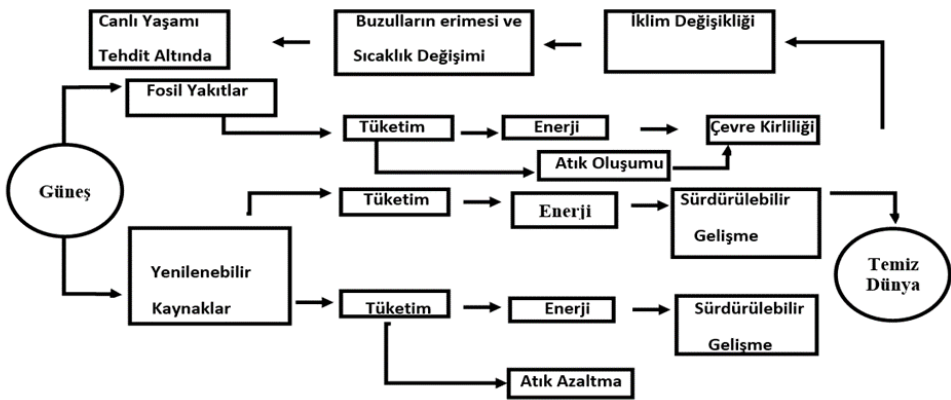
Şekil: 1
Çevre-Ekonomi İlişkisi



Kaynak: Ulucak & Erdem, 2012: 80.

Enerjiye olan talebin artışı hem maliyet hem de enerji arzı bakımından ülkeleri yenilenebilir enerji kaynaklarının kullanımına itmektedir. Gerek ülkelerin gelişmişlik seviyeleri gerekse teknolojik altyapılarının yetersizliği enerjiye olan talebin yenilenebilir enerji kaynaklarından sağlanması noktasında yeterli seviyede değildir. Enerjiye olan talebin fosil yakıtlardan elde ediliyor oluşu doğaya salınan karbondioksit emisyonunu artırmakta ve çevreye zarar vermektedir. Bu bağlamda yenilenebilir enerji kaynaklarına yönelmek ve fosil yakıtların kullanımının azaltılması enerjiye olan talebin karşılanması ve çevreye verilen zararın da minimuma indirilmesi noktasında önemini her geçen gün artırmaktadır.

Şekil: 2
Enerji Kaynakları Kullanımı ve Çevre İlişkisi



Kaynak: Selici, 2006: 58.

Özellikle sanayi devriminden sonra hızla gelişen sanayileşme ve makineleşme süreci emek yoğun üretimden uzaklaşarak sermaye yoğun üretimin yaygınlaşmasına yol açmıştır. Söz konusu sanayileşme süreci her geçen gün artan hammadde ve enerji talebini beraberinde getirmiştir. Artan enerji ihtiyacını karşılama noktasında fosil yakıt kullanımının etkileri çevrede ve doğal kaynaklarda negatif dışsallığa neden olmaktadır. Çevresel sorunların artışı araştırmacıları bu problemin nedenlerini araştırmaya ve çözüm yolları aramaya itmektedir. Aşağıda bu konu hakkında bugüne kadar yapılmış olan çalışmalarda da (özet olarak) bu durum açıkça görülmektedir.

Tablo: 1
Literatür Özeti

YIL	YAZAR	DÖNEM	YÖNTEM	SONUÇ
2011	Arı & Zeren	2000-2005	Panel Veri Analizi	ET (+) → CO ₂ (+)
2011	Li vd	1985-2007	En Küçük Kareler Yöntemi	GSYHkb(+) → CO ₂ (+)
2011	Hossain	1971-2007	Panel Veri Analizi	≠ GSYHkb → CO ₂
2011	Sharma	1985-2005	Panel Veri Analizi	ET (+) → CO ₂ (+)
2013	Yavuz & Yılancı	1960-2005	Panel Veri Analizi	GSYH (+) → CO ₂ (+)
2013	Chen & Huang	1981-2009	Panel Veri Analizi	ET (+) ↔ CO ₂ (+)
2013	Burnett vd.	1981-2003	Vektör Hata Düzeltme Modeli	EB (+) → CO ₂ (+)
2013	Sarısoy & Yıldız	1992-2009	Panel Birim Kök Testi	GSYH (+) → CO ₂ (+)
2013	Altıntaş	1970-2008	Panel Birim Kök Testi	EB (+) → CO ₂ (+) ET (+) → CO ₂ (+)
2015	Long vd.	1952-2012	Granger Nedensellik Testi	EB (+) ↔ CO ₂ (+)
2015	Salahuddin vd.	1980-2012	Panel Veri Analizi	Uzun Dönem EB (+) → CO ₂ (+) ET (+) → CO ₂ (+)
2015	Kesgingöz & Karamelikli	1960-2011	ARDL Sınır Testi Yaklaşımı	EB (+) → CO ₂ (+) ET (+) → CO ₂ (+)
2016	Bayramoğlu & Yurtkur	1960-2010	Engle-Granger Eş-Bütünleşme Analizi	EB (+) → CO ₂ (+)
2016	Çetintaş vd.	1960-2011	ARDL Sınır Testi Yaklaşımı	Uzun Dönem EB (+) → CO ₂ (+) ET (+) → CO ₂ (+)
2016	Topallı	1980-2010	Panel Veri Analizi	EB (+) → CO ₂ (+)
2017	Khobai & Roux	1971-2013	Vektör Hata Düzeltme Modeli	ET (+) → CO ₂ (+)
2017	Boamah vd.	1970-2014	Granger Nedensellik Testi	Uzun Dönem EB (+) → CO ₂ (+)
2017	Güllü & Yakışık	1971-2010	Granger Nedensellik Testi	GSYH (+) → CO ₂ (+)
2017	Karış	1960-2013	Toda -Yamamoto Nedensellik Testi	ET (+) ↔ CO ₂ (+) EB (+) → CO ₂ (+)
2017	Ergün & Polat	1980-2010	Panel Eş-Bütünleşme Analizi	EB (+) ↔ CO ₂ (+) ET (+) → CO ₂ (+)
2017	Alper & Alper	1985-2014	ARDL Sınır Testi Yaklaşımı	GSYH (+) → CO ₂ (+)
2018	Şahin	1990-2014	Panel Veri Analizi	EB (+) → CO ₂ (+) ET (+) → CO ₂ (+)
2018	Öztürk & Yüksel	1960-2014	VAR Analizi	EB (+) → CO ₂ (+)
2018	Külünk	1960-2013	Granger Nedensellik Testi	CO ₂ (+) → GDP (+)
2019	Yücesan vd.	1988-2014	Panel Veri Analizi	ET (+) → CO ₂ (+) EB (+) → CO ₂ (-)
2020	Khan vd.	1965-2015	ARDL Sınır Testi Yaklaşımı	EB (+) → CO ₂ (+) ET (+) → CO ₂ (+)
2020	Öncü & Özdemir	2007-2017	GMM	EB (+) → CO ₂ (+)
2020	Yılmaz & Dilber	1970-2014	ARDL Sınır Testi Yaklaşımı	Uzun dönem ET (+) → CO ₂ (+) GSYH (+) → CO ₂ (+)
2021	Atgür	1971-2014	Granger Nedensellik Testi	EB (+) → CO ₂ (+) ET (+) → CO ₂ (+)

ET: Elektrik Tüketimi / CO₂: Karbondioksit Emisyonu / EB: Ekonomik Büyüme / GSYHkb: Kişi Başı Gelir, →: Tek Yönlü İlişki, ↔: Çift Yönlü İlişki

Tablo 1'de görüldüğü gibi; bugüne kadar konuyla ilgili olarak yapılmış olan çalışmalarda ulusal ve uluslararası literatür incelendiğinde karbondioksit emisyonu ve

belirleyicileri arasındaki ilişkiler seçilen ülke grubu, ekonometrik yöntem ve döneme bağlı olarak farklı sonuçlar içermektedir. 2015 yılından itibaren resmi olarak faaliyete geçen Avrasya Ekonomik Birliği üye ülkeleri başta Rusya Federasyonu, Kazakistan olmak üzere enerji kaynakları bakımından oldukça zengin ülkelere oluşmaktadır. Bu sebeple söz konusu kaynaklardan elde edilen enerjinin doğaya saldıđı karbondioksit emisyonu miktarı da azımsanamayacak düzeydedir. Bu durum çevresel tehditler ortaya çıkmadan önce müdahale edilmesi, çevrenin ve doğal kaynakların korunması amacıyla karbondioksit emisyonu ve belirleyicilerinin analiz edilmesini gerekli kılmaktadır. Bu çalışmada Türkiye ve Avrasya Ekonomik Birliğine üye ülkelerin 2000-2018 yılları arasındaki verileri kullanılarak karbondioksit emisyonu ile belirleyicileri olan elektrik enerjisi kullanımı ve kişi başına düşen milli gelir ilişkisi panel veri yöntemi kullanılarak analiz edilmiştir. Söz konusu ülkelerdeki karbondioksit emisyonunun azaltılmasına yönelik politikalar arasında yenilenebilir enerji yatırımlarının artırılması, teşvik edilmesi ve kullanımının yaygınlaştırılması büyük önem arz etmektedir.

3. Uygulama

Bu çalışmada, Avrasya Ekonomik Birliği üye ülkeleri ve Türkiye'de CO₂ emisyonu üzerinde kişi başına gelir ve elektrik enerjisi tüketiminin etkileri panel veri yöntemlerinden sabit etkiler ve tesadüfi etkiler modelleri kapsamında karşılaştırmalı olarak incelenmektedir.

3.1. Yöntem ve Veri Seti

Ekonometrik uygulamalarda yaygın olarak kullanılan üç yöntem bulunmaktadır. Bunlardan ilki, tek bir zaman noktasında değişkenlerin incelenmesine olanak sağlayan yatay kesit analizi. İkincisi, değişkenlerin belli bir dönem aralığında değerlerinin incelenmesine olanak sağlayan zaman serisi analizi. Üçüncüsü ise, zaman ve birim boyutunun birlikte ele alındığı panel veri analizidir. Diğer bir ifadeyle, panel veri analizi N tane birim ve her birime karşılık T sayıda gözlemden oluşmaktadır. Panel veri analizlerinde, Birimlerin zamana göre değişkenliğinin ve değişkenliklerin zaman içinde sabit olup olmadığının araştırılması amaçlanmaktadır. Her bir birimin kendine has özellikleri "Birim Etkisi", her bir zaman diliminin kendine has özellikleri ise "Zaman Etkisi" olarak karşımıza çıkmaktadır. Panel veri modellerinin, zaman serisi ve yatay kesit modellerine göre bazı avantajları bulunmaktadır:

- Birimlerin değişkenliğinin ve gözlemlenemeyen heterojenliğinin modele dahil edilebilmesi,
- Dışlanan değişkenlerden kaynaklı hata terimiyle ilgili bağımsız değişkenlerin korelasyon içermesi nedeniyle ortaya çıkan sapmalı parametre tahminlerinin etkisinin kontrol altına alınabilmesi ve azaltılabilmesi,
- Serbestlik derecesinin azlığı nedeniyle özellikle zaman serilerinde sık görülen çoklu bağıntı sorununun azaltılması,

Diğer taraftan panel veri analizleri dengeli/dengesiz ve statik/dinamik modeller olarak sınıflandırılmaktadır. Buna göre, her bir birim için eşit sayıda gözlem olduğu durum

dengeli panel olarak tanımlanmakta iken bazı birimlerde gözlem kaybı yaşandığı durum dengesiz panel olarak tanımlanmaktadır. Statik model; değişkenlerin gecikmelerinin modelde yer almaması nedeniyle anlık ilişkinin incelenmesine olarak sağlayan modeller olarak karşımıza çıkmaktadır (Çağlayan & Güriş, 2005: 807). Statik panel veri analizi en genel biçimiyle (1) numaralı denklemdeki gibi ifade edilebilmektedir:

$$Y_{it} = X_{it} \beta + \mu_i + \varepsilon_{it} \quad i=1,2,\dots,N \quad t=1,2,\dots,T \quad (1)$$

(1) numaralı denklemde; i ve t alt indisleri sırasıyla yatay kesitleri ve zaman için kullanılmaktadır. Matris X_{it} , k tane açıklayıcı değişkeni ifade etmektedir ve matriste sabit terim yer almamaktadır. Açıklanan değişkeni ve μ_i yatay kesitler arası korelasyonu göstermektedir. Statik panel veri modelleri, genelde bireysel etkilerin sabit terim ya da hata teriminde yer almasına bağlı olarak sabit ya da tesadüfi etkiler modeli ile tahmin edilmektedir (Greene, 2000: 182).

Sabit etkiler modeli, çift yönlü ve tek yönlü olarak ikiye ayrılmaktadır. Çift ve tek yönlü sabit etki modellerinde sabit katsayının yatay kesit ve zaman boyutuna bağlı olarak değişebildiği varsayımı yapılmaktadır. Buna göre, sabit katsayı sadece yatay kesite bağlı olarak değişiyorsa tek yönlü hem zaman hem yatay kesite bağlı olarak değişiyorsa çift yönlü sabit etkiler modeli olarak nitelendirilmektedir (Hsiao, 2007: 11). Aşağıda (2) numaralı denklem aracılığıyla Tek Yönlü Sabit Etkiler Modeli ve (3) numaralı denklem aracılığıyla Çift Yönlü Sabit Etkiler Modeli gösterilmiştir:

$$Y_{it} = \alpha_i + \beta_{1it}\chi_{1it} + \beta_{2it}\chi_{2it} + \dots + \beta_{kit}\chi_{kit} + u_{it} \quad (2)$$

$$Y_{it} = (\alpha_i + \mu_t) + \beta_{1it}\chi_{1it} + \beta_{2it}\chi_{2it} + \dots + \beta_{kit}\chi_{kit} + u_{it} \quad (3)$$

$$i = 1, 2, \dots, N \quad t = 1, 2, \dots, T$$

Y= Bağımlı değişken

X= Bağımsız değişkenler

β = Bağımsız değişkenlerin katsayıları

k = Bağımsız değişken sayısı

u = Hata terimi

Sabit etkiler modelinde, hata terimlerinin homojen ve varyansı sıfırdır. Sabit etkiler modelinin dezavantajı, serbestlik derecesi kayıplarının yaşanmasıdır ve zaman içerisinde değişkenlerin değişkenlik göstermemesidir. (2) numaralı denklemde, sabit katsayı (α) birim değerlerine (i) göre tanımlanmakta iken, (3) numaralı denklemde, sabit katsayı (α) hem birim değerlerine (i) hem de zaman etkilerine (μ_t) göre tanımlanmaktadır (Greene, 2012: 359). Sabit Etkiler Modelinde her bir kesit ve/ veya zaman için 117 farklı sabitler tahmin ederek sabit katsayının kesitler ve zamanlar boyunca farklı olmasına neden olmaktadır (Baltagi, 2005: 12).

Tesadüfi Etkiler Modelinde birimler rassal olarak seçildiklerinden, birimler arasındaki farklılıklar da rassal olacaktır. Bu birim farklılıklarına "rassal farklılıklar" denilmektedir. Regresyon analizinde genelde bağımlı değişkenin değerini etkileyen, fakat bağımsız değişken gibi modelde yer almayan çok sayıda faktör olduğu ve bu faktörlerin rassal bir kalıntı tarafından özetlendiği varsayılmaktadır. Tesadüfi (Rassal) etkiler modelinin ise sabit etkiler modeline göre iki avantajı bulunmaktadır. Bunlardan ilki, sabit etkiler modelinin aksine zaman ve birim değişimleri ayrı ayrı dikkate alınmamaktadır. Başka bir deyişle, tesadüfi Etkiler modelinde, birimlere ve/veya zamana bağlı olarak meydana gelen değişimlerin, bağımsız değişkenlerle korelasyon içinde olmadığı ve etkilerin yatay kesit birimleri boyunca rasgele dağıldığı varsayılmaktadır. Serbestlik derecesi kayıplarına engel olmak için zaman ve birim değişimleri hata teriminde bileşen olarak yer almaktadır. Söz konusu modelin diğer bir avantajı ise, örneklem dışındaki değişkenlerin analize dahil edilmesine imkân tanınmasıdır (Greene, 2003: 371). Tesadüfi etkiler modeli (4) numaralı denklemdeki gibi gösterilmektedir:

$$Y_{it} = \alpha + \beta_{1it}\chi_{1it} + \beta_{2it}\chi_{2it} + \dots + \beta_{kit}\chi_{kit} + u_{it} + \varepsilon_{it} \quad (4)$$

$$i = 1, 2, \dots, N \quad t = 1, 2, \dots, T$$

Y = Bağımlı değişken

X = Bağımsız değişkenler

α = Ortalama sabit katsayı

β = Bağımsız değişkenlerin katsayıları

k = Bağımsız değişken sayısı

u = Hata terimi

ε = Birim içi hata terimi

Birim etkiler bağımsız değişkenlerle ilişkisiz ise, tesadüfi etkiler modeli tutarlı ve etkin olmasına karşın sabit etkiler modeli ise tutarlıdır fakat etkin değildir. Eğer birim etkiler bağımsız değişkenlerle ilişkili ise; sabit etkiler modeli tutarlı ve etkin olmasına karşın tesadüfi etkiler modeli tutarsızdır. Eğer model tahmininden belli bir birim için çıkarım yapılmak istenirse sabit etkiler modelinin, geniş bir kitlenin gözlemleri ya da kitlenin tümü için çıkarım yapılmak istenirse tesadüfi etkiler modelinin kullanılması daha avantajlıdır (Greene, 2003: 371). Sabit etkiler modeli ile tesadüfi etkiler modeli arasında seçim yapmak için Hausman testinden yararlanılmaktadır. Hausman testi hata terimi ile bağımsız değişkenler arasında ilişki olup olmadığını; dolayısıyla tesadüfi etkiler modelinin uygunluğunu ölçmektedir.

Dinamik model ise, değişkenlerin gecikmeli değerlerinin modele dahil edildiği için geçmiş dönemlerin etkilerinin de analiz edilmesini sağlayan model olarak tanımlanmaktadır. $Y_{i,t-1}$ açıklayıcı değişkenin bir dönem gecikmeli değeri, η_i gözlemlenemeyen birim etkisi ve

u_{it} hata terimi olmak üzere Dinamik Panel Veri Modeli (5) numaralı denklemdeki gibi ifade edilmektedir (Wang, 2009: 265; Bond, 2002: 3-4):

$$Y_{it} = \delta Y_{i(t-1)} + \beta X_{it} + \eta_i + u_{it} \quad i=1, \dots, N \quad t=1, \dots, T \quad (5)$$

Dinamik Panel Veri Modelinde Y_{it} ve $Y_{i,t-1}$, η_i 'nin bir fonksiyonudur ve bu yüzden $Y_{i,t-1}$ ve u_{it} ilişkilidir. Bu nedenle u_{it} 'nin ardışık değerleri arasında ilişki bulunmasa da En Küçük Kareler (EKK) hem sapmalı hem de tutarsız sonuçlar vermektedir (Bond, 2002: 4). Sabit Etkiler modeli ve Tesadüfi Etkiler modeli için sırasıyla; En Küçük Kareler Kukla Değişken tahmincisi ve Genelleştirilmiş En Küçük Kareler tahmincileri de sapmalı ve tutarsız bir tahmin ortaya koymaktadır. Bu durum, (6) numaralı denklemde gösterildiği gibi, sabit ve tesadüfi etkiler modellerinin ilk fark alınması ile ortadan kaldırılabilir (Greene, 2003: 307-308):

$$Y_{it} - Y_{i(t-1)} = \delta(Y_{i(t-1)} - Y_{i(t-2)}) + \beta(X_{it} - X_{i(t-1)}) + (u_{it} - u_{i(t-1)}) \quad (6)$$

Modelin farkı alınsa da açıklanan değişkenin gecikmeli değeri ile hata terimi arasında korelasyon devam etmektedir. Dinamik panel veri modellerinde, gecikmeli bağımlı değişkenin hata terimi ile korelasyon içermesi nedeniyle en küçük karelere ve grup içi tahmincileri tutarlı değildir. Bu nedenle modelin sapmasız ve tutarlı tahmini için araç değişken tahmincileri önerilmektedir. Araç değişken tahmincileri, hata terimi ve bağımsız değişkenin ilişkili olduğu durumlarda kullanılmaktadır (Stock & Watson, 2011: 331). Panel veri modellerine uygulanan Genelleştirilmiş Momentler Yöntemi (GMM) ile geçerli araç değişken tahmincileri, ilk kez Hansen (1982), Holtz-Eakin, Newey ve Rosen (1988) ve Arellano ve Bond (1991) tarafından geliştirilmiştir.

Arellano ve Bond'la (1991) ve daha sonrasında Arellano ve Bover (1995) ve Blundell ve Bond (1998) tarafından geliştirilen GMM tahmincileri Dinamik Panel Veri Tahminleri için en çok tercih edilen yöntemler arasında yer almaktadır. GMM tahmincisi özellikle, yatay kesit birim sayısının gözlem yapılan dönem sayısına göre daha fazla ($N > T$) olduğu veri setleri için önerilmektedir (Roodman, 2006: 1). Arellano ve Bond (1991) tarafından geliştirilen GMM Tahmincisi, açıklayıcı değişkenler arasında açıklanan değişkenin tek bir gecikmesinin bulunduğu diğer bir ifadeyle dinamik panel veri modelinin fark alma işlemine dayanmaktadır. GMM tahmincisi (7) numaralı denklemde ifade edildiği gibidir:

$$Y_{it} = Y_{i(t-1)} + \beta X_{it} + \eta_i - u_{it} \quad E(u_{it} | X_{i1}, \dots, X_{iT}, \eta_i) = 0 \quad (t=1, \dots, T) \quad (7)$$

(6) numaralı denklemde X 'in ve Y 'nin gecikmeli değerleri gösterilmektedir. Denklemde X ile hata terimi arasında korelasyon bulunmamaktadır. Bu yüzden, dışsal bir değişken olan " X ", sadece " n " bireysel etkisi ile ilişkilidir (Arellano, 2003: 43). Ayrıca, modelde Y_{it} ve $Y_{i(t-1)}$ arasında ilişki bulunmakta iken, $Y_{it}, Y_{i(t-2)}$ ve daha önceki dönemlere ait gecikmeli değerleri ile korelasyon içermemektedir. Bu nedenle, Arellano-Bond (1991) tarafından $j \geq 2$ koşuluyla, $Y_{i(t-j)}$ ve doğrusal kombinasyonları geliştirilen GMM Tahmincisi $Y_{i(t-1)}$ için araç değişken olarak kullanılmaktadır.

$$E=(\Delta Y_{it}, Y_{i(t-j)}) = 0 \quad j:2, \dots, t-1 \quad t:3, \dots, T$$

Anderson ve Hsiao'dan (1982) tarafından geliştirilen modelden farklı olarak, Arellano ve Bond (1991) modelde bağımlı ve bağımsız değişkenlerin tüm gecikmeli değerleri araç değişken olarak kullanılmaktadır.

Bu çalışmada; Rusya Federasyonu, Belarus, Kırgızistan, Kazakistan, Ermenistan ve Türkiye'de 2000-2018 dönemi için kişi başına milli gelir ve elektrik enerji tüketimi değişkenlerinin CO₂ emisyonu üzerindeki etkileri panel veri yöntemlerinden sabit etkiler modeli, tesadüfi etkiler modeli ve genelleştirilmiş momentler modeli kullanılarak karşılaştırmalı olarak analiz edilmektedir. Bu çalışmada CO₂ emisyonu üzerinde etkisi araştırılan değişkenler Tablo 2'de özetlenmektedir.

Tablo: 2
Ekonometrik Analizdeki Değişkenlerin Tanımlanması

DEĞİŞKEN	KISALTIMA	BİRİM
CO ₂ Emisyonu*	CO ₂	Milyon Ton
Kişi Başına Milli Gelir **	GSYHkb	Cari fiyatlarla/USD
Elektrik Enerji Tüketimi *	ET	twh

* Uluslararası Enerji Ajansı (IEA) veri tabanından elde edilmiştir.

** Veriler Dünya Bankası veri tabanından elde edilmiştir.

$$CO_2 = \beta_0 + \beta_1 \ln P + \beta_2 \ln GSYH + \beta_3 \ln ET + e_t \quad (8)$$

(8) numaralı denklemde; bağımlı değişken CO₂ (CO₂ Emisyonu), sabit terim β_0 ve hata terimi e_t ile gösterilmektedir. Denklem sağ tarafında P (Nüfus), GSYH (Milli Gelir) ve ET (Enerji Tüketimi) açıklayıcı değişkenlerinin logaritmik formlarına yer verilmiş ve β_1 , β_2 , ve β_3 parametreleri sırasıyla bu değişkenlere aittir.

3.2. Ampirik Bulgular

Çalışmanın bu bölümünde CO₂ emisyonu üzerinde nüfus, milli gelir ve enerji tüketimi etkileri panel veri yöntemlerinden sabit etkiler modeli, tesadüfi etkiler modeli ve genelleştirilmiş momentler modeli ile incelenmektedir. Bu modellere ait sonuçlar aşağıdaki Tablo 3'te ifade edilmektedir.

Tablo: 3
Sabit Etkiler ve Tesadüfi Etkiler Analiz Sonuçları

Bağımlı Değişken/ Bağımsız Değişkenler	Sabit Etkiler Modeli	Sabit Etkiler Modeli (Güçlendirilmiş)	Tesadüfi Etkiler Modeli	Tesadüfi Etkiler Modeli (Güçlendirilmiş)	Genelleştirilmiş Momentler Yöntemi
Sabit Katsayı	0,372 (1,43)	0,372 (0,52)	0,100 (0,41)	0,100 (0,17)	0,197 (0,40)
LnGSYH _{kb}	-0,0000531 (-1,17)	-0,0000531 (-0,68)	-0,0000817 (-1,94)	-0,0000817 (-1,35)	-0,0000436 (-1,07)
lnET	0,999*** (14,05)	0,999*** (5,29)	1,073*** (19,47)	1,073*** (8,34)	0,603*** (4,77)
L.lnCO ₂	-	-	-	-	0,407*** (8,53)

Hausman Testi → Olasılık Değeri = 0.11009

Not: Parantez içindeki ifadeler t istatistikleridir. *, **, *** sırasıyla %1, %5, %10 anlam düzeylerini ifade etmektedir.

Çalışmada 3 farklı panel veri modeli (Sabit etkiler, tesadüfi etkiler ve genelleştirilmiş momentler) oluşturulmuştur. Sabit etkiler ve tesadüfi etkiler modeli arasında seçim yapmak için Hausman testinden yararlanılmaktadır. Hausman test sonucuna, olasılık değeri 0.05'ten büyük olduğu için tesadüfi etkiler modeli tercih edilmektedir. Bu nedenle çalışmada, tesadüfi etkiler modeli ve GMM sonuçları değerlendirilmektedir. Söz konusu her üç modelde de GSYH_{kb} ile CO₂ emisyonu arasında herhangi bir ilişki tespit edilmemektedir. Ancak, tesadüfi etkiler modeli ve GMM modeli sonuçları incelendiğinde, elektrik enerjisi tüketiminin CO₂ emisyonu aleyhine sonuç sergilediği görülmektedir. Tesadüfi etkiler, güçlendirilmiş tesadüfi etkiler ve genelleştirilmiş momentler modelinde, elektrik enerjisi tüketiminin CO₂ emisyonu üzerindeki etkisinin %10 anlam düzeyinde istatistiksel olarak anlamlı olduğu görülmektedir. Buna göre, Tesadüfi etkiler ve güçlendirilmiş tesadüfi etkiler modelinde elektrik enerjisi tüketimindeki %1'lik bir artış CO₂ emisyonunu %1.073 oranında artırmakta iken genelleştirilmiş momentler yönteminde, elektrik enerjisi tüketimindeki %1'lik bir artış CO₂ emisyonunu %0.603 oranında artırmaktadır.

Elde edilen ampirik sonuçlara göre, çalışmaya konu olan ülke grubunda yenilenebilir enerji yatırımlarının teşvik edilmesinin CO₂ emisyonu üzerindeki etkisini azaltılmasında önemli bir rolü olacağı düşünülmektedir. Bu nedenle, çevre ve enerji politikalarının birlikte ele alınması sürdürülebilir bir büyüme için büyük önem arz etmektedir.

4. Sonuç

CO₂ emisyonu belirleyicilerini tespit etmeye yönelik gerçekleştirilen bu çalışmada, AEB üye ülkeleri ve Türkiye'de 2000-2018 dönemi için elektrik enerjisi tüketimi ve kişi başına gelirin CO₂ emisyonu üzerindeki etkisi panel veri yöntemlerinden sabit etkiler, tesadüfi etkiler ve genelleştirilmiş momentler yöntemi ile analiz edilmektedir. Çalışmada üç panel veri yönteminde elde edilen ampirik bulgulara göre, GSYH_{kb} ile CO₂ emisyonu arasında herhangi bir ilişki tespit edilmemektedir. Ancak, tesadüfi etkiler modeli ve GMM modeli sonuçlarında kişi başı milli gelirin tersine elektrik enerjisi tüketimi ve CO₂ emisyonu arasında doğrusal bir ilişki söz konusudur. Buna göre, Tesadüfi etkiler ve genelleştirilmiş momentler modelinde elektrik enerjisi tüketiminin CO₂ emisyonu üzerindeki etkisi %10 anlam düzeyinde istatistiksel olarak anlamlı olduğu görülmektedir. Tesadüfi etkiler, güçlendirilmiş tesadüfi etkiler ve genelleştirilmiş momentler modelinde, elektrik enerjisi tüketimindeki %1'lik bir artış sırasıyla CO₂ emisyonunu %1.073 ve %0.603 oranında artırmaktadır. Elde edilen ampirik sonuçlar literatürdeki diğer gelişmekte olan ülke gruplarıyla yapılan çalışmalarla benzerlik göstermektedir. AEB Üye ülkeleri ve Türkiye'de diğer gelişmekte olan ülke çalışmalarında olduğu gibi elektrik enerjisi tüketimi CO₂ emisyonu gelişmiş ülkelere oranla daha fazla artırmaktadır.

Bu sonuçlar doğrultusunda; çevre sorunlarının belirleyicilerinin tespit edilmesi çevre sorunlarının çözümüne yönelik geliştirilecek politikalar AEB üye ülkeleri ve Türkiye için CO₂ emisyonunu azaltmak açısından büyük önem taşımaktadır. Enerji tüketiminde önceliğin ülkelerin sahip olduğu yenilenebilir enerji kaynakları potansiyeline verilmesi ve bu alanda yapılacak yatırımlar ülkeler için hem enerji verimliliğini artıracak hem de çevre üzerinde

oluşan baskıyı azaltmada önemli bir katkı sağlayacaktır. Enerji verimliliğinin artması dolaylı olarak üretim vasıtasıyla refah düzeyinin yükselmesini sağlayacaktır. Bu çerçevede ülkelerin nihai amacı olan refah düzeylerini yükseltme yolunda atacakları adımları çevre açısından ele almaları gerekmektedir. Aksi takdirde çevre kirliliğine rağmen büyümek geri dönüşü olmayan sonuçlara ve maliyetlere katlanmak zorunda kalmalarına neden olacaktır.

Sürdürülebilir büyüme için refah düzeyi artışlarının çevre ve enerji düzenleme ve yatırımlarına yönlendirilmesi, çevreyle dost teknolojilerin seçiminin yanı sıra çevre sorunlarına yönelik çözüm arayışlarında uluslararası platformda işbirliğine gönüllük esasıyla katılmaları çevre sorunlarına hızlı ve etkili biçimde çözümler geliştirilmesine katkı sağlayacağı düşünülmektedir.

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