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The Content Analysis of the Post-graduate Theses Related with Competition in Civil Aviation

Sivil Havacılık Alanında Rekabet ile İlgili Hazırlanan Lisansüstü Tezlerin İçerik Analizi

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ABSTRACT

With the deregulation in the civil aviation industry, competition has started to increase. Firms operating in the sector had to continue their services in a competitive environment. For this reason, scientific studies and theses have been conducted on competition for firms operating in the field of civil aviation. The aim of the research is to profile the postgraduate theses prepared in the field of civil aviation and competition in Turkey by examining them bibliometrically. All postgraduate theses prepared in the field of civil aviation and competition in the National Thesis Center were included in the research. The number of theses prepared in the field of civil aviation and competition topics was determined as 24. The content analysis method, which is one of the qualitative research methods, was used in the research. It was determined that most of the theses examined adopted the qualitative research method. When the samples of the theses were examined, Turkish Airlines for 10 theses and Pegasus for 8 theses were taken as samples. The first five frequently used keywords are competition, airlines, airline transportation, competitive strategies, and civil aviation, respectively.

Anahtar Kelimeler:

Sivil Havacılık,

Rekabet,

İçerik Analizi,

Jel Kodları:

M10, M19

ÖZET

Havayolu taşımacılığında serbestleşme ile sivil havacılık sektörü genişlemiş ve rekabet artmıştır. Her sektörde olduğu gibi sivil havacılık sektöründe de rekabet ortamının şiddeti, daha iyi hizmet verme konusunda işletmeleri motive etmektedir. Bu süreçte sivil havacılık eğitimi de yaygınlaşmıştır. Araştırmanın amacı Türkiye'de sivil havacılık alanında ve rekabet konusunda hazırlanmış olan lisansüstü tezleri bibliyometrik olarak inceleyerek profilini çıkarmaktır. Ulusal Tez Merkezi'nde yer alan sivil havacılık alanında ve rekabet konusunda hazırlanmış olan tüm lisansüstü tezler araştırmaya dahil edilmiştir. Sivil havacılık alanında ve rekabet konusunda hazırlanan tez sayısı 24 olarak belirlenmiştir. Araştırmada nitel araştırma yöntemlerinden biri olan içerik analizi yöntemi kullanılmıştır. İncelenen tezlerin büyük bir çoğunluğunun nitel araştırma yöntemini benimsediği belirlenmiştir. Tezlerin örneklemleri incelendiğinde ise 10 tezin Türk Hava Yollarını ve 8 tezin Pegasus'u örneklem olarak aldığı görülmektedir. İlk beş sık kullanılan anahtar kelime sırasıyla rekabet, havayolu işletmeleri, havayolu taşımacılığı, rekabet stratejileri ve sivil havacılıktır.

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1. INTRODUCTION

The aviation industry has developed tremendously over the centuries as people have chased their dreams of flying. Early humans performed various experiments by imitating the flight methods of birds (Johnson, 2003). However, the real development of the aviation industry began with the Wright brothers' first flight towards the end of the 19th century. The success of the Wright brothers led to a breakthrough in the aviation industry. At the beginning of the 20th century, many countries worldwide began to work on the production and development of aircrafts. World War I was a milestone in the aviation industry. During this period, aircrafts played an important role in wars and developed rapidly (Maw, 1994). In the postwar period, the aviation industry began to grow rapidly with the rise in civil aviation. New airports, air traffic control systems, and civil aircrafts have been developed.

The first passenger flights were made, and air transportation began to spread around the world. The aviation industry has gained momentum with technological advances and the increasing importance of air transportation. The aviation industry experienced a devastating competitive period in the 1930s and 1940s (Pickrell, 1991). Before deregulation, competitiveness in the aviation industry was shaped by government policies. With the introduction of domestic deregulation in the United States in 1978, many entrepreneurs took part in the decision-making mechanism in the aviation industry (Borenstein & Rose, 2014). Deregulation has also changed the barriers to entry into the aviation industry. The status quo has been lifted and market rules have been rearranged. Thus, airline companies have started to develop strategies and policies to gain a competitive advantage to survive (Kangis & O'reily, 1998). In the 1990s, globalization increased in the markets, and as a result, global competition in the aviation industry intensified with the discovery of new markets and rapid progress in information and communication technologies (Çoban, 2011: 20). The aviation industry also showed serious development in the 1990s, and competition in the aviation industry increased with the increase in intercontinental and international flights (Bakırtaş & Bakırtaş, 2008: 102).

Towards the end of the 20th century, jet planes, supersonic planes, and other technological innovations emerged. These have provided air transport with speed, comfort, and safety (Federal Aviation Administration, 2021). The aviation industry, which is an important part of the global economy, facilitates global trade by enabling people to travel around the world and transport goods and services. It provides jobs for millions of people worldwide and contributes to the economic development of countries (Smith, 2006). The aviation industry, which indirectly supports many sectors and business lines (IATA Annual Review, 2020), facilitates international economic relations by accelerating interactions between many countries (Rajasekar & Fouts, 2009: 94). Therefore, it can be said that the aviation industry provides employment, creates economic growth, and facilitates trade.

The first aviation activities in Turkey started with the initiative of foreign enterprises in the first few years of the republic. In 1933, with nationalization policies, the airline company, which is the basis of today's Turkish Airlines, was established in Turkey (Yurtoğlu, 2016: 305). Until the 1980s, the development of Turkey’s aviation industry was limited. The aviation industry developed in our country, with permission to establish private airline companies in 1893 and the deregulation of domestic flights in 2023 (Yalçınkaya, 2019: 432). With the freedom given to the aviation industry, such as capacity, price, market entry, and access, airline companies can operate in a competitive environment as they wish. Competition has intensified both domestically and internationally.

With the increase in competition in the aviation industry, scientific studies have begun to be conducted on this subject. The concepts of competition and competitive strategies have become popular concepts of researchers working in the field of aviation management. (Gerede, 2012; Gündüz, 2013; Sönmez & Eroğlu, 2018; Sönmez & Eroğlu, 2020; Yaşar & Gerede, 2018; Yaşar & Gerede, 2020). With the increase in the number of higher education institutions providing education in the field of aviation in Turkey, the interest in the field has also been reflected in postgraduate theses. These theses not only provide students with the intended competencies, but also contribute to the development of the literature. The constant increase in scientific studies makes it necessary to interpret and summarize the information complexity. In this research, it was aimed to reveal the current status of the scientific development of the subject of competition in postgraduate education in the aviation sector and to give guiding suggestions for future studies. For this purpose, the bibliographic analysis method was used. In the literature part of the research, the aviation industry and the concept of competition are explained. In the method section, the method, purpose, population and sample of the research, research questions, how the data were obtained, data analysis and analysis methods are explained. In the findings section, the findings and comments obtained from the data obtained in the research are presented. In the results and recommendations section, the results and recommendations are included.

2. AVIATION INDUSTRY AND COMPETITION

Civil aviation, which is known for the Wright brothers' first flight trials at the beginning of the 20th century, and the first steps taken, has passed through several phases until today. With the phases that the aviation industry has passed through, it has developed, advanced, and matured. These phases enabled the development of the aviation industry, especially in the second half of the 20th century. With the airline deregulation movement in the United States of America in 1978 and the privatization process, the aviation industry has undergone a radical evolution (Ko, 2016: 53). In this process, there has been serious passenger demand, and the sector has developed rapidly. However, with the crisis on September 11, a serious break occurred in the aviation industry. In 2003, there was a crisis due to the SARS virus and the aviation industry was immediately adversely affected. Another crisis that negatively affected the development of the aviation industry and became a breaking point was the 2008 global economic crisis (Cento, 2009: 3). The last breaking point that brought the aviation industry to a standstill is the Covid-19 pandemic, which started in China in 2020 and has affected the whole world. The development of the aviation industry was adversely affected, as airlines could not see their way in times of crises, such as security problems, economic uncertainties, and pandemics. In these processes, airline companies made radical changes in their strategies and policies and started to provide services on different lines and implement various price policies to ensure their sustainability in the sector. With the decrease in prices of airline companies' services, there has been a great increase in demand. Thus, new airline companies that aimed to diversify their passenger demands in the aviation industry entered the sector (Ko, 2016: 53).

To maintain their presence in the sector, achieve their goals and objectives, and maintain their market shares, airline companies should analyze the competitive structure of the markets in which they operate and their competitors (Kılınç et.al., 2009: 174). It is possible to list some of the important factors affecting competition for airline companies, such as members of an airline alliance, free competition structure, the attitude of civil aviation authorities, having a slot at major airports, and the type and size of exit barriers (Peksatıcı, 2010: 14). Reducing risks and costs is more important for businesses competing in the aviation industry than for those in other industries. What airline companies need to do to survive by making their activities sustainable is to develop and implement a competitive strategy jointly to reduce and manage risk, to jointly develop a strategy to manage uncertainty, to ensure customer satisfaction, to create a common synergy and to share information, technology, and experience (Kanbur & Karakavuz, 2015: 487).

The aviation industry is a transportation market in which many different airlines produce similar services and compete (Wells, 1999: 168). Competition in airline companies, which are a part of this market, started in the years when deregulation was achieved. Deregulation was realized in the United States of America in 1978; the effects of this deregulation began to be felt by the sector in the 1980s, and deregulation took place in Europe in the 1990s. Before the deregulation of the airline, airlines were subject to some restrictions to prevent competition in matters such as line structures and fares. With deregulation, the first competition between airlines concerned prices (Fillol, 2009: 966).

When Turkish Civil Aviation was examined, it was seen that the first steps of deregulation were taken in the 1980s. In 1983, the government developed and implemented policies related to deregulation in many different sectors, especially in transportation, communication, and tourism (Yalçınkaya, 2019). To develop and revitalize the tourism sector in our country, the aviation industry, which is one of the most important complements of tourism, has also been included in sectors where deregulation will take place. First, the Turkish Civil Aviation Law was put into effect in 1983, followed by the Commercial Air Transport Operations Regulation was put into effect in 1984. Thus, the establishment of private airline companies in Turkey and their entry into the market were allowed (Gerede, 2011: 510). During this period, many new airline companies took part in the Turkish Civil Aviation industry because of deregulation (Gerede & Orhan, 2015: 189). However, some private airline companies that started operating could not be successful because they could not keep up with competition in the sector (Yaşar & Gerede, 2018: 172). With the Gulf War that started in this period, there was a contraction in the demand for tourism in Turkey, which had a negative impact on Turkey’s aviation industry. After the crises and competition, many of the first private airline companies that were established had difficulty continuing their activities and declared bankruptcy within a few years (Yalçınkaya, 2019: 425). For example, during the Covid-19 pandemic, the Turkish aviation industry was adversely affected. In 2020, air passenger traffic in Turkey decreased by 67.2% compared with the previous year (T.R. Ministry of Transport and Infrastructure, 2021). This decrease affected the financial situation of Turkish Airlines and caused operational losses (Çavuşoğlu, 2021). In addition, travel restrictions were imposed worldwide owing to the pandemic, which prevented the Turkish aviation industry from operating in international markets (Yavaş, 2020).

3. METHODOLOGY

3.1. Research Model

The research model examines postgraduate theses prepared in the field of civil aviation and competition in Turkey and analyzes the features of these theses, such as the models they used, the years they were written, keywords, sample groups, research methods, and data collection methods. Bibliometric analysis is a research method performed by collecting, organizing, and analyzing numerical data from scientific publications. This method is used to measure the characteristics of scientific publications such as journal effects, citation rates, author performance, publication trends, and interdisciplinary collaboration (Glanzel & Schoepflin, 1999). In addition, bibliometric analysis can be used to analyze the qualities of academic studies on a particular subject (Leta et al., 2016).

This research aims to profile postgraduate theses prepared in the field of civil aviation and competition in Turkey by examining them bibliometrically. Within the scope of the research, the years in which postgraduate theses conducted in the field of civil aviation and competition in Turkey were widely written, their distribution according to keywords, sample groups, distribution according to research and data collection methods, and their findings were examined.

3.2. Population and Sample (Research Group)

In this study, a population was selected in which all postgraduate theses could be used. The theses examined were not limited to their writing language and a certain date range. All postgraduate theses prepared in the field of civil aviation and competition at the National Thesis Center were included in the research. The total number of theses was determined to be 24. All these are open to access, and there are no theses that cannot be accessed. Ethics committee approval was not required as secondary data were used in the study.

3.3. Data Collection Tools

Data were collected from postgraduate theses in the National Thesis Center. The scanning was carried out on 30.12.2022 by writing "civil aviation" on the subject and "competition" in the name of the thesis from the "detailed scanning" section.

The content analysis method, which is one of the qualitative research methods, was used in the research. Content analysis is a method generally used in the analysis of written and visual data (Özsarı et.al., 2016: 211). In the content analysis method, it ensures that the data revealed by the researcher, within the framework of the rules, are accepted as a scientific report to classify and reveal the determined judgments (Koçak & Arun, 2006: 22). Each thesis included in this study was examined one by one within the scope of research questions and the data were collected in the excel program and their percentage distribution was determined.

4. RESULTS

In Table 1, the type of distribution of the theses examined within the scope of the research is given. As given in Table 1, 17 (70.83%) theses, which are the majority of these, were prepared as master's theses and the other 7 (29.17%) theses were prepared as doctoral theses. This distribution of thesis types reflects a notable disparity between master's and doctoral theses within the scope of the research. The higher proportion of master's theses indicates that there might be a greater emphasis on investigating topics related to master's level studies.

Table 1. Distribution of Types of Theses

Thesis Type	F	%
Master's thesis	17	70.83
Doctoral thesis	7	29.17
Total	24	100

In Table 2, the distribution of theses prepared in the field of civil aviation and competition is given over the years.

Table 2. Distribution of Theses by Years

	Master's thesis		Doctoral thesis		Total	
Thesis Type	**F**	**%**	**F**	**%**	**F**	**%**
2006	1	5.88	0	0.00	1	4.17
2007	3	17.65	0	0.00	3	12.50
2008	1	5.88	0	0.00	1	4.17
2014	0	0.00	1	14.29	1	4.17
2015	1	5.88	0	0.00	1	4.17
2016	4	23.53	1	14.29	5	20.83
2017	3	17.65	0	0.00	3	12.50
2018	1	5.88	1	14.29	2	8.33
2019	2	11.76	0	0.00	2	8.33
2020	1	5.88	1	14.29	2	8.33
2021	0	0.00	2	28.57	2	8.33
2022	0	0.00	1	14.29	1	4.17
Total	17	100.00	7	100.00	24	100.00

The first thesis on civil aviation and competition was prepared in 2006. The thesis in 2006 is a master's thesis. Then, 3 master's theses were prepared in 2007 and 1 master thesis in 2008. No thesis was prepared between 2008-2014. The first doctoral thesis was published in 2014. 1 thesis was prepared in 2014 and 2015. 2016 is the year in which the most theses were prepared with 6 theses. While 3 theses were prepared in 2017, 2 theses were prepared in the following years 2018, 2019, 2020 and 2021. In 2022, a thesis was prepared. The findings suggest that the research on competition in the aviation industry has undergone fluctuations over time, likely influenced by industry dynamics and external factors (Smith et al., 1991). It can be said that the subject of competition in the aviation industry, which is one of the sectors according to the stopping point during the Covid-19 pandemic period, has been researched very little. Especially during the pandemic period, the aviation industry experienced a global crisis, which had a significant impact on the shrinkage and bankruptcy of airline companies and the competitive structure in the industry. Therefore, the pandemic process has also caused serious problems in the data collection processes in the sector. Due to the pandemic, it has become more difficult to collect and process the data required for competitive analysis in the aviation industry. For this reason, it can be said that the subject of competition in the aviation industry has been researched very little during the pandemic period. It can be said that the number of doctoral theses is quite low.

In Table 3, the numbers, and distributions of the examined theses according to the language in which they were prepared are given.

Table 3. Distribution of Theses by Language

Language	**F**	**%**
Turkish	21	87.50
English	2	8.33
German	1	4.17
Total	24	100

As seen in Table 3, most of the theses were prepared in Turkish. Of the theses, 21 (87.50%) were written in Turkish, 2 (8.33%) in English and 1 (4.17%) in German. The theses prepared in English were prepared within Bahçeşehir University and the language of the university is English. The German thesis was the first thesis prepared in 2006 and was prepared at Marmara University.

The number and distribution of the analyzed theses according to the institutes where they were prepared are given in Table 4.

Tablo 4. Distribution of Theses According to the Institute of Preparation

Institute	**F**	**%**
Institute of Social Sciences	22	91.67
Institute of Graduate Studies	2	8.33
Total	24	100

As shown in Table 4, 22 (91.67%) of the theses prepared in the field of civil aviation and competition were prepared at the institute of social sciences and 2 (8.33%) in the institute of postgraduate education.

Table 5 shows the number and distribution of theses on civil aviation and competition within the scope of the universities where they were prepared.

Table 5. Distribution of Theses According to the University of Preparation

	Master's thesis		Doctoral thesis		Total	
Universty	**F**	**%**	**F**	**%**	**F**	**%**
Anadolu U.	2	11.76	2	28.57	4	16.67
Marmara U.	2	11.76	0	0.00	2	8.33
Türk Hava Kurumu U.	1	5.88	1	14.29	2	8.33
Beykent U.	2	11.76	0	0.00	2	8.33
Akdeniz U.	2	11.76	0	0.00	2	8.33
Bahçeşehir U.	2	11.76	0	0.00	2	8.33
İstanbul Arel U.	1	5.88	1	14.29	2	8.33
Haliç U.	1	5.88	0	0.00	1	4.17
Dokuz Eylül U.	1	5.88	0	0.00	1	4.17
Düzce U.	1	5.88	0	0.00	1	4.17
İstanbul U.	0	0.00	1	14.29	1	4.17
İzmir Katip Çelebi U.	1	5.88	0	0.00	1	4.17
Okan U.	1	5.88	0	0.00	1	4.17
İstanbul Medipol U.	0	0.00	1	14.29	1	4.17
Ondokuz Mayıs U.	0	0.00	1	14.29	1	4.17
Total	17	100.00	7	100.00	24	100.00

When Table 5 is analyzed, it is seen that the theses prepared in the field of civil aviation and competition are mostly prepared within Anadolu University. Four theses (16.66%) were prepared at Anadolu University. Two theses each were prepared at Marmara, Turkish Aeronautical Association, Beykent, Akdeniz, Bahçeşehir and İstanbul Arel Universities and one thesis each at Haliç, Dokuz Eylül, Düzce, İstanbul, İzmir Kâtip Çelebi, Okan, İstanbul Medipol and Ondokuz Mayıs Universities. The highest number of doctoral theses was prepared at Anadolu University with 4 theses.

Table 6 shows the number and distribution of theses according to the gender of the students who prepared the theses. When Table 6 is analyzed, it is seen that 15 (62.50%) theses were prepared by male students and 9 (37.50%) theses were prepared by female students. Of the total of 17 master's theses, 11 were prepared by male students.

Table 6. Gender Distribution of the Students Preparing the Theses

	Master's thesis		Doctoral thesis		Total	
Gender	**F**	**%**	**F**	**%**	**F**	**%**
Male	11	64.71	4	57.14	15	62.5
Female	6	35.29	3	42.86	9	37.5
Total	17	100.00	7	100.00	24	100.00

Table 7 shows the number and distribution of the theses directed by the advisors with which title.

Table 7. Distribution of Theses by Title of Advisor

	Master's thesis		Doctoral thesis		Total	
Title of Advisor	**F**	**%**	**F**	**%**	**F**	**%**
Professor	3	17.65	4	57.14	7	29.17
Associate Professor	6	35.29	3	42.86	9	37.50
Assistant Professor	8	47.06	0	0.00	8	33.33
Total	17	100.00	7	100.00	24	100.00

Of the 24 theses examined within the scope of the study, 9 (37.50%) were supervised by associate professors, 8 (33.33%) by Assistant Professors and 7 (29.17%) by professors. While 8 of the master's theses were supervised by an assistant professor, none of the doctoral theses were supervised by an assistant professor.

Table 8 provides information on the page spacing of the theses analysis.

Table 8. Distribution of Page Range of Theses

	Master's thesis		Doctoral thesis		Total	
Page Range	**F**	**%**	**F**	**%**	**F**	**%**
0-100	5	29.41	1	14.29	6	25.00
101-130	4	23.53	0	0.00	4	16.67
131-150	1	5.88	0	0.00	1	4.17
151 and over	7	41.18	6	85.71	13	54.17
Total	17	100.00	7	100.00	24	100.00

Of the analyzed theses, 12 (50%), i.e., half of them have "151 or over" pages. 6 theses (25%) have "0-100 pages", 4 (16.67%) have "101-130 pages" and 2 (8.33%) have "131-150 pages". When the number of pages of all theses was totaled, it was determined that the number of pages was 4347. Therefore, the average number of pages of 24 theses is 181.13. It can be said that the theses generally have "151 or over" number of pages.

Table 9 shows the distribution of theses prepared in the field of civil aviation and competition according to the research methods used. It was determined that most of the theses analyzed adopted the qualitative research method. 17 theses (70.83%) were qualitative, 5 theses (20.83%) and 2 theses (8.33%) were mixed research methods.

Table 9. Distribution of Theses According to the Method Used

	Master's thesis		Doctoral thesis		Total	
Research Methodology	**F**	**%**	**F**	**%**	**F**	**%**
Qualitative	12	70.59	7	100.00	19	79.17
Quantitative	5	29.41	0	0.00	5	20.83
Total	17	100.00	7	100.00	24	100.00

When the data collection tools of the studies were analyzed, it was determined that 8 theses used interviews, 7 theses used case studies, 5 theses used questionnaires, 2 theses used document analysis, 2 theses used website scanning. When the samples of the theses were examined, it was determined that 10 theses sampled Turkish Airlines, 8 theses sampled Pegasus Airlines, 4 theses sampled Atlasjet Airlines, 4 theses sampled Onur Air, 4 theses sampled Sun Express Airlines, 2 theses sampled Bora Jet Airlines, 2 theses sampled Hürkuş Airlines, 2 theses sampled Corendon Airlines, 2 theses sampled Tailwind Airlines, 1 thesis sampled Air France and 1 thesis sampled IzAir. While 4 of the theses kept their samples confidential, airline company employees in 2 theses, airport managers in 1 thesis and airline experts in 1 thesis were determined as the population.

The keywords used in the abstracts of the theses analyzed within the scope of the research were also examined. The word cloud prepared with the ten most frequently used keywords is given in Figure 1.

Figure 1. Top Ten Most Frequently Used Keywords in Theses

As shown in Figure 1, the top five frequently used keywords are competition, airline operations, airline transportation, competitive strategies, and civil aviation, respectively. Deregulation, strategic airline alliances and strategic management keywords were used 3 times each; low cost airlines, airline management, business model, competitive dynamics and strategy keywords were used 2 times each; European Union, deregulation, state aid, airline, airline market, hybrid airlines, service quality, cost, qualitative research, competitor analysis, competitive advantage model, competitive tension, strategic planning, sustainability, trade agreements, Turkey, THY, balanced scorecard, airport, internal marketing, competitive advantage, airline marketing strategies, business model competition, regional market, Aegean region, intellectual competence, competitive organizational culture, organizational performance, move types, customer satisfaction, text mining, total factor management, window analysis and competitiveness keywords were used once.

Keywords like deregulation, strategic airline alliances, and strategic management being used multiple times suggest a focus on regulatory changes, industry partnerships, and managerial approaches that drive competition and innovation within the aviation sector. This resonates with existing literature that often highlights the transformative impact of deregulation and strategic alliances on shaping the competitive landscape of the aviation industry (Kankaew, 2022; Tanrıverdi & Dogan, 2022). The inclusion of keywords related to geographical factors, such as European Union, Turkey, Aegean region, and regional market, suggests a concern for regional nuances and international context in the competitive dynamics of the aviation industry. This relates to the existing literature that explores how regional and global factors intersect in determining competitive advantages and challenges for airlines (Fang et al., 2022). The distribution of keywords reflects the multidimensional nature of research on civil aviation and competition, encompassing regulatory (Leylekian et al., 2022), strategic (Tahir et al., 2022), operational (Ekici et al., 2022), and market-related aspects (Koumoutsidi et. al., 2022). The alignment with existing literature underscores the relevance of these themes and suggests a comprehensive approach to understanding and addressing competitive dynamics within the aviation industry.

The findings of the analyzed theses are given in Table 10.

Table 10. Findings of the Theses

Author	Thesis Type	Research Method	Findings
Barlas (2006)	Master's Degree	Quantitative	Airline companies operating long-haul flights such as Transatlantic offer a comfortable travel experience by considering important factors such as legroom and adjustability of seats to increase customer satisfaction.
Karasu (2007)	Master's Degree	Qualitative	Two different low-cost carrier models stand out. The first one utilizes factors such as flight frequency and daily flight hours based on the maximum utilization of aircraft. The second one aims to maximize revenue with a single class arrangement on long-haul routes.
Dikyol (2007)	Master's Degree	Qualitative	Airline B aims to make a difference in its services with purely technological innovations and to emphasize its quality and brand image. All airline companies operate flights at almost the same costs.

Tunç (2007)	Master's Degree	Qualitative	The Turkish airline transportation sector has shown a significant growth trend in the last four years. If full membership to the EU is achieved, businesses engaged in civil aviation activities will be under great competitive pressure.
Taşgit (2008)	Master's Degree	Qualitative	Airline operators have generally focused on a low-cost strategy, but some have also adopted partial differentiation and focus strategies.
Erdoğan (2014)	PhD Degree	Qualitative	Problems in the organizational structure of airports arise when they are operated by a single government agency. Especially in airports with leased terminals, different strategic objectives and profit expectations between the airport operator and the terminal operator can lead to problems.
Sungur (2015)	Master's Degree	Qualitative	The aviation industry is a sector that consists of many elements and is fed by national and international sources. It has been found that common steps can be taken on generally accepted issues such as safety and security, but it is not easy to achieve uniformity on commercial issues.
Tanrıverdi (2016)	Master's Degree	Qualitative	A collaborative competitive strategy is essential for the sustainability of the aviation industry.
Yaşar (2016)	Master's Degree	Quantitative	As a result, significant relationships were found between perceived competitive tension and competitive asymmetry, market concentration, resource similarity and market commonality.
Karabulak (2016)	Master's Degree	Qualitative	It has been observed that the current competition in the civil aviation industry is focused on price and service elements.
Ekicikol (2016)	Master's Degree	Quantitative	Since the most important factor for passengers is the discounted ticket, advertisements, promotions and campaigns are frequently followed and the airline offering the best price is preferred.
Saldıraner (2016)	PhD Degree	Qualitative	Problems in the organizational structure of airports arise when they are operated by a single government agency. Especially in airports with leased terminals, different strategic objectives and profit expectations between the airport operator and the terminal operator can lead to problems.
Şener (2017)	Master's Degree	Quantitative	It is observed that the average quality score is higher for firms adopting a differentiation strategy. The greatest difference between firms using different competitive strategies was observed in the trust factor, while the lowest difference was observed in the physical characteristics factor.
Korkmaz (2017)	Master's Degree	Qualitative	According to the findings, competition policy and state aid together are equally important for the sustainability of a successful economic system in the EU.
Cam (2017)	Master's Degree	Qualitative	In order to protect domestic competition, the AnadoluJet factor was also mentioned, and it was stated that the move taken during the evaluation process was correct and necessary.
Hüseynov (2018)	Master's Degree	Qualitative	The analysis, which evaluated all data pertaining to items such as fixed assets, net profit for the period, operating profits, current assets, sales revenues and gross profit, revealed that the strategic alliance did not have a visible impact on Turkish Airlines' (THY) performance in the short term, but had a positive impact on the sector averages in the long term.
Aldemir (2018)	PhD Degree	Qualitative	It has been concluded that three charter and five scheduled airlines employ all of Porter's Generic Competitive Strategies, but cost leadership is prioritized among these strategies.
Pamuk (2019)	Master's Degree	Qualitative	In terms of profitability and employment potential, civil aviation is in a better position than many other sectors worldwide.
Of (2019)	Master's Degree	Quantitative	Internal marketing practices (management support, communication, rewards, in-service training and social opportunities) have a positive impact on airlines' competitive advantage.
Tosuner (2020)	Master's Degree	Qualitative	As a result of the negotiations, it was determined that the factors affecting regional transportation are seasonal or year-round business, demand and aircraft occupancy rate, the type and model of aircraft selected in parallel, the choice of hub by the main carriers flying, the strength of alternative means of transportation in the region, the economic level of the young population in the region and the choice of slots affecting the type of flight.
Güngör (2020)	PhD Degree	Qualitative	According to the research results, as managers' strategic and effective management competencies increase, learning orientation, competition-oriented inter-functional coordination, risk and proactivity tendency, customer orientation and innovation tendency increase positively.
Yaşar (2021)	PhD Degree	Qualitative	The results show that size, total number of flights, human resources, resources on standby have a positive impact on the number of tariff-based moves, while operational maturity, fleet homogeneity, ability to transfer resources and market partnership have a negative impact.
Mızrak (2021)	PhD Degree	Qualitative	What customers expect from all airlines in general is the quality of the service provided.
Doğan (2022)	PhD Degree	Qualitative	It is observed that the diversity of business models has increased and competition among enterprises has intensified due to deregulation in the Turkish air transport industry. The results of the efficiency analysis show that marketing efficiency is 0.764, production efficiency is 0.887 and system efficiency is 0.796.

The results in Table 10 can be summarized as follows.

- Low-cost carrier models can be effective.
- Comfort is important for long-haul flights.
- Technological differences emphasize the brand image.
- Turkish airline sector is growing.
- Airline companies generally adopt low-cost strategy.
- The organizational structure of airports may cause problems.
- Low-cost airlines have difficulty in competing.
- Collaborative competitive strategy is important.
- There is a relationship between perceived competitive tension and market partnership.
- Passengers prefer discounted tickets.
- Common steps in the aviation industry are difficult on commercial issues.
- Competition is on price and service.
- The difference in quality is greater in companies that follow a differentiation strategy.
- Anadolu Jet is important in domestic competition.
- State aids and competition policy are important.
- Cost leadership is a priority for scheduled airlines.
- Strategic cooperation has an impact on THY's performance.
- Civil aviation is in a better position than other sectors.
- Internal marketing practices provide a competitive advantage.
- Factors affecting regional transportation have been identified.
- Positive effects are observed as managers' strategic management competencies increase.
- There are various effects on tariff-based moves.
- Customers expect quality service.
- Business models have diversified, and competition has intensified in the Turkish air transportation sector.

5. CONCLUSION

The aim of this study is to bibliometrically examine the postgraduate theses prepared in the field of civil aviation and competition in Turkey and to reveal their profile. For this purpose, 24 theses on civil aviation and competition were downloaded and analyzed through The National Thesis Center. Seventeen of the theses are master's theses and seven are doctoral theses. The first thesis was prepared in 2006. 1 thesis each was prepared in 2014 and 2015. 2016 is the year with the highest number of theses with 6 theses. While 3 theses were prepared in 2017, 2 theses were prepared in the following years 2018, 2019, 2020 and 2021. In 2022, one thesis was prepared. Theses were mostly prepared in Turkish. Most of theses were conducted at the Institute of Social Sciences and Anadolu University. Theses were mostly written by men. It was determined that thesis advisors were equally distributed. It was determined that half of the theses had "150 or more" pages. It was determined that most of the analyzed theses adopted the qualitative research method. When the samples of the theses were analyzed, it was seen that 10 theses took Turkish Airlines as a sample and 8 theses took Pegasus as a sample. The first five frequently used keywords are competition, airline businesses, airline transportation, competitive strategies, and civil aviation, respectively. Considering the findings of the theses analyzed, the following suggestions were made regarding the theses to be prepared on civil aviation and competition.

- Although the interest in civil aviation and competition started late, the number of theses has not increased in the last 3 years. It is recommended to prepare more theses on this subject, especially doctoral theses.

- Only two of the theses are in English. For theses to be effective in the international academic environment, it is recommended to prepare more theses in foreign languages.
- The training provided by universities to students in civil aviation and related departments makes an important contribution to future aviation industry employees. Therefore, preparing a thesis on civil aviation and competition will help students to closely follow the current developments in the sector and familiarize themselves with the problems and opportunities of the sector. Moreover, these thesis studies can be used to analyze and develop competitive strategies of businesses in the sector. Therefore, it would be important for universities to encourage students to prepare theses on civil aviation and competition for future aviation professionals.
- In analyzing the data, it is important to use mixed methods to support each other by using both quantitative and qualitative methods simultaneously. Therefore, it is recommended to use more mixed methods in theses.

AUTHORS' DECLARATION

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AUTHORS' CONTRIBUTIONS

Conceptualization, writing-original draft, editing – **AGS** and **DÖÖ**, data collection, methodology, formal analysis – **NE, AGS**, Final Approval and Accountability – **NE, DÖÖ** and **AGS**.

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Bank-Specific Determinants of Financial Stability in Participation Banks: Fresh Evidence from the Driscoll-Kraay Estimator

Katılım Bankalarında Finansal İstikrarın Bankaya Özgü Belirleyicileri: Driscoll-Kraay Tahmincisinden Yeni Kanıtlar

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ABSTRACT

Since its first introduction as a primary policy goal by a big central bank, financial stability has received much interest as a distinct matter, separate from price stability and the efficient functioning of the financial sectors. Accordingly, different financial analysts and scholars in the financial system have tried to unravel the complexity of financial stability and have conducted theoretical and empirical research at different levels. This study aims to reveal the internal factors affecting the financial stability of participation banks in Turkey. Therefore, we consider the data of 6 participation banks for the 2019Q1-2023Q1 period. Moreover, we assess the stability of participation banks with the Z-score. As a result of the analyses with the Driscoll &Kraay robust standard errors estimator, firstly, we found a negative relationship between risk-weighted and non-risk-weighted capital ratios and bank stability. Secondly, we concluded that while there is a negative relationship between bank stability and bank size, there is a positive relationship between cost-to-income ratio, loan ratio and collected funds ratio and bank stability. Finally, we observed a negative relationship between asset and fund diversifications and bank stability; in contrast, there is a positive relationship between income diversification and bank stability. The results of the research state that the factors affecting bank stability from most to least are income diversification, fund and asset diversifications, collected funds ratio, non-risk weighted capital ratio, cost-to-income ratio, loan ratio, risk-weighted capital ratio and bank size, respectively. The research results also indicate that participation banks must improve their management efficiency, credit, collected fund and income diversification levels to support their sustainable financial stability and soundness.

Anahtar Kelimeler:

Finansal İstikrar,

Katılım Bankaları,

Bankaya Özgü Göstergeler,

Driscoll-Kraay Tahmincisi

Jel Kodları:

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ÖZET

Finansal istikrar, büyük bir merkez bankası tarafından birincil politika hedefi olarak ilk kez ortaya atıldığından bu yana, fiyat istikrarından ve finansal sektörlerin etkin işleyişinden ayrı bir konu olarak büyük ilgi görmüştür. Bu doğrultuda, finansal sistemdeki farklı finansal analistler ve akademisyenler finansal istikrarın karmaşıklığını çözmeye çalışmış ve farklı düzeylerde teorik ve ampirik araştırmalar yürütmüşlerdir. Bu çalışma, Türkiye'deki katılım bankalarının finansal istikrarını etkileyen içsel faktörleri ortaya koymayı amaçlamaktadır. Bu nedenle 2019Q1-2023Q1 dönemi için 6 katılım bankasının verilerini dikkate alınmıştır. Ayrıca, katılım bankalarının istikrarı Z-skor ile değerlendirilmiştir. Driscoll & Kraay dirençli standart hatalar tahmincisi ile yapılan analizler sonucunda, ilk olarak, risk ağırlıklı ve risk ağırlıklı olmayan sermaye oranları ile banka istikrarı arasında negatif bir ilişki bulunmuştur. İkinci olarak, banka istikrarı ile banka büyüklüğü arasında negatif bir ilişki varken, maliyet-gelir oranı, kredi oranı ve toplanan fonlar oranı ile banka istikrarı arasında pozitif bir ilişki olduğu sonucuna varılmıştır. Son olarak, varlık ve fon çeşitlendirmeleri ile banka istikrarı arasında negatif bir ilişki varken, gelir çeşitlendirmesi ile banka istikrarı arasında pozitif bir ilişkinin olduğu gözlemlenmiştir. Araştırma sonuçları, banka istikrarını en çoktan en aza doğru etkileyen faktörlerin sırasıyla gelir çeşitlendirmesi, fon ve varlık çeşitlendirmeleri, toplanan fonlar oranı, risk ağırlıklı olmayan sermaye oranı, maliyet-gelir oranı, kredi oranı, risk ağırlıklı sermaye oranı ve banka büyüklüğü olduğunu belirtmektedir. Araştırma sonuçları ayrıca, katılım bankalarının sürdürülebilir finansal istikrar ve sağlamlığını desteklemek için yönetim etkinliğini, kredi, toplanan fon ve gelir çeşitlendirme düzeylerini geliştirmeleri gerektiğini göstermektedir.

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1. INTRODUCTION

Financial stability implies the stability of the overall financial sector and individual financial institutions. The topic is crucial as the financial industry affects the economy and its players in various ways. A breakdown in the financial sector may disturb the payment system since intermediaries own the resources. Still, they need a plan for processing or saving payments. As economic deterioration can affect the valuation of assets and currencies, payment obligations that were previously possible may no longer be potential due to fluctuations in the price of money or other assets in the payer's asset portfolio. Similarly, a large discrepancy between cash inflows and outflows can trigger a crisis, affecting the regular flow of economic activities of governments, private enterprises and individuals. Market actors could extend the list of possible scenarios. All these examples emphasize that the stability of the overall financial sector and individual institutions is vital for the health of the economy and, indirectly, for sustaining social harmony (Ali & Izhar, 2015).

Since various periods of financial instability affect countries with different intensities and cause unemployment and production losses, financial stability is still necessary today. The great depression is one of history's most severe periods of financial instability. At that time, top economists argued for a banking system to sustain long-term financial stability and proposed the Chicago reform plan. Their suggestions formed some of the basic structures of Islamic finance. After this plan, it became apparent that a financial system that respects Islamic regulations is invulnerable to instability. The 2008 Global Financial Crisis, characterized by many bankruptcies and other economic turmoil, dominated the world and brought the old thorny issue of the search for financial stability back to the agenda (Iqbal et al., 2010; Belouafi et al., 2015).

In this environment of intense debate, Islamic financial organizations and the principles governing their activities attracted great interest. Indeed, official and formalized Islamic banking agencies have emerged recently, although they need to be more organized and engaged in private actions. The fundamentals of Islamic finance were laid in the 1940s. In the following years, Muslim countries such as Pakistan, Malaysia, Dubai, Kuwait, Qatar and Egypt have taken various initiatives based on Islamic finance and banking mechanism (Iqbal & Molyneux, 2016). The interest-free (Islamic) banking structure, which started to develop worldwide in the 1970s, emerged in Turkey in 1983 a "private finance institution". Private Finance Institutions began to take place in the banking sector as "Participation Banking" in Turkey in 2005. Participation banks' market share in the sector, which was 5% in 2017, reached 8.3% at the end of 2022, and their asset size reached TL 1.2 trillion. With the expansion of the inclusion area, the funds disbursed reached TL 643.8 billion, with an increase of 74.3% without compromising the basic risk management principles. While developing digital channels without lagging behind technology, the bank continues to invest in traditional distribution channels. The number of branches reached 1.379, and the number of employees earned 17.868. Considering the development of participation banks in recent years, it is seen that they achieved growth above the sector in 2022 as well (TKBB, 2022). Due to several countries' adoption of this experience, the Islamic banking sector is undergoing unparagoned expansion. This fact has increased the significance of Islamic financial stability and the factors affecting it. For this reason, various theories have tried to explain the factors that can make Islamic banking a stable banking system in the literature.

Based on Islamic banking theory, the first factor evaluated in the literature in line with the financial stability of Islamic banks is the balance sheet structure. In Islamic banks, the balance sheet's assets consist of Islamic financing and investment accounts, while the liabilities consist of investment accounts and demand deposits. In addition, the balance sheets of Islamic banks allow for balance sheet transfers while acting on the assumption that the maturities of assets and liabilities are compatible (Ghassan & Krichene, 2017).

The second factor is profit and loss sharing (PLS). Chishti (1985) agrees that profit and loss-sharing financing provides stabilizing instruments incorporated into the projects in which investments are made. This argument describes the need for a gap between payment obligations and cash flows. A shortfall has long been seen as a source of financial instability. In addition, PLS allows the bank to actively engage in investments in exceptionally efficient industries, diversification of assets, and follow-up of banks to improve projects and mitigate potential risks (Khoutem & Nedra, 2012).

The quality of banking assets is considered the third factor. It is observed that Islamic banks have superior asset quality because they protect their shareholders' equity in terms of investment deposits, savings and lower non-performing loans (Prima Sakti & Mohamad, 2018).

The link between the real economy and the financial sector contributes to Islamic finance's stability in the literature. Islamic banking theory proposes that Islamic banks can connect the real economy and the financial field due to the Shariah imperative that a monetary asset must back all financial transactions (Njima & Zouari, 2012).

In this context, this study aims to reveal the factors affecting the financial stability of participation banks operating as Islamic banks in Turkey for 2019Q1-2023Q1.

The motivation to investigate this topic stems from two reasons. Firstly, the average value of the financial stability of participation banks in Turkey, according to the Z-score indicator from 2019Q1 to 2023Q1, varies between 0.929 and 188.877. This fact indicates significant differences with a standard deviation of 29.413%. These contradictions raise the question of exactly which factors influence the financial stability of participation banks. Therefore, this study plans to address this gap by examining bank-specific variables affecting participation banks' financial stability. Secondly, when reviewing domestic and foreign literature, we observe that studies focus on comparing financial stability levels between Islamic and conventional banks. In addition, we conclude that a limited number of studies (Iskenderoglu & Tomak, 2013; Danisman, 2018; Alihodzic et al., 2020; Ekinci & Kok, 2020; Collu, 2021; Tunay & Tunay, 2021) have examined the determinants of financial stability, especially for participation banks in Turkey.

The remainder of the study is planned as follows. Section 2 summarizes the determinants of financial stability in Islamic banks and empirical studies. Section 3 highlights the data set and methodology. Section 4 reports and discusses the results of the research. The last section concludes the paper and provides policy recommendations.

2. LITERATURE REVIEW

This section discusses the financial stability levels of banks as revealed by empirical studies and the main factors affecting financial stability.

Farook et al. (2009), one of the studies investigating the issue of 200 banks abroad, found that small Islamic banks are, on average, more financially stable than their conventional counterparts; however, large Islamic banks are weaker on average. Čihák & Hesse (2010) compared the financial stability levels of Islamic and commercial banks on 19 banks, Shahid & Abbas (2012) on 16 banks, Ouerghi (2014) on 94 banks and Chakroun & Gallali (2015) on 136 banks. They reported that small Islamic banks tend to be financially stronger than small commercial banks, large commercial banks tend to be stronger than large Islamic banks and small Islamic banks tend to be stronger than large Islamic banks. Rajhi & Hassairi (2013) examined the issue of 557 banks and determined that Islamic banks are more financially stable than commercial banks, except for small Islamic banks. Altaee et al. (2013) compared the financial stability of commercial and Islamic banks on 97 banks before and after the global financial crisis. They stated that there was no significant difference between the financial stability levels of commercial and Islamic banks for the relevant periods; however, commercial banks tended to be financially stronger than Islamic banks. Wahid & Dar (2016) examined the issue in 38 banks. They concluded that large Islamic banks are less stable than large commercial banks, while small Islamic banks are more stable than small commercial banks. They also revealed that bank size, level of capitalization and income diversification are essential determinants of the stability of Malaysian Islamic and commercial banks. Rashid et al. (2017) investigated the issue using data from 20 banks. They reported that income diversity, profitability ratio, loan/asset ratio, bank size and market concentration ratio have significant effects on the stability of banks. They also found that Islamic banks contribute more effectively to the banking sector's stability than commercial banks. Alqahtani & Mayes (2018) examined whether Islamic banks outperformed commercial banks during the financial shocks in the 2000-2013 period. They identified no significant difference between the two banking types during the global financial crisis; however, when the economic shock spread to the real economy in the later stages of the crisis, large Islamic banks were less stable than commercial banks. Kasri & Azzahra (2020) tested the issue on a total of 94 banks, including commercial and Islamic banks, and showed that the main factors that positively affect the stability of banks in Indonesia are exchange rate, financial inclusion, asset returns and loan/financing growth; however, interest rates have a negative impact on stability. Safiullah (2021) examined the level of financial stability of Islamic and commercial banks on 198 commercial and Islamic banks from 28 countries and stated that Islamic banks have higher stability efficiency than commercial banks.

Studying 45 Islamic banks from 13 countries, Ibrahim & Rizvi (2017) argued that larger Islamic banks are more stable when they exceed a specific threshold size and that operating restrictions and capital tightening play a role in strengthening the stability-size relationship. Lasty et al. (2019), who examined the issue of 11 Islamic banks in Indonesia, determined that an increase in competition, bank size and capital buffer increase bank stability. In a similar study, Widarjono (2020) revealed that the factors affecting bank stability of Indonesian Islamic banks are bank size, capital adequacy ratio and operating efficiency. In a study of 81 Islamic banks from 22 countries, Daoud & Kammoun (2020) reported that risk-based and non-risk-based capital ratios, bank size, loans to total assets ratio, total deposits to total assets ratio, and fixed costs to total assets ratio are essential determinants of bank

stability in the Islamic banking sector. Amaroh (2023) analyzed the determinants of bank stability during the pandemic period on 10 Islamic banks in Indonesia and concluded that capital adequacy, profitability, and financing ratio positively affect bank stability, while the COVID-19 pandemic has no significant effect. Joudar et al. (2023) investigated 31 Islamic banks from 12 Middle East and North Africa (MENA) countries and stated that capital adequacy ratio and liquidity positively affect bank stability, while size, governance and bank concentration level have a negative effect. Sari & Sudarmawan (2023), who tested the issue on 11 Islamic banks from 3 Southeast Asian countries, concluded that while the quality of institutions positively affects bank stability, the impact of financing growth is negative. They also detected that earnings management variables do not significantly affect bank stability. Shahriar et al. (2023), who investigated the relationship between diversification and bank stability on a total of 105 banks consisting of Islamic and commercial banks from 10 MENA countries, found that asset and fund diversification has a negative effect on bank stability, while income diversification has a positive impact on bank stability.

There are also studies in the literature that compare the financial stability levels of commercial and Islamic (participation) banks in the Turkish banking sector and test the determinants of bank stability. Sakarya (2016) examined whether Islamic banks in Turkey are more stable than commercial banks and reported that Islamic banks in Turkey have a significant level of stability compared to commercial banks and that low bank size in Islamic banking leads to low levels of risk. Elbadri & Bektas (2017) compared the financial stability levels of commercial and Islamic banks on 29 banks. They concluded that the level of financial stability is lower for large Islamic banks than for large commercial banks and that small Islamic banks tend to be more financially stable than large Islamic banks. They also found that bank size, loan/asset ratio, cost/income ratio, income diversification and inflation rate, economic growth, oil prices and political stability have a negative effect on financial stability in the banking sector; in contrast, stock prices have a positive impact. Ece & Cadirci (2022) tested the effect of loan concentration level on bank stability in Islamic and commercial banks. They observed that loan portfolio diversification has both negative and positive lagged effects on the commercial banking system in the short run and reduces the risk of bankruptcy in the long run. They also revealed that in the Islamic banking system; at the same time, diversification reduces the financial stability of banks in the short run, and the relationship between diversification and financial stability is not significant in the long run.

Among the studies testing the factors affecting bank stability, Iskenderoglu & Tomak (2013) tested the relationship between competition and bank stability on 15 commercial banks and identified a positive relationship between asset composition and non-performing loans representing bank stability. They also detected a negative relationship between bank size and Z-score, which means bank stability, while the relationship with the deposit ratio is positive. Sakarya & Akkus (2017) analyzed the data of three banks suitable for analysis in participation banks in the Turkish banking sector and the sector regarding credit risk. They concluded that participation banks in the Turkish banking sector have adequate capital adequacy ratios and are resilient against potential shocks in terms of financial stability. Danisman (2018) examined the determinants of bank stability on 27 commercial banks and stated that the inefficiency index, loans to total assets ratio, non-interest income ratio, loan loss provisions ratio and return on assets ratio are leading indicators affecting bank stability. Similarly, Alihodzic et al. (2020) tested the stability of commercial banks in Turkey and some Balkan countries. They observed that the strongest correlation with non-performing loans representing bank stability is between the ratio of total non-interest income to total income and the foreign bank assets to total bank assets. They also concluded that the indicators most strongly correlated with Z-score, representing bank stability, are gross domestic product, Lerner index, net interest margin and cost-to-income ratio. Ekinci & Kok (2020) investigated the relationship between competition and bank stability in 156 commercial banks from 26 European Union countries. They found a positive relationship between market power and bank stability. Collu (2021) examined the issue of 25 commercial banks and found a positive relationship between bank stability return on equity and funding risk and a negative relationship between liquidity risk and bank size. Tunay & Tunay (2021) tested how financial and macroeconomic variables affect commercial banks' stability. They reported that the Z-score representing bank stability is negatively affected by unemployment, broadly defined money supply, interest rate, exchange rate and income level of countries. They also revealed that non-performing loans, representing bank stability, are negatively affected by growth and broadly defined money supply but positively affected by inflation, unemployment and current account balance.

When we evaluate all the empirical studies mentioned above, the studies focus on Islamic banks and compare Islamic and conventional banks regarding financial stability. The literature review verifies the relationship between bank stability and macroeconomic and bank-specific variables; however, it presents different results. Moreover, the existing literature uses a unique econometric model that simultaneously covers both types of banks through stress testing, panel regression, ARDL, VAR, and two-system GMM methods. We analyze the internal

determinants of Islamic banks' financial stability using robust estimators that consider autocorrelation and heteroscedasticity problems and static models that do not. The facts mentioned above prove that the research will contribute to the scientific world by filling the gap in the literature.

3. DATASET AND METHODOLOGY

This study investigates bank-specific factors affecting the stability of Islamic banks. Accordingly, we consider the quarterly data of 6 participation banks operating as Islamic banks in Turkey for 2019Q1-2023Q1. The reason for choosing this period is to reveal what exactly determines the financial stability of participation banks at different risk levels, such as pre-COVID-19, COVID-19 and inflationary periods. We calculate the financial data of the banks from the data obtained from the solo audit reports published by the Banking Regulation and Supervision Agency (BRSA) on a bank basis, and we conduct the analyses in the study with Stata and Gauss packages.

We utilize the Z-scores of banks to represent bank stability, which is the dependent variable in the study. The insolvency of a bank means the probability that its assets' value is lower than its liabilities, which means that as the Z-score increases, the bank's risk of insolvency decreases. Therefore, the Z-score ratio is a standard measure of bank strength and is calculated as follows:

$$Z = \frac{(\mu + K)}{\sigma} \tag{1}$$

In equation (1), μ is the bank's return on assets (ROA), K is the ratio of total equity to total assets, and σ represents the standard deviation of ROA. A Z-score greater than 2.99 means that the bank does not have a problem with financial conditions, while a Z-score less than 1.88 means that the bank has serious financial difficulties or has defaulted. A Z-score between 1.88 and 2.99 indicates that the bank faces minor problems related to financial conditions (Lasty et al., 2019:661).

Bank-specific variables (independent variables) in the study are non-risk weighted capital ratio (CAP), risk-weighted capital ratio (CAR), bank size (SIZE), cost-to-income ratio (CIR), loan ratio (LTA), deposits (collected funds) ratio (DEPA), asset diversification (AST_DIV), fund diversification (FUND_DIV) and income diversification (INC_DIV). We also present detailed information on the variables in Table 1.

Table 1. Detailed Information on Variables

Variables	Formulas	References
	Dependent Variable	
Bank Stability	Z-score = $\frac{\mu ROA + CAP}{\sigma ROA}$	Sakarya (2016); Rashid et al. (2017); Alqahtani & Mayes (2018); Lasty et al. (2019); Daoud & Kammoun (2020); Widarjono (2020); Ece & Cadirci (2022); Shahriar et al. (2023).
	Bank-Specific Variables (Independent Variables)	
Non-Risk Weighted Capital Ratio (CAP)	Total Equity/Total Assets	Sakarya (2016); Wahid & Dar (2016) Alqahtani & Mayes (2018); Daoud & Kammoun (2020); Widarjono (2020); Joudar et al. (2023).
Risk-weighted Capital Ratio (CAR)	(Tier 1 Capital + Tier 2 Capital)/Risk-Weighted Assets	Daoud & Kammoun (2020); Amaroh (2023).
Cost-to-Income Ratio (CIR)	Operating Expenses/ Operating Income	Sakarya (2016); Wahid & Dar (2016); Elbadri & Bektas (2017); Rashid et al. (2017); Widarjono (2020); Joudar et al. (2023).
Bank Size (LNBS)	Natural Log of Total Assets	Sakarya (2016); Wahid & Dar (2016); Elbadri & Bektas (2017); Rashid et al. (2017); Alqahtani & Mayes (2018); Daoud & Kammoun (2020); Ece & Cadirci (2022).

Loan Ratio (LTA)	Net Loans/Total Assets	Wahid & Dar (2016); Rashid et al. (2017); Daoud & Kammoun (2020).
Deposits (Collected Funds) Ratio (DEPA)	Total deposit (Collected Funds)/Total Assets	Daoud & Kammoun (2020).
Asset Diversification (AST_DIV)	$1-\left(\frac{Net\ Loans - Other\ Earning\ Assets}{Total\ Earning\ Assets}\right)$	Shahriar et al. (2023).
Fund Diversification (FUND_DIV)	$\frac{Total\ Liabilities - Total\ Deposits\ (Collected\ Funds)}{Total\ Liabilities}$	Shahriar et al. (2023).
Income Diversification (INC_DIV)	INC_DIV = $1-(NIT_s^2 - NII_s^2)$ NIT is net interest income, and NII is net non-interest income. In addition, NIT is the share of net operating income from net interest sources, while NII is the share of net operating income from non-interest sources. Their calculation is as follows: $NIT_s = \frac{NIT}{NIT + NII}$ $NII_s = \frac{NII}{NIT + NII}$ INC_DIV measures the degree of diversification in an entity's net operating income. The higher this value is, the more diverse the mix will be. A value of 0.0 means that all income comes from a single source, while 0.5 means an equal split between net interest income and non-interest income (Stiroh & Rumble, 2006: 2137).	Shahriar et al. (2023).

When the time dimension T is large, Driscoll & Kraay (1998) showed that standard nonparametric time series covariance matrix estimators can be improved to be robust to all general spatial and periodic correlation forms. Driscoll & Kraay's methodology performs a Newey-West type correction for the series of cross-sectional averages. In this way, the corrected standard error estimates improve the consistency of the covariance matrix estimators regardless of the cross-sectional dimension N (even N→ ∞). Thus, Driscoll & Kraay's approach is derived as an alternative to the Parks-Kmenta or PCSE approaches, which produce consistent covariance matrix estimators only for large T, which are weak in the case of sizeable cross-sectional size, especially in micro econometric panels. This estimator has standard errors consistent with heteroscedasticity even in the case of large T and N and is robust to general forms of spatial and periodic correlation. In the following panel data model, assuming that the error term $Y_{it} = \beta X_{it} + u_{it}$ is heteroscedastic, autocorrelated and interdivisional correlated, the parameters can be estimated consistently by the pooled least squares method (Driscoll & Kraay, 1998: 551; Yerdelen Tatoglu, 2016: 276):

$$\hat{\beta} = (X\acute{X})^{-1}X\acute{Y} \tag{2}$$

The Driscoll & Kraay standard errors of the parameter estimates are also obtained from the square roots of the diagonal elements of the asymptotic (robust) covariance matrix.

$$V(\hat{\beta}) = (X\acute{X})^{-1}\hat{S}_T(X\acute{X})^{-1} \tag{3}$$

where $\hat{S}_T$ is defined as follows:

$$\hat{S}_T = \hat{\Omega}_0 + \sum_{j=1}^{m(T)} w(j,m)\left[\hat{\Omega}_j + \hat{\Omega}'_j\right] \tag{4}$$

m(T) denotes the lag length for autocorrelation. Bartlett weights, expressed as *w(j.m(T))=1-j/(m(T)+1),* ensure that $\hat{S}_T$ is positive definite and allows higher order lags in the sample autocovariance function to receive lower weights. The (K+1)×(K+1) dimensional matrix $\hat{\Omega}_j$ is also stated as follows:

$$\hat{\Omega}_j = \sum_{t=j+1}^{T} h_t(\hat{\beta})\, h_{t-j}(\hat{\beta})' \tag{5}$$

In equation (5) there is equality $h_t(\hat{\beta}) = \sum_{i=1}^{N(t)} h_{it}(\hat{\beta})$. The square of the moment conditions t for each unit $h_{it}(\hat{\beta})$ is computed for N's with different T's. With this minor correction, the Driscoll & Kraay covariance matrix estimator can also be used in unbalanced panel data models. The orthogonality conditions $h_{it}(\hat{\beta})$ for the units in pooled least squares estimation are the (K+1)×1 dimensional moment conditions of linear regression. For example, It can be shown as $h_{it}(\hat{\beta}) = X_{it}\hat{u}_{it} = X_{it}(Y_{it} - X'_{it}\hat{\beta})$. Driscoll & Kraay's covariance matrix estimator, which is calculated with the help of equations (4) and (5), is equal to Newey-West's covariance matrix estimator for the time series of the cross-sectional means of $h_{it}(\hat{\beta})$, which is robust in the presence of heteroscedasticity and autocorrelation. With this approach based on cross-sectional averages, standard error estimates are consistent regardless of the cross-sectional dimension N of the units. Driscoll & Kraay demonstrate consistency, even when N goes to infinity. Moreover, the standard errors from the estimated covariance matrix are robust to general spatial and periodic correlation forms (Driscoll & Kraay, 1998: 552; Yerdelen Tatoglu, 2016: 276).

4. EMPIRICAL RESULTS AND DISCUSSION

In this section, we first present the descriptive statistics of the variables in Table 2.

Table 2. Summary Statistics

	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque-Bera (Prob)
ZSCORE	33.96002	26.28736	188.8773	0.929496	29.41304	3.146057	14.40652	721.2226*** (0.0000)
SIZE	18.06051	18.16877	19.89098	14.16117	0.959987	-1.072161	5.270246	41.44655*** (0.0000)
LTA	0.577444	0.576784	0.833086	0.400929	0.084892	0.503812	3.627375	5.987843** 0.0500)
CAP	0.081881	0.066763	0.789669	0.040830	0.077227	7.802372	70.90572	20632.45*** (0.0000)
CAR	0.230201	0.171708	2.269101	0.121729	0.245156	6.468659	50.38240	10252.98*** (0.0000)
DEPA	0.738430	0.752275	0.855484	0.115548	0.090589	-3.500718	23.57340	2007.211*** (0.0000)
AST_DIV	0.420453	0.420593	0.579790	0.221642	0.072770	-0.145326	3.791932	7.543025** (0.0422)
FUND_DIV	0.261570	0.247725	0.884452	0.144516	0.090589	3.500718	23.57340	2007.211*** (0.0000)
INC_DIV	0.480709	0.496814	0.499998	0.097268	0.052263	-5.360888	35.39282	4948.069*** (0.0000)

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

Table 2 suggests that all values are positive except for some skewness values; the sample mean, median, maximum, minimum and standard deviation values are close to 0 except for ZSCORE and SIZE variables. When we analyze the skewness values of the variables, we observe that all variables except SIZE, DEPA, AST_DIV and INC_DIV show positive asymmetry and right-skewed distribution. The fact that the skewness parameters of the other variables are negative indicates that they show negative asymmetry and exhibit a left-skewed distribution. In addition, kurtosis values of the variables above 3 mean that the distribution curves are flatter and have leptokurtic. When we examine the Jarque-Bera test statistics, we conclude that the variables do not exhibit a normal distribution since the test statistics are generally significant at the 5% level. Following the descriptive statistics, we investigate the presence of multicollinearity between the independent variables by the Spearman correlation test and report the findings in Table 3.

Table 3. Spearman Correlation Test Results

Probability	ZSCORE	SIZE	LTA	CAP	CAR	CIR	DEPA	AST _DIV	FUND_DIV	INC_DIV
ZSCORE	1.000000									

SIZE	**-0.281591*****	1.000000								
	0.0041	-----								
LTA	**0.196928****	**-0.502615*****	1.000000							
	0.0473	0.0000	-----							
CAP	0.106191	**-0.473643*****	**0.312744*****	1.000000						
	0.2881	0.0000	0.0014	-----						
CAR	-0.064501	-0.031021	**-0.405252*****	**0.281696*****	1.000000					
	0.5195	0.7569	0.0000	0.0041	-----					
CIR	**0.274270*****	**-0.233357****	**0.355129*****	**-0.191529***	**-0.442826*****	1.000000				
	0.0053	0.0183	0.0002	0.0538	0.0000	-----				
DEPA	**-0.202662****	**0.647586*****	**-0.374264*****	**-0.603922*****	**-0.228142****	0.059909	1.000000			
	0.0411	0.0000	0.0001	0.0000	0.0211	0.5498	-----			
AST_DIV	**-0.267609*****	**0.525810*****	**-0.591717*****	**-0.371223*****	**0.253378****	**-0.309928*****	**0.390402*****	1.000000		
	0.0065	0.0000	0.0000	0.0001	0.0102	0.0015	0.0000	-----		
FUND_DIV	**0.202662*****	**-0.647586*****	**0.374264*****	**0.603922*****	**0.228142****	-0.059909	**-0.632174*****	**-0.390402*****	1.000000	
	0.0411	0.0000	0.0001	0.0000	0.0211	0.5498	0.0000	0.0000	-----	
INC_DIV	-0.033288	0.117360	0.044450	**0.271218*****	**0.393174*****	**-0.258359*****	-0.150878	-0.083941	0.150878	1.000000
	0.7398	0.2401	0.6573	0.0058	0.0000	0.0087	0.1301	0.4016	0.1301	-----

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

Table 3 demonstrates that there is no correlation value of 0.75 and above between the model's error term and the independent variables. The findings indicate that there is no multicollinearity problem among the independent variables. Since the time dimension is larger than the cross-sectional dimension (102 terms > 6 banks), we test the cross-sectional dependence of the variables with Breusch-Pagan LM (1980), and Pesaran et al., (2008) Bias-Corrected Scaled LM tests and present the findings in Table 4.

Table 4. Cross-Section Dependence Test Results

	CD Tests	**Stat.**	**Prob.**
ZSCORE	LM	437.071***	0.0000
	$LM_{Adj.}$	12.251***	0.0000
CAP	LM	630.906***	0.0000
	$LM_{Adj.}$	-1.225	0.8900
CAR	LM	243.300***	0.0000
	$LM_{Adj.}$	-2.176	0.985
SIZE	LM	604.978***	0.0000
	$LM_{Adj.}$	38.505***	0.0000
CIR	LM	462.529***	0.0000
	$LM_{Adj.}$	28.519***	0.0000
LTA	LM	229.850***	0.0000
	$LM_{Adj.}$	54.772***	0.0000
DEPA	LM	606.783***	0.0000
	$LM_{Adj.}$	11.179***	0.0000
INC_DIV	LM	295.434***	0.0000
	$LM_{Adj.}$	2.676***	0.0040
AST_DIV	LM	265.331***	0.0000
	$LM_{Adj.}$	26.809***	0.0000
FUND_DIV	LM	606.783***	0.0000
	$LM_{Adj.}$	11.179***	0.0000

*** indicate statistical significance at the 1% level.

Table 4 shows that the probability values of all variables except CAR and CAP variables are statistically significant at the 1% level in both tests. Therefore, we cannot accept the null hypothesis, which suggests that there is no cross-sectional dependence in the variables, and we conclude that there is cross-sectional dependence in the variables. We also confirm that there is cross-sectional dependence in the LM test for CAP and CAR variables; however, we conclude that there is no cross-sectional dependence in the Bias-Corrected Scaled LM test. Accordingly, we test the stationarity of the variables with the Hadri & Kurozumi (2012) unit root test, which can be used both with and without cross-sectional dependence and give the findings in Table 5.

Table 5. Hadri & Kurozumi Unit Root Test Results

	Z_A^{SPC}	Z_A^{LA}
ZSCORE	-0.9099 [0.8186]	0.3263 [0.3721]
CAP	-2.2247 [0.9870]	-2.5635 [0.9948]
CAR	-0.1155 [0.5460]	-0.0905 [0.5360]
SIZE	-2.2735 [0.9885]	-2.2905 [0.9890]
CIR	-2.3479 [0.9906]	-2.2044 [0.9863]
LTA	-2.2222 [0.9869]	-2.4324 [0.9925]
DEPA	-1.9639 [0.9752]	-1.8402 [0.9671]
INC_DIV	-1.6286 [0.9483]	-1.8677 [0.9691]
AST_DIV	-0.1003 [0.5399]	0.0321 [0.4872]
FUND_DIV	-1.9639 [0.9752]	-1.8402 [0.9671]

The values in [ ] are probability values for the test statistics.

In the Hadri & Kurozumi (2012) test, which runs in the KPSS test logic, if there is a cross-sectional dependence on the variables, it is decided according to the Z_A^{SPC} bootstrapping test statistics. If there is no cross-sectional dependence on the variables, it is selected according to the Z_A^{LA} test statistics. According to Table 5, since the probability values for both test statistics are not statistically significant, we accept the null hypothesis, which suggests the stationarity of the series. After we provide the stationarity condition required for panel data models, we analyze the factors affecting bank stability with fixed and random effects models, apply the Hausman test for the appropriate model selection and display the findings in Table 6.

Table 6. Fixed and Random-Effects Models and Hausman Test Estimation Results

Panel A: Fixed-Effects Models

ZSCORE	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
CAP	-45.35541 [32.30246] (0.164)	-	-	-	-	-
CAR	-	-	-	-	-	-24.09445** [11.51616] (0.039)
SIZE	-	-	-	-10.26822** [4.812976] (0.036)	-	-
CIR	26.50913 [18.91524] (0.164)	32.77612* [18.99714] (0.088)	34.29392* [17.55725] (0.054)	-	34.29392* [17.55725] (0.054)	27.54195 [17.75564] (0.124)
LTA	62.52285 [44.08123] (0.159)	69.70688 [43.84635] (0.115)	-	-	-	-
DEPA	-	65.01438** [32.5285] (0.049)	85.90163** [34.73893] (0.015)	-	-	-
INC_DIV	120.5145** [47.81537] (0.013)	125.1788** [47.3997] (0.010)	133.0865*** [47.189] (0.006)	154.541*** [49.02691] (0.002)	133.0865*** [47.189] (0.006)	125.8951*** [47.32635] (0.009)
AST_DIV	-	-	-87.39754** [43.78613] (0.049)	-89.64222** [42.64137] (0.038)	-87.39754** [43.78613] (0.049)	-69.05062 [42.27845] (0.106)

FUND_DIV	-	-	-	-134.2171*** [42.57162] (0.002)	-85.90163** [34.73893] (0.015)	-
R^2	0.1396 (0.0074) ***	0.1577 (0.0031) ***	0.1705 (0.0016) ***	0.1768 (0.0012) ***	0.1705 (0.0016) ***	0.1555 (0.0034) ***
Panel B: Random-Effects Models						
CAP	-45.05937 [31.89475] (0.158)	-	-	-	-	-
CAR	-	-	-	-	-	-23.94211** [11.25696] (0.033)
SIZE	-	-	-	-10.30542** [4.690166] (0.028)	-	-
CIR	27.7739 [17.83337] (0.119)	32.80025* [17.56869] (0.062)	33.09433** [16.60004] (0.046)	-	33.09433** [16.60004] (0.046)	27.87134 [16.92942] (0.100)
LTA	56.27785 [42.00831] (0.180)	62.40838 [41.63623] (0.134)	-	-	-	-
DEPA		61.74155* [31.63534] (0.051)	82.44592** [33.87747] (0.015)	-	-	-
INC_DIV	116.6905** [47.1135] (0.013)	118.3542** [46.9632] (0.012)	127.149*** [46.61399] (0.006)	153.4325*** [48.05503] (0.001)	127.149*** [46.61399] (0.006)	122.8728*** [46.54375] (0.008)
AST_DIV	-	-	-85.28969** [42.96352] (0.047)	-88.74069** [41.63506] (0.033)	-85.28969** [42.96352] (0.047)	-66.96903 [41.10493] (0.103)
FUND_DIV	-	-	-	-134.8742*** [41.74018] (0.001)	-82.44592** [33.87747] (0.015)	-
R^2	0.1394	0.1576	0.1705	0.1768	0.1705	0.1555
(Prob)	(0.0048) ***	(0.0022) ***	(0.0008) ***	(0.0004) ***	(0.0008) ***	(0.0016) ***
Hausman χ^2 Test Statistics	0.63 (0.9592)	8.05* (0.0896)	0.99 (0.9112)	0.04 (0.9998)	0.99 (0.9112)	0.20 (0.9952)

The values in ( ) are probability values for the coefficients. The values in [ ] are standard errors. ***, ** and * indicate statistical significance at the 1%, 5% 10% level, respectively.

Analyzing fixed and random effects model findings, we conclude a statistically significant and positive relationship between ZSCORE and CIR, DEPA and INC_DIV; at the same time, there is a negative relationship between ZSCORE and CAR, SIZE, AST_DIV and FUND_DIV. According to the Hausman test results, the random effects model is the most appropriate in all models except model 2. In panel data models, it is generally assumed that there are no problems with heteroscedasticity, autocorrelation and interdivisional correlation. However, since these problems in the model will lead to a loss of efficiency in the estimated parameters, whether these problems are present after the model is estimated should be tested. Therefore, we apply the modified Wald test to examine whether there is a heteroscedasticity problem in fixed effects models, the Baltagi & Wu (1999) LBI and Bhargava et al., (1982) Modified Durbin Watson tests to check for autocorrelation, and the Breusch & Pagan (1980) LM test to assess interdivisional correlation. We also analyze the random effects models using Levene (1960); Brown & Forsythe (1974) tests for the heteroscedasticity problem, Baltagi & Wu (1999) LBI, and Bhargava et al., (1982) Modified Durbin Watson tests for the autocorrelation problem. We summarize the findings obtained in Table 7.

Table 7. Diagnostic Test Results for Models

Panel A: Fixed-Effects Models						
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Breusch & Pagan (1980) LM Test	23.002* (0.0841)	17.524 (0.2885)	15.195 (0.4375)	9.788 (0.8328)	15.195 (0.4375)	19.548 (0.1900)
Bhargava et al. (1982) Modified Durbin Watson Test	1.0969394	1.1162919	1.1348216	1.1559003	1.1348216	1.109234
Baltagi & Wu (1999) LBI Test	1.1972717	1.2132493	1.2289758	1.2258483	1.2289759	1.2131083
Modified Wald Test	3932.02*** (0.0000)	6985.39*** (0.0000)	10966.08*** (0.0000)	10283.56*** (0.0000)	10966.08*** (0.0000)	4947.58*** (0.0000)
Panel B: Random-Effects Models						
Bhargava et al. (1992) Modified Durbin Watson Test	1.0969394	1.1162919	1.1348216	1.1559003	1.1348216	1.109234
Baltagi & Wu (1999) LBI Test	1.1972717	1.2132493	1.2289758	1.2258483	1.2289759	1.2131083
Levene (1960); Brown & Forsythe (1974) Test						
W_0	24.3396634*** df(5, 96) Pr > F = 0.00000000					
W_{50}	8.1652274*** df(5, 96) Pr > F = 0.00000187					
W_{10}	19.5974680*** df(5, 96) Pr > F = 0.00000000					

The values in ( ) are probability values for the coefficients and χ^2 test statistics. ***, ** and * indicate statistical significance at the 1%, 5% 10% level, respectively. df shows the degree of freedom.

According to the interdivisional correlation test results for fixed effects models, since the probability values are insignificant in all models except model 1, we accept the null hypothesis, which suggests no interdivisional correlation. However, we prove that there is an interdivisional correlation in model 1. According to the autocorrelation test results in Table 7 for all models, the test statistics are less than 2. In other words, the findings indicate an autocorrelation problem in all models. According to the results of the heteroscedasticity test estimated for all models, since the test statistics are statistically significant at the 1% level, we cannot accept the null hypothesis, which suggests no problem with heteroscedasticity in the models. In other words, we reveal a heteroscedasticity problem in the models.

According to the autocorrelation test results estimated for the random effects models, test statistics less than two mean an autocorrelation problem exists in the models. Moreover, the results of the variance test estimated for all models show that the test statistics are statistically significant at the 1% level in all dimensions. The findings obtained prove the existence of the problem of heteroscedasticity in all models. In the case of autocorrelation, interdivisional correlation and heteroscedasticity problems in the error terms of the panel data model, the Driscoll & Kray estimator, which has robust standard errors instead of biased standard errors, should be preferred (Hoechle, 2007:282). We report the results of the Driscoll & Kraay fixed effects robust standard errors estimator in Table 8.

Table 8. Driscoll & Kraay Fixed Effects Robust Standard Errors Estimator Results

ZSCORE	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
CAP	-45.35541*** [9.91087] (0.006)	-	-	-	-	-
CAR	-	-	-	-	-	-24.09445*** [3.770986] (0.001)
SIZE	-	-	-	-10.26822** [3.627539] (0.037)	-	-
CIR	26.50913** [6.90505]	32.77612** [8.21662]	34.29392*** [7.107896]	-	34.29392*** [7.107896]	27.54195*** [5.811779]

	(0.012)	(0.010)	(0.005)		(0.005)	(0.005)
LTA	62.52285** [22.41234] (0.038)	69.70688** [21.52041] (0.023)	-	-	-	-
DEPA	-	65.01438*** [15.1109] (0.008)	85.90163*** [12.13759] (0.001)	-	-	-
INC_DIV	120.5145** [36.13977] (0.021)	125.1788** [36.43935] (0.019)	133.0865** [37.73845] (0.017)	154.541*** [37.33046] (0.009)	133.0865** [37.73845] (0.017)	125.8951** [37.68364] (0.021)
AST_DIV	-	-	-87.39754** [26.98821] (0.023)	-89.64222*** [21.27227] (0.008)	-87.39754** [26.98821] (0.023)	-69.05062* [29.39537] (0.066)
FUND_DIV	-	-	-	-134.2171*** [21.4729] (0.002)	-85.90163*** [12.13759] (0.001)	-
R^2	0.1396	0.1577	0.1705	0.1768	0.1705	0.1555
F	15.51***	12.95***	20.28***	29.46***	20.28***	14.96***
Prob>F	0.0050	0.0075	(0.0027)	(0.0011)	(0.0027)	(0.0055)

The values in ( ) are probability values for the coefficients. The values in [ ] are standard errors. ***, ** and * indicate statistical significance at the 1%, 5% 10% level, respectively.

When we analyze Table 8, the F statistic results suggest that the models are generally significant. According to Model 1, we find that the relationship between CAP and ZSCORE is statistically significant and negative at the 1% level. In other words, increasing the non-risk weighted capital ratio decreases bank stability. The findings differ from the results of Wahid & Dar (2016), Daoud & Kammoun (2020), Widarjono (2020), and Joudar et al. (2023). They concluded that there is a positive relationship between the variables. The R^2 value of 0.1396 in Model 1 indicates that the independent variables in the model explain approximately 14% of the changes in bank stability. According to Model 6, the relationship between CAR and ZSCORE is statistically significant and negative at the 1% level. In other words, an increase in the risk-weighted capital ratio decreases bank stability. The findings differ from those of Daoud & Kammoun (2020) and Amaroh (2023). They concluded that there is a positive relationship between the variables. The R^2 value of 0.1555 in Model 6 shows that the independent variables in the model explain approximately 16% of the changes in bank stability. According to Model 4, the relationship between SIZE and ZSCORE is statistically significant and negative at the 5% level. In other words, an increase in bank size decreases bank stability. While the findings are similar to the results of Wahid & Dar (2016), Elbadri & Bektas (2017) and Joudar et al. (2023), they are different from the findings of Ece & Cadirci (2022). Ece & Cadirci (2022) concluded that while there is a positive relationship between the variables in the short run, there is no significant relationship in the long run. The R^2 value of 0.1768 in Model 4 states that the independent variables in the model explain approximately 18% of the changes in bank stability. According to both Model 1 and Model 2, the relationship between LTA and ZSCORE is statistically significant and positive at the 5% level. In other words, an increase in the loan ratio increases bank stability. While the findings are consistent with the results of Rashid et al. (2017), they are different from the findings of Wahid & Dar (2016) and Daoud & Kammoun (2020). Wahid & Dar (2016) and Daoud & Kammoun (2020) discovered a negative relationship between the variables. The R^2 value of 0.1577 in Model 2 shows that the model's independent variables explain approximately 16% of the changes in bank stability. According to both Model 2 and Model 3, the relationship between DEPA and ZSCORE is statistically significant and positive at the 1% level. In other words, increasing the deposits (collected funds) ratio increases bank stability. The findings are different from the findings of Daoud and Kammoun (2020). They detected that there was a negative relationship between the variables. The R^2 value of 0.1705 in Model 3 suggests that the independent variables in the model explain 17% of the changes in bank stability. According to both Model 4 and Model 5, the relationship between FUND_DIV and ZSCORE is statistically significant and negative at the 1% level. In other words, an increase in banks' fund diversification has a negative impact on bank stability. The R^2 value of 0.1705 in Model 5 indicates that the independent variables in the model explain approximately 17% of the changes in bank stability. We determine that the relationship

between INC_DIV and ZSCORE is statistically significant and positive at the 5% level, while the relationship between AST_DIV and ZSCORE is negative. In other words, while increasing banks' income diversification positively affects bank stability, we reveal that increasing banks' asset diversification negatively affects bank stability. The findings obtained are consistent with the results of Shahriar et al. (2023). Finally, we conclude the relationship between CIR and ZSCORE is statistically significant and positive. In other words, an increase in the cost-to-income ratio increases bank stability. The findings are different from the findings of Wahid & Dar (2016), Elbadri & Bektas (2017), Rashid et al. (2017), Widarjono (2020) and Joudar et al. (2023). Wahid & Dar (2016) and Elbadri & Bektas (2017) reported a negative relationship between the variables, while Rashid et al. (2017) and Joudar et al. (2023) concluded that the relationship between the variables was not significant. Widarjono (2020) also discovered a negative relationship between the variables in the short run and a positive relationship in the long run. Overall, the findings reveal that banks' income diversification is the most influential factor in bank stability. This factor is followed by banks' fund and asset diversification, deposits (collected funds) ratio, non-risk weighted capital ratio, cost-to-income ratio, loan ratio, risk-weighted capital ratio and bank size.

5. CONCLUSION

The overall purpose of setting up an Islamic bank is to create an economic balance by ensuring social well-being, generating job opportunities and decreasing poverty following Islamic values. Similar to conventional banks, Islamic banks also carry out commercial operations. Moreover, the rapid spread of COVID-19 globally demands strategic and tactical actions by Islamic banks to maintain good financial stability. This study investigates the bank-specific factors affecting the financial stability of participation banks in Turkey, which are traded as Islamic banks. Accordingly, we analyze the data of 6 participation banks for 2019Q1-2023Q1 with the Driscoll & Kraay (1998) fixed effects robust standard error estimator.

As a result of the analyses, we discover that the non-risk-weighted capital ratio has a negative impact on financial stability as measured by the Z-score. The findings suggest that equity is used for purposes other than increasing public confidence in banks. In addition, the findings indicate that banks' bankruptcy risk increases due to increased capital requirements and are not sufficiently resilient against financial shocks.

Another finding is that risk-weighted capital has a negative effect on the Z-score, a measure of financial stability. The findings imply that more than the increased regulatory capital is required to reduce banks' financial distress and improve their financial health; increasing the banking sector's resilience by increasing regulatory capital alone is impossible.

Bank size negatively affects the financial stability of participation banks. The findings demonstrate that banks are more likely to be exposed to risk due to their orientation towards risky investment areas with the expectation of further growth as their assets increase and are more vulnerable to critical conditions during adverse economic conditions. Moreover, the findings indicate that bank policymakers should proceed with caution when considering plans to increase the size of participation banks.

On the contrary, we identify that banks' loan ratios positively impact financial stability. The findings show that the increase in the credit risk of participation banks tends to increase stability. Such a case is possible only if the bank has an effective system for monitoring and controlling credit risk.

We determine that the effect of deposits (funds collected by banks) on financial stability is positive. The findings suggest that participation banks reduce the risk of default by diversifying the funds they manage and that fund owners are willing to accept a lower rate of return than what is due under the "real" terms of the investment contract. Similarly, we find that the cost-to-income ratio positively impacts financial stability. The findings mean that an increased cost-to-income ratio equals higher management efficiency.

Among the diversification indicators, firstly, we discover that fund diversification has a negative impact on financial stability. Secondly, we observe that income diversification positively affects financial stability. Lastly, we detect that asset diversification has a negative effect on financial stability. The findings argue that more excellent asset and fund diversification may weaken bank stability, in contrast to greater income diversification, which may enhance stability.

The research findings are precious for bank management, investors, customers, and policymakers. In particular, the results improve our understanding of how bank-specific variables are related to the financial stability of the banking system. The results also support the knowledge of the role of participation banks in financial stability.

Furthermore, the results indicate that the role of banks in financial soundness can be strengthened by creating robust competition in the banking sector.

This research can be utilized as a guideline to follow participation banks' financial stability and differentiate between stable and distressed banks. Other determinants other than financial ratios (macroeconomic and financial innovation indicators, product diversity, credit diversification, geographic diversification etc.) can be employed in future studies. In this regard, a qualitative approach can be implemented to obtain more results on the financial stability of participation banks.

AUTHORS' DECLARATION

This paper complies with Research and Publication Ethics, has no conflict of interest to declare, and has received no financial support.

AUTHORS' CONTRIBUTIONS

All sections are written by the author.

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Investigating the Sheltering Effect of Sustainability Indices During the Coronavirus Crash

Koronavirüs Çöküşü Sırasında Sürdürülebilirlik Endekslerinin Koruma Etkisinin İncelenmesi

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ABSTRACT

This study aims to demonstrate that making sustainability investments benefits a firm not just in terms of enhanced investor trust and visibility, but also in terms of providing a safe haven for them during difficult times. For this purpose, the abnormal returns of the companies which are listed in the Sustainability Index of Borsa Istanbul are compared with the rest of the companies during the "Coronavirus crash" which took hold of every financial market in the world. To determine if the businesses represented by the BIST SI are less impacted by the Covid-19 crash than the rest, an independent samples t-test is used. The primary approach used is event study methodology, where the Leybourne, Newbold & Vougas (LNV) test for the BIST100 index is applied to confirm the impact of the "event" in question. Findings show that, like other financial markets, Borsa Istanbul had a price drop in March 2020. Also, it was observed that inclusion in the Sustainability Index reduced average loss. This implies that it is reasonable to make sustainable investments and, as a result, to be included in the sustainability indexes, as inclusion has been found to be particularly helpful in reducing loss during crisis times.

Anahtar Kelimeler:

Sürdürülebilirlik Endeksi,
Koronavirüs Çöküşü,
Olay Çalışması,
Kurumsal Sosyal Sorumluluk,

Jel Kodları:

G10 G14

ÖZET

Bu çalışma, kurumların gerçekleştirdiği sürdürülebilirlik yatırımlarının sadece yatırımcı güvenini ve firma görünürlüğünü artırmakla kalmayıp, aynı zamanda onlara zorlu zamanlarda güvenli bir sığınak sağlama konusunda da fayda sağladığını göstermeyi amaçlamaktadır. Bu amaç doğrultusunda, Borsa İstanbul Sürdürülebilirlik Endeksi'nde listelenen şirketlerin, dünya finans piyasalarını etkileyen "Koronavirüs çöküşü" sırasında elde ettikleri anormal getirileri diğer şirketlerle karşılaştırmaktadır. Bu amaçla, öncelikli olarak BIST SE kapsamındaki şirketlerin Covid-19 çöküşünden etkilenme derecelerinin diğerlerine göre daha düşük olup olmadığını belirlemek için bağımsız örneklemler t-testi kullanılmıştır. Çalışmada kullanılan temel yaklaşım, BIST100 endeksi kapsamında (Leybourne, Newbold ve Vougas) LNV testinin uygulandığı olay çalışması metodolojisine dayanmaktadır. Bulgular, diğer finansal piyasalar gibi Borsa İstanbul'un da Mart 2020'de değer kaybına uğradığını göstermektedir. Ayrıca, Sürdürülebilirlik Endeksi'nde yer almanın ortalama kaybı azalttığı gözlemlenmiştir. Bu durum, sürdürülebilir yatırımların mantıklı bir tercih olduğunu ve kriz dönemlerinde kaybı azaltmada özellikle yardımcı bir rol oynadığını belirtmektedir.

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1. INTRODUCTION

One of the greatest challenges the world has faced was the Covid-19 pandemic in the year 2020. Not only as a health problem, but also by means of its social and economic consequences, it was a severe crisis. Especially, interruptions in supply chains based on international restrictions within the framework of quarantine practices, led to a contraction in economic activities. In parallel with these, the Covid-19 pandemic was devastating to the stock market as well. During this period, investments in some sectors and stock prices decreased due to the uncertainty and pessimism in stock markets. As McKibbin & Fernando (2020) stated, shocks based on pandemics generally cause a sharp decline in consumption and investment. The decrease in total demand, economic slowdown and the increase in perceived risks result in a decline in expected returns in the stock markets.

According to the well-known Efficient Markets Hypothesis (EMH), financial asset prices are assumed to contain the sum of all available information that can be obtained. As soon as new information reaches the market, asset prices rapidly change to form a new equilibrium state in the efficient markets. In this context, during the first months of 2020, firstly stock prices decreased with a reaction sale arising from new information reaching the market with the pandemic, followed by a compensation and recovery movement for losses.

Nowadays, more organizations increase their investments towards sustainability and enlighten their stakeholders about their activities in environmental, social, economic and managerial issues by publishing their "corporate social responsibility" or "sustainability" reports. A comprehensive study conducted by Margollis et al. (2009) revealed that corporate social responsibility activities have a positive and significant effect on share values of the companies.

According to a research report by Unruh et al., (2016), conscious investors are aware that a successful sustainability performance can create a remarkable business value for a company, such as long-term value creation, increased revenue potential and operational efficiency. Ioannau & Serafeim (2020) stated that being listed in the sustainability index provides a competitive advantage and a better reputation for companies due to increased visibility and trust which are created by transparency in reporting. Moreover, engagement with the sustainability indices could lead to increased attractiveness for investors, meeting customer requirements in a better way, enhancing the image and sustainability performance of the company (Hsu & Chang, 2017). Additionally, efforts to take a part in such indices increase the awareness towards sustainable investing in society.

Based on all the discussions in the previous literature, in this study it is aimed to investigate whether the companies included in the Borsa Istanbul Sustainability Index (BIST SI) have better reliability in the investor's eyes and hence if they are less affected by the Covid-19 crash than others listed in the BIST 100 index. The expected effect is believed to stem from a cause-and-effect relationship. In the theoretical framework, it is posited that a company's inclusion in the sustainability index positively influences investors, suggesting that this company may be less impacted by the Covid-19 crash compared to others. The theoretical framework addresses sustainability's role in financial markets, its impact on investor behavior due to index inclusion, and the influence of Covid-19 on stock prices.

2. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

2.1. Sustainability and Financial Markets

Despite its importance in the macro scale, sustainability has emerged as a component of corporate ethics and a part of the corporate social responsibility act (Bormane et al., 2017) in the micro scale. It is observed that, especially in the last two decades, more companies started to transform their operations to be more environmentally friendly while trying to contribute to social welfare, despite the increased expenses related to such practices. Consequently, from a financial perspective it is important to show that corporate social responsibility expenses are not only "expenses" but should be considered "investments" in the long run (Unruh et al., 2016). Companies which show environmentally conscious operations, participate in social responsibility activities and act parallel with the sustainability goals defined by the United Nations, are accepted to be *sustainable companies* in stock markets. The interest on acting socially responsible is not only limited to companies, but also it is observed that investors started to value this phenomenon in stock markets as well (Cheung, 2011, Lourenco et al., 2012, Wasara & Ganda, 2019, Durand et al., 2019). Making responsible investments was observed after the second half of the twentieth century parallel with the increased consciousness on environment, income distribution and social welfare.

The term "sustainability index" can be defined as an instrument that measures the performance of companies in demonstrating responsible acts in environmental, social and economic areas in a transparent, systematic and objective manner (Searcy & Elkhawas, 2012, Windolph, 2011). From this perspective, the indices act as a reference and a benchmarking tool. Moreover, indices are also useful as research tools to identify environmentally and socially sustainable companies (Fernando, 2020). With the development of sustainability indices, not only awareness towards sustainable investing has increased, but also a benchmark and basis for socially responsible investing has been formed (Cunha & Souza, 2013). The Sustainability Index of Borsa Istanbul (BIST), was introduced in the year 2014 with the members selected from the BIST 30 Index according to sustainability assessments. Starting from 2019, the index has been calculated with the constituents selected from a list of companies which are included in BIST 100 and volunteer to be assessed for the BIST Sustainability Index. As reported on the official webpage of BIST (BIST Sustainability Index, 2021), "the *BIST Sustainability Index reflects companies' approach to important sustainability issues including global warming, draining of natural resources, health, security and employment, while allowing an independent assessment of their operations and decisions regarding these issues"*. The companies who pass the assessment are included in the index with providing an opportunity for them to compare their sustainability performance on both national and international scales as well as increasing their reputation and corporate image.

2.2. The Effect of Sustainability Index Inclusion on Investor Behaviours

Investors seek an answer to the question of whether sustainable investment is rewarded or punished with stock value within the framework of environmental, social and ethical evaluations. According to a study conducted by Marti et al (2007), it is seen that the financial performance of the companies reacts positively towards the corporate social responsibility (CSR) and sustainable development efforts of the companies. On the other hand, companies are more concerned with whether the efforts and costs spent for sustainability activities are reflected positively or negatively on share prices (Daszyńska-Żygadło et al., 2014). According to a study conducted by Kaspereit and Lopatta (2014), corporate sustainability activities have a positive impact on market value. Revealing a company's sustainability performance is something more than showing off in sustainability indices. Investors want to learn more about a company's success and survival ability deriving from its sustainability efforts, and how these efforts create value for the company. That value is extensive, covering many indicators such as less capital costs and more innovation. Most of the investment corporations are making decisions using new assessment techniques which combine sustainability reporting with corporate performance (Unruh et al., 2016).

According to the downward sloping demand curve hypothesis, as the demand increases, the price and volume increase as well. However, the price pressure hypothesis states that since they have time, information and source restrictions to evaluate all the stocks in the market, investors tend to buy stocks which draw their attention. Both hypotheses predict that index addition (deletion) of companies induces an increase (decrease) in stock returns with higher (lower) liquidity (Cheung & Roca, 2013).

The impact of sustainability activities on companies on financial performance has been discussed extensively in the literature. Investors, who are sensitive to environmental and social issues, are more likely to prefer companies that pay attention to corporate sustainability activities. This preference might lead those companies to create value and provide more returns to their stakeholders (Çıtak & Ersoy, 2016). There is some evidence that investors investing in firms that engage in more corporate social responsibility initiatives receive higher stock returns (Wei et al., 2020).

Consolandi et al. (2009) studied on European stock markets' reaction to the Dow Jones Sustainability STOXX Index (DJSSI) addition and deletion announcement, and found a significant positive reaction to additions, and a slightly bigger negative reaction to deletions. Cheung (2011) investigated the reaction of American stock markets to afore mentioned announcements and showed that announcement of addition affects more than deletion whereas they both affect returns significantly but temporarily.

Lo & Kwan (2017) investigated the response of the investors with the case study analysis in the Hong Kong Stock Exchange. In their study, 48 events of 17 companies that are the pioneers of corporate sustainability in Hong Kong are observed within the framework of environmental, social, corporate governance and sustainability initiatives. They found that the cumulative average abnormal return (CAAR) value was positive and statistically significant. Accordingly, they stated that investors had a positive response to companies' initiatives towards sustainability. In another study, Gök & Gökşen (2020) analysed 8 banks in the BIST sustainability index and found that their cumulative average abnormal returns were negative before the announcement of inclusion and turned positive afterwards. Brusnahan (2020) claimed that 44% of expert investors confirm that sustainable investments induce higher returns and more resilience to stock movements. For example, Yılmaz et al. (2020) stated that in case of a

severe crisis, the companies which are included in the BIST Sustainability Index are more resilient than the others by means of total risk reduction and stock drop protection. This finding requires special attention since 2020 is proved to be a critical year, both for humanity and economics with a severe global crisis caused by the Covid-19 Pandemic.

2.3. The Effect of Covid-19 on Stock Prices

It is a common acceptance that 2020 was a tough year for the whole world with the rapid spread of Covid-19, in the means of life, production and economy. Covid-19 pandemic has spread all over the world, existing approximately in 221 countries. The pandemic not only affects public health, but also the economy as well. World Health Organization (WHO) declared Covid-19 as a global pandemic on March, 11 2020 and recommended all the countries to take immediate and strict cautions. The first Covid-19 case in Turkey was also announced on the same day by the Ministry of Health.

According to traditional financial and economic theory, stock prices are affected by the factors relevant to the market and the companies (Moskowitz & Grinblatt, 1999). As expected, Covid-19 had an enormous negative influence on the global economy (Iyke, 2020, He et al., 2020). The financial markets have become quite unpredictable and unstable due to the uncertain atmosphere stemming from the pandemic itself and the economic losses relevant to it (Zhang et al., 2020). According to Ramelli & Wagner (2020), the global capital market started to reflect the economic struggle caused by the pandemic. A sudden and significant drop in stock values, which is defined as a stock market crash, pushes investors to sell their shares in a short period. Therefore, as the demand for stocks decreases, the stock prices decrease as well (Coy, 2020). This stock market crash, caused by the pandemic, was severely observed between 20.02.2020 - 07.04.2020 and is referred to as "the Coronavirus Crash" (Hogan, 2020).

Investment decisions are mainly based on the perception of the information about the events. The capital market's reaction to events is reflected as the changes in stock trade volume and stock prices (MacMuddah et al., 2020). The theory of behavioural finance holds that emergencies influence investors' behaviours which indirectly affect stock prices. Since Covid-19 pandemic has a negative impact on individual psychology, it is expected to affect investor sentiments; hence causing stock price drops as well (He et al., 2020). It is stated that investor optimism decreases earnings volatility and conversely investor pessimism increases it (Lee et al., 2002).

According to Albuquerque et al. (2020), one of the main causes of Coronavirus Crash is assumed to be the subsequent lockdowns. Another opinion about the reason of the crash is the deceleration of the global economic activities resulting from the restriction and the closure of the boundaries. Moreover, the panic moods of the companies, investors and consumers have changed their economic behaviours, leading to abnormality in the financial markets. As a result, financial markets reacted to the situation with sharp drops in stock indices (Özkan, 2020).

During the Coronavirus Crash, significant drops in share prices and share values of many corporations were observed in most of the widely watched stock market indices such as Dow Jones, Standard & Poor and Nikkei (MacMuddah, et al., 2020). According to Zhang et al. (2020), global financial market risks increased significantly with the Covid-19 outbreak. They claimed that the reaction of each national stock market is consistent with the level of the pandemic in that country. Especially in March 2020, the U.S. stock market experienced a sharp reversal from an upward to a downward trend. The Wilshire 5000 Total Market index dropped around 34.9 %, which is considered the worst loss in one month since the 2008 Great Recession (Shu & Zhu, 2020).

Many studies have articulated the effect of the Coronavirus Crash on global and national stock markets. He et al. (2020) found that the pandemic affected stock prices negatively on the Shanghai Stock Exchange. In another study, Alber (2020) stated that stock revenues in China, France, Germany, Italy, Spain and the USA are sensitive to cumulative Covid-19 cases. Baker et al. (2020) found that the pandemic induced a significant rise in US stock return volatilities. Sansa (2020) indicated a connection between Covid-19 cases and financial markets as the Shanghai Stock Exchange and New York Dow Jones, in March 2020. Nicola et al. (2020) showed that the fall in global stock markets increased the volatility and led the liquidity to critical levels, in the pandemic period.

In his study about the effect of governmental precautions for Covid-19 on stock returns, Ashraf (2020) found that social distancing applications had a direct negative or indirect positive impact on stock returns. While the expectation of negative influence on economic activities affected stock returns in a direct and negative way, the expectation of decreasing the spread of Covid-19 affected stock returns in an indirect and positive way. He also declared that governmental awareness programmes, test and quarantine applications, and support incentives had a positive impact on stock returns. Mazur et al. (2020) claimed that the sharp drop of stock prices in March 2020

is an indicator of one of the biggest stock market crashes in history. They stated that in the Coronavirus crash, the stock returns of health, food, gas and software sectors achieved high returns, whereas the companies in other sectors such as virgin oil, real estate, entertainment and accommodation experienced a sharp drop of more than 70% in the stock returns.

Along with the other stock markets, the Turkish stock market has also been affected by the crisis. Bayraktar (2020) examined the impact of the pandemic on stock returns of the BIST 100 index in Turkey and observed that BIST also experienced the same fall with global stock markets in a similar way. Göker et al. (2020) analysed the effects of Covid-19 on Turkish industrial index returns and claimed that the sports, tourism and transportation industries were more sensitive than the others. Examining the effect of Covid-19 on BIST (Stock Market of Istanbul), Kılıç (2020) determined negative abnormal changes in the stock returns. Soylu (2020) investigated the changes in macroeconomic indicators and showed that industrial trust indices, foreign trade statistics, labour market, industry production index and tourism returns are directly affected by the pandemic, in Turkey. Özkan (2020) reported that volatility jumps occurred in all sector indices in March 2020, due to the effect of Covid-19, in Turkey.

Based on the above discussions, it is obvious that financial markets are highly susceptible to factors in the external environment and Covid-19 pandemic has a negative impact on financial markets all over the World (Baker et al., 2020, Almarayeh, 2020), however more studies related to empirical evidence on the effect of COVID-19 on the stock market performance of emerging economies are required (Salisu et al, 2020). Moreover, it is commonly observed that investors increasingly value the sustainability activities of companies and they react strongly to their association with the sustainability indices (Hawn et al., 2018).

In order to confirm these findings in the literature, the following hypotheses are proposed:

Hypothesis 1 (H_1): *Covid-19 pandemic announcement has a negative and significant effect on the BIST 100 index values.*

Hypothesis 2 (H_2): *There is a significant difference between the abnormal stock returns of companies listed in the BIST Sustainability Index compared to the ones which are not, after the Covid-19 pandemic announcement.*

3. MATERIALS AND METHODS

The purpose of this study is to investigate whether there is a difference in the stock returns of the companies included in the BIST Sustainability Index compared to the companies that are not included, during the Covid-19 crash. In accordance with this purpose, the sample is chosen as BIST 100 index, since it is assumed to be the basic indicator of the stock market in Turkey. The test group of the study is composed of companies that are included in both BIST 100 index and the BIST Sustainability Index. The other companies that are in the BIST 100 index, but not in the BIST Sustainability Index, are used as the control group of the study. As seen in Table 1, there are 54 companies in the test group and 46 companies in the control group.

Table 1. Test and Control Groups of the Study

BIST 100 INDEX				
		BIST SUSTAINABILITY INDEX		
AKCNS	ISMEN	AEFES	KORDS	AFYON
AKSGY	KARSN	AGHOL	KRDMD	AKENR
ALARK	KARTN	AKBNK	LOGO	ANELİ
ALCTL	KONYA	AKGRT	MGROS	ANHYT
ALGYO	KOZAA	AKSA	NETAS	GLYHO
ALKIM	KOZAL	AKSEN	OTKAR	POLHO
BAGFS	MAVI	ALBRK	PETKM	VESBE
BERA	MPARK	ARCLK	PGSUS	
BIMAS	NTHOL	ASELS	SAHOL	
BRSAN	ODAS	AYGAZ	SISE	
BUCIM	OYAKC	BIZIM	SKBNK	
CEMTS	OZKGY	BRISA	SOKM	
DEVA	PNSUT	CCOLA	TATGD	

ECILC	SASA	CIMSA	TAVHL
EGEEN	SELEC	DOAS	TCELL
EGGUB	TRGYO	DOHOL	THYAO
EKGYO	TURSG	ENJSA	TKFEN
GOODY	VERUS	ENKAI	TOASO
GOZDE	YATAS	EREGL	TSKB
GSDHO		FROTO	TTKOM
GUBRF		GARAN	TTRAK
HEKTS		HALKB	TUPRS
IHLGM		HLGYO	ULKER
INDES		ISCTR	VAKBN
IPEKE		ISDMR	VESTL
ISFIN		KCHOL	YKBNK
ISGYO		KERVT	ZOREN
CONTROL GROUP		**TEST GROUP**	

This study employs the "Event Study" method, which is a frequently used method to test the effects of economic, political, or social events on stock returns. The method requires the completion of 7 steps- starting with the definition of the event, continues with a determination of the selection criteria, calculating normal and abnormal returns, followed by prediction procedure selection and testing. The process is finalized by analyzing the results and interpretation of results (Basdas & Oran, 2014).

Event window durations generally range from 21 to 212 days (Peterson, 1989). In this study, the event date was accepted as March 11, 2020, which was the declaration date of WHO on Covid-19 outbreak as a worldwide pandemic, and also the announcement date of the first Covid-19 case in Turkey. The estimation window was determined as (-100, -10) (t_0, t_1) trading days, and the event window was chosen as (-10, +10) trading days (t_1, t_2), as shown in Figure 1.

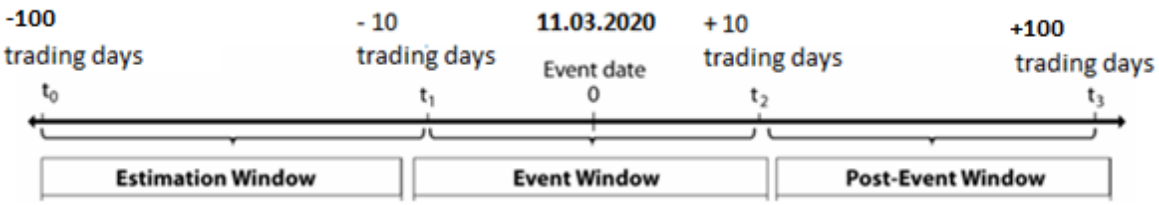

Figure 1. Event Study Timeline

The data of the study consisted of daily closing stock prices of the 54 companies (test group) included in both BIST 100 and BIST Sustainability indices and the remaining 46 companies of the BIST 100 companies (control group) from October 18, 2019, to March 25, 2020. The BIST 100 index was chosen as the benchmark index. The data used for the analysis were collected from Thomson Reuters Datastream.

As the next step in the event method, the expected and abnormal returns during the event period were calculated with the help of the following formulas.

Daily returns of stocks were calculated as follows;

$$R_{i,t} = \ln (P_{i,t} / P_{i,t-1}) \quad (1)$$

Where,

$R_{i,t}$: Daily return of i stock on day t

$P_{i,t}$: Closing price of the share i on t day

$P_{i,t-1}$: Closing price of the share i on t-1 day

BIST 100 index for Turkey was taken as the benchmark to calculate market returns and the market index return were calculated as follows:

$$R_{m,t} = \ln (E_{m,t}/ Em_{,t-1}) \quad (2)$$

Where,

$R_{m,t}$ = Returns of (BIST 100) index on t day

$E_{m,t}$ = Closing value of the index on day t

$E_{m,\, t-1}$ = Closing value of the index on day t-1

There are numerous alternative models such as the mean adjusted returns model, market-adjusted return model, market model, Scholes-Williams Beta Model, Dimson Beta model, etc., in the implementation of the event study (Dyckman et al., 1984). Each of these models has their own advantages, shortcomings and limitations. However, the most common method used in event study is observed to be the market model due to its high performance in determining and calculating the abnormal returns (Delattre, 2007, Cheung, 2011). In the market model, the expected firm return is a linear function of the market return where α and β are calculated over the estimation period using OLS (ordinary least squares regression). Consequently, the expected returns of the stocks were calculated with the help of the below formula:

$$E(R_{i,t}) = \alpha + \beta (R_{m,t}) \quad (3)$$

Where, α is the intercept and β is the slope of the regression line; and $R_{m,\, t}$ stands for the returns of the market portfolio in period t.

Accordingly, abnormal return was calculated as follows:

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (4)$$

Finally, cumulative abnormal returns (CAR) for the event window (-10, +10 trading days) were calculated as follows:

$$CAR_{i,\,(t1\text{-}t2)} = \sum_{t1}^{t2} ARi \quad (5)$$

To test H_1, the BIST 100 index closing values during the estimation period and event window (ie., -100, +10 trading days) by NonStat (Leybourne, Newbold ve Vougas) LNV test (Omay & Emirmahmutoglu, 2017) was analysed in order to observe the structural break in the graph and examine the direction and the significance of the event's effect on stock returns. This test is significantly beneficial for observing both smooth and sharp shifts in the trend or average of the series and it is especially useful in the case of small samples (Sollis, 2004). The original LNV test (Omay & Emirmahmutoglu, 2017) is used for a smooth transition as an autoregressive process in detecting the structural breaks. However, their optimization algorithms are criticised as being not optimal to find the best fitting trend under the structural break data; hence, Omay & Emirmahmutoglu (2017) further investigated the optimization algorithms and found out that simplex and genetic algorithms are best for detecting optimal fitting trend. Therefore, in this study, the methodology by using the NonStat program, developed by the aforementioned researchers was applied.

The graph (Figure 2) shows the logistic smooth transition trend model and original series. In the graph two different trends, occurring before and after the event, can be observed. The LNV test results are presented in Table 2.

Table 2. Results of LNV Test

lag1	Gamma	Threshold	Beta0	Beta1	t-stat0	t-stat1
- 2.018211	0.6	0.92	1117.972	-265.2838	158.1299	-9.89249
p0 = 0.00			p1= 0.00			

Beta0 shows the average of the first trend series which covers the period before the event, whereas Beta1 shows the difference between the first trend series and the second trend (after the event) series. As can be seen from the Figure 2, there is a sharp break between the slopes of the two series just around the event window period. According to the LNV test results, the t-statistics between the two series is found to be significantly different from

each other (t=-9.89, p= .00). Therefore, H_1 is accepted according to these results; indicating that, Covid-19 pandemic announcement had a negative and significant effect on BIST 100 index values.

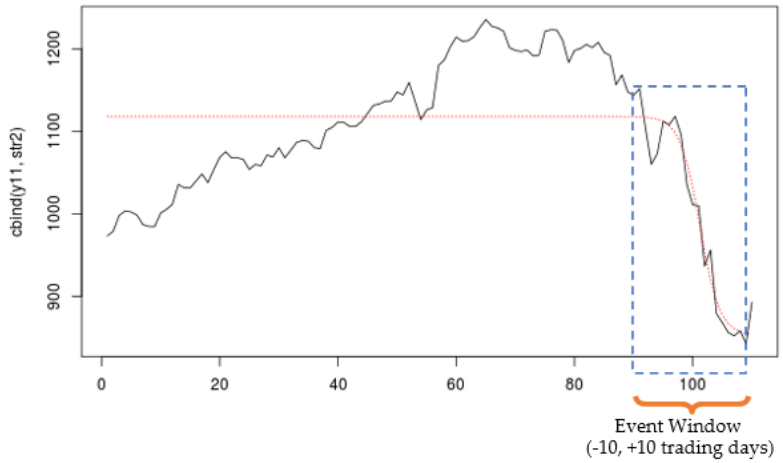

Figure 2. Logistic Smooth Transition Trend Model_A and Original Series (LNV test)

To test if being listed or not in the BIST Sustainability Index creates a significant difference between the abnormal stock returns of companies after the Covid-19 pandemic announcement (H_2), first the data set for each group as a box plot graph was plotted (Figure 3). This graph shows the cumulative abnormal returns of the two groups. The average of the cumulative abnormal returns (CAAR) values of the control group and the test group are found to be -0,065 and -0,190 respectively. Since the CAAR value of the test group is closer to zero, it could be interpreted as that the test group experienced fewer negative returns than the control group. However, in order to ensure the statistical significance of the difference, independent samples t-test on Microsoft Excel was applied.

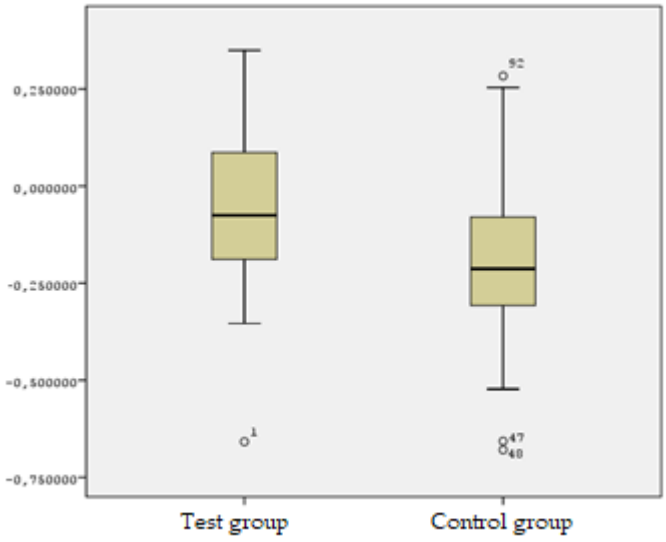

Figure 3. Box Plot Graph for the Cumulative Abnormal Returns for Test and Control Groups

In order to fulfil the equality of the populations of two groups assumption, which is required for applying the t-test; 8 of the companies' stock return data, which showed the least change in the CAR value, were eliminated. As a result, both the test and the control groups included data of 46 companies. The groups are assumed to be normally distributed, considering that the sample size of 46 per group is large enough to exhibit normal distribution and to yield accurate p values (Green et al., 2000).

As can be seen in the output of the Table 3, there is a significant difference between the abnormal returns of the test group and the control group at 95% confidence level (t (46) = 2.89, p= .00), which leads to confirming the second hypothesis (H_2).

Table 3. Independent Samples t-test

	Variable 1	**Variable 2**
Mean	-0,065284505	-0,190871546
Variance	0,037321923	0,049710938
Observations	46	46
Hypothesised Mean Difference	0	
Degree of freedom	88	
t Stat	2,88723486	
P(T<=t) two tail	0,004889681	
t Critical two tail	1,987289865	

4. DISCUSSION AND CONCLUSION

The year 2020 witnessed one of the rarest global events in the World's history. Covid-19 pandemic not only caused health problems, but also had a huge effect on social, economic and financial issues. In this paper, the effect of Covid-19 crash on the BIST 100 index was analysed, while searching for its possible variation on the companies which were and were not included in the sustainability index. Event study methodology was employed, and the event date was accepted as March 11, 2020, which is the declaration date of WHO on Covid-19 outbreak as a worldwide pandemic, and also the announcement date of the first Covid-19 case in Turkey by the Ministry of Health.

In parallel with the previous research applying the same methodology, the estimation window was determined as (-100, -10) trading days, and the event window was chosen as (-10, +10) trading days. The sample of the study consisted of the companies which are listed in BIST 100, whereas 46 of them, also listed in the sustainability index, entailed the test group of the study. After executing the required steps of the event methodology, NonStat LNV test was used for observing the structural break in the CAR of the market index and examine the event's effect on stock returns. Furthermore, to test possible variation between the abnormal stock returns of companies in the sustainability index with respect to the others, an independent samples t-test was applied for the data in the event window.

The results revealed that, as expected, Covid-19 pandemic announcement had a negative and significant effect on the returns of the BIST 100 index. This result shows that the BIST 100 index has also been affected by the Covid-19 crash, similar to the other stock exchange markets around the globe, as mentioned in the relevant literature (Engelhardt et al., 2020; Lee et al., 2002). Additionally, this result exposes that both groups experienced a negative cumulative average abnormal return throughout the event period.

The main finding of the study is that there is a significant difference between the abnormal returns of the test group and the control group, which means that the negative effect of Covid-19 crash was less for the companies which are listed in the sustainability index, compared to the others. This finding is consistent with the previous literature about the role of corporate sustainability practices on investor behaviours in times of crisis. According to Morrone (2021), during the crisis, investors seek for more secure, liquid and guaranteed investments, while tending to positively evaluate companies that adopt and apply sustainable activities. Similarly, Xu et al. (2015) also declared that in case of a crisis, as the level of social responsibility increases, the cost of equity decreases in a remarkable way.

In addition to the widely studied and agreed positive internal impact of sustainability investments on the internal environment (including employee satisfaction, profit/loss, organizational culture, management style, etc.) of companies, the perceptions of the external stakeholders (i.e, investors, public pressure groups, suppliers, competitors, etc) are reflected indirectly on the financial performance of the companies. It is also known that

enterprises that invest for sustainability are considered more stable, reliable and robust from the investor's perspective.

Although the perceived risk of financial markets is high and the decrease in investments is sharp in the Covid-19 crash, investors tend to seek for a safe-haven to invest; hence they take shelter in the promising sustainability practices. In this context, the sustainability and corporate social responsibility activities of the companies are not only beneficial for their own survival and prosperity, but also in enhancing the corporate image and reliability in the investors' perspective as well. Although some research has shown that corporate social responsibility activities positively affect businesses in the long term due to increased visibility, transparency and the decreased cost of capital, there is no particular study on whether being included in the sustainability index acts as a buffer against the devastating impact of the pandemic. Accordingly, the most important contribution of the study is that having been listed in the sustainability index has a positive effect on reducing the losses that companies can suffer during a crisis period (Ioannou and Serafeim, 2020). Therefore, it could be recommended for top managers not to underestimate the power and the effectiveness of corporate social responsibility activities and exhibit more effort in being a member of the sustainability indices.

5. LIMITATIONS AND RECOMMENDATIONS FOR FURTHER STUDIES

As in every study, this paper contains certain limitations. The first limitation arises from the event study methodology. To start with, the assumptions used in event study methodology may not be valid in some circumstances. For example, the assumption of the efficiency of markets might not be fulfilled in reality. Moreover, some coexisting externalities can cause a collateral effect on the market, which could lead to misinterpretation of the results.

The second limitation can stem from the sample choice. In this study, BIST 100 and BIST sustainability indices were analysed. Moreover, in this study each of the test and control groups contained 46 companies, causing the external reliability to be limited. Therefore, for future studies it could be recommended to use data from different stock markets with proper categorizing and to include a higher number of cases in groups to be compared.

Thirdly, even though the majority of the companies experienced a decrease in the stock returns during the pandemic, the effect was not isolated and therefore was not specifically distinguished. The fact that variations could occur between different industries was ignored. Hence, a comparative study compromising industry-based clusters could improve the contributions to the literature, as a further study.

AUTHORS' DECLARATION

This paper complies with Research and Publication Ethics, has no conflict of interest to declare, and has received no financial support.

AUTHORS' CONTRIBUTIONS

Conceptualization, writing-original draft, editing – **BT**, data collection, methodology, formal analysis – **BT**, **PÖ**, Final Approval and Accountability – **BT**.

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The Relationship Between Financial Innovation and Environmental Pollution in OECD Countries

OECD Ülkelerinde Finansal Yenilik ve Çevre Kirliliği Arasindaki İlişki

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O31, O33, Q54

ABSTRACT

Climate changes as a result of environmental degradation have negative effects in many areas. Many studies in the economics literature have examined the effects of these negativities from different perspectives. In this study, the relationship between financial innovation and CO_2 emission, which is newly used in the literature, is examined for 14 OECD member countries. LLC and IPS unit root tests, Pedroni and Kao cointegration tests and FMOLS estimator were used in the analyses for the period between 2009 and 2019. According to the findings obtained from the analyses, it is seen that financial innovation, economic growth and urbanization have negative effects on CO_2 emissions. In addition, in the results of Dumitrescu-Hurlin causality test applied in the study, it was determined that there is a bidirectional causality relationship between economic growth, urbanization and CO2 emissions, and a unidirectional causality relationship between financial innovation and CO_2 emissions. In this direction, it is considered important that companies and governments should act together. It is considered that the creation of green loans by financial intermediaries for environmentally sensitive projects can encourage investors. In order to prevent environmental degradation from a holistic perspective, the government should take measures such as subsidies and tax reductions to encourage environmentally friendly projects.

Anahtar Kelimeler:

Finansal İnovasyon,
CO_2 Emisyonu,
Kentleşme,
Ekonomik Büyüme,
Panel Veri Analizi

Jel Kodları:

O31, O33, Q54

ÖZET

Çevresel bozulmalar sonucunda meydana gelen iklim değişiklikleri birçok alanda olumsuz etkiler oluşturmaktadır. Ekonomi literatüründe birçok çalışma farklı açılardan bu olumsuzlukların etkileri incelenmiştir. Bu çalışmada literatürde yeni kullanılan finansal inovasyon ile CO_2 emisyonu arasında ilişki OECD üyesi 14 ülke için incelenmiştir. 2009 – 2019 yılları arasındaki dönem için yapılan analizlerde LLC ve IPS birim kök testleri, Pedroni ve Kao eşbütünleşme testleri ve FMOLS tahmincisi kullanılmıştır. Analizlerden elde edilen bulgulara göre finansal inovasyon, ekonomik büyüme ve kentleşmenin CO_2emisyonu üzerinde negatif etkili olduğu görülmektedir. Ayrıca çalışmada uygulanan Dumitrescu-Hurlin nedensellik testi sonuçlarında ekonomik büyüme, kentleşme ve CO_2 emisyonu arasında çift yönlü, finansal inovasyon ile CO_2 emisyonu arasında tek yönlü nedensellik ilişkisi olduğu tespit edilmiştir. Bu doğrultuda firmaların ve hükümetlerin birlikte hareket etmesi gerektiği önemli görülmektedir. Finansal aracıların çevreye duyarlı projelere yönelik yeşil kredileri oluşturmaları yatırımcıları teşvik edebileceği değerlendirilmektedir. Çevresel bozulmanın bütüncül bir bakış açısıyla önlenebilmesi için ise devlet çevre dostu projeleri teşvik etmek üzere sübvansiyon ve vergi indirimleri gibi önlemleri almalıdır.

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1. INTRODUCTION

Increases in heat waves, droughts and floods caused by climate change are affecting many regions and billions of people around the world. Despite a temporary decline in carbon dioxide emissions (CO_2) in 2020, energy-related CO_2 increased by approximately 6% in 2021 as the demand for coal, oil and natural gas increased with the resumption of economic activity. Based on available data, global emissions are projected to increase by around 14% over the next decade. For this reason, it is accepted that the joint efforts of governments, the private sector and non-governmental organizations (NGOs) have a key role in preventing global environmental disasters (United Nations Secretary-General, 2022:19).

Under pressure from environmental degradation (ED) and social tensions, the Sustainable Development Goals (SDGs) for 2030 were endorsed in the last quarter of 2015, requiring nations to make efforts to combat climate change and its impacts. In December 2015, the Paris Climate Conference (COP21) was held to tackle global climate change and the Paris Agreement was adopted. Specifically, COP21 placed finance at the center of the solution to ED. Accordingly, it is aimed to develop green finance to provide financial support for low-carbon infrastructure investments, technological investments and other solutions to prevent ED (United Nations, 2015: 1; Lv & Li, 2021: 1). At this point, the relationship between finance and the environment needs to be put forward correctly. A well-functioning financial system affects environmental quality in three ways. First, stock market development enables listed companies to reduce financing costs, diversify risk and optimize their asset/liability structure. Secondly, financial development (FD) helps attract foreign direct investments (FDIs) and realize economic growth (GDPPC). However, this leads to an increase in CO_2 along with GDPPC. Thirdly, FD may provide the opportunity to adopt energy-saving production methods and environmentally-friendly consumption products (Ye et al., 2021: 1234).

As stated in the majority of theoretical and empirical studies today, it is not possible to explain the financial system and its development in terms of a few types of securities and a few basic financial institutions. Because today there is a wide variety of different financial products, many different types of financial institutions and the processes that these institutions use to do business (Tufano, 2003: 313). Accordingly, through the differentiation of financial opportunities, financial innovation (FINI) has emerged as a tool to explore financial progress (Nazir et al., 2020). FINI, which has shown a significant rise since the 1980s, is defined as a driving force that pushes an economic system towards higher economic competence in order to align it with the economic benefits arising from the evolving economic environment (Khan et al., 2021: 2).

To suffice innovation initiatives within a country, these products need to meet financial needs. Following the invention and diffusion components of innovation, FINI is realized through product and process innovations that are subject to the demand of nations' economic systems. While innovation efforts are directed at combating climate change, the financialization of these efforts is also expected to require certain levels of innovation. This neo-financialization channel is important because of the risk associated with projects. From this perspective, it is recognized that FINI can have a significant impact on ED, albeit through an indirect channel (Chisti & Sinha, 2022: 3).

This study will investigate the impact of FINI, GDPPC, and urbanization (URBN) on CO_2 in OECD member countries between 2009 and 2019. The study will contribute to the literature by selecting countries that rank high in the environmental performance index, energy-intensive production in these countries and using industry-based research and development (R&D) expenditure statistics in the commercial enterprise sector according to the International Standard Industrial Classification (ISIC) revision 4 instead of "loans to the private sector", which is frequently used in the literature to represent FD. The reason for choosing the 2009-2019 period in the study is the availability of financial innovation data generated by the OECD with a different calculation method between these years. In addition, the reason for using OECD countries in this study is that the countries with financial innovation data are limited to OECD member countries. This motivated study consists of four sections. In the first section, the scope of the study is explained by giving brief and descriptive information about the subject. The second section reviews the current literature on the subject of the study. The third section, model, data and methodology, presents information about the model, study constraints and analysis methods used in the study. The fourth section presents the evaluation and interpretation of the empirical results obtained from the analysis. Finally, in the conclusion and discussion section, the compatibility of the results with the literature will be evaluated and appropriate policy recommendations will be made.

2. LITERATURE REVIEW

In recent years, there have been many studies on environmental pollution (EP) in the economics literature. In these studies, the relationship between GDPPC and the environment is particularly emphasized and the Environmental Kuznets Curve hypothesis is tested. However, recent studies analyze the impact of different variables such as globalization, financial development, technology, renewable energy consumption (REC) on EP as potential determinants of ED. Since the relationship between FINI and EP will be evaluated in our study, studies with other variables will not be included in this section. Accordingly, in this section of the study, the studies analyzing the relationship between FD and EP in relation to our research topic will be discussed chronologically. Firstly, studies conducted on countries other than OECD countries and secondly, studies conducted for OECD countries will be analyzed.

Among the studies conducted for non-OECD countries, Omri et al. (2015) examined the relationship between FD, trade, GDPPC and CO_2 for a panel of 12 MENA countries. For the 1990-2011 period, the study found that the neutrality hypothesis was valid between FD and CO_2. Abbasi & Riaz (2016) for Pakistan investigated the impact of economic and FD on CO_2 for the period 1988-2011 using the ARDL bounds test method. The results of the study revealed that FD increased CO_2. However, it was stated in the study that FD did not reach the desired level and it would have been useful to develop new policies to reach this level. In the study of Salahuddin et al. (2018), the 1980-2013 period for Kuwait was analyzed and the relationship between GDPPC, electricity consumption, FDI, FD and CO_2 was investigated. In the study, the relationship between the variables was tested by applying the ARDL bounds test approach and it was found that a cointegration relationship existed between the series. The findings indicated that GDPPC, electricity consumption and FDIs had a decreasing effect on CO_2. However, no statistically significant relationship between FD and CO_2 was found in the analysis. Park et al. (2018) investigated the relationship between internet use, electricity consumption, GDPPC, trade openness (TO) and FD, and CO_2 over the period 2001-2014 for EU countries. Using the pooled mean group estimation method for panel data, the study concluded that internet use and electricity consumption had a positive effect on ED, while GDPPC, TO, and FD had a negative effect. Acheampong (2019) investigated the direct and indirect effects of FD on CO_2 for 46 Sub-Saharan African countries for the period between 2000 and 2015. Among the indicators used to represent FD, broad money, domestic loans to the private sector and domestic loans to the private sector by banks were found to increase CO_2. On the other hand, it was revealed that FDI liquid liabilities and domestic credit extended by the financial sector to the private sector did not affect CO_2. Mohammed Saud et al. (2019) analyzed the impact of energy consumption (EC), public expenditures and FD on CO_2 for Venezuela for the period 1971-2013 with the ARDL bounds test approach. The results of the analysis indicated that EC and public expenditures had a positive effect on environmental pollution. On the other hand, it was concluded that FD prevented ED in Venezuela. Zhoa & Yang (2020) investigated the relationship between the FD index of cities created since 2001 and CO_2 on a city basis. Panel analysis results revealed that an increase in the level of regional FD significantly reduces CO_2. The study also found that there was a bilateral causality between regional FD and CO_2 in the long run. Ozturk et al. (2020) analyzed the relationship between CO_2 emissions and economic growth, financial development and income inequality for Turkey for the period 1987-2019 using the NARDL method. The findings of the study show that financial development has a positive effect on CO_2 emissions.

Khezri et al. (2021) comprehensively examined the direct and spillover effects of FD on regional CO_2 with spatial econometric models in 31 Asia-Pacific countries in the period between 2000-2018. The study found that GDPPC, TO, energy intensity and URBN had a reducing effect on CO_2. On the other hand, it was concluded that the six FD criteria used in the study positively affected CO_2. In the results of the analysis of spatial effects, it was seen that neighboring countries had a significant effect on the CO_2 of the other country. Ye et al. (2021) examined the relationship between FD and CO_2 for Malaysia over the period 1987-2020. The results of the ARDL bounds test approach revealed that population growth, GDPPC, EC and FD had a positive effect on CO_2. In their comprehensive study, Khan & Ozturk (2021) investigated the relationship between FD and CO_2 in 88 developing countries over the period between 2000 and 2014. Using five different FD indicators, the study found that FD had a negative impact on environmental pollution in selected countries. The study also revealed that FD reduced the negative effects of income, TO, and FDI on CO_2. In a study of 97 countries, Lv & Li (2021) investigated whether there was a spatial correlation between FD and CO_2 in the 2000-2014 period. The findings indicated that FD had a significant impact on reducing CO_2 and that the environmental performance of a country neighboring nearby countries with high FD would have been positively affected. Okumuş & Erdoğan (2021) tested the environmental kuznet curve hypothesis for 6 countries in the top twenty in terms of tourism GDP in the period 1995 - 2014. As a result of the analysis, it was concluded that economic growth, energy consumption and trade reduce

environmental pollution in the long term. Erdogan et al. (2022) examined the effect of cryptocurrencies on environmental pollution through Ripple, Bitcoin and Ethereum. In their study, Bitcoin and Ethereum, excluding Ripple, had causal effects on environmental degradation. Pata et al. (2023) analyzed the effect of urbanization on achieving sustainability targets in the period between 1970 and 2018 in their study on the German sample. The results obtained indicate that it reduces environmental pollution in the short and long term. Erdoğan et al. (2023) examined the impact of economic growth, renewable energy investments and technology on the environment in the G7 countries between 2004 and 2018 with second generation analysis methods. The study reveals that economic growth is an important factor in reducing environmental pollution.

Among the recent studies for OECD countries, Lee & Chen (2015) analyzed the relationship between CO_2 and EC, GDPPC and FD for 25 OECD countries for the period 1971-2007 using FMOLS (Fully Modified Ordinary Least Square) method. The findings indicated that the ECA was not valid and FD had a negative effect on CO_2 in eight countries, namely Austria, Denmark, Germany, Ireland, Ireland, the Netherlands, Norway, Portugal and the USA. Halkos & Polemis (2017) analyzed the relationship between FD and ED for the period 1970-2014. It is understood that the effect of FD on CO_2 was positive and statistically significant. Ganda (2019) analyzed the impact of FD on ED for the period 2001-2012 using static models and system GMM analysis. In the study, FDI, banks' domestic loans to the private sector and domestic loans to the private sector were considered as three indicators of FD. The findings indicated that banks' loans to the private sector had a negative impact on CO_2. On the other hand, the effect of domestic loans to the private sector, GDPPC and FDI on CO_2 was positive. In another study, Ganda (2020) analyzed the impact of FDI, GDPPC and FD on the environment in 26 OECD countries in the period 2000-2014. The findings of the study showed that FDI and FD have a negative effect on CO_2, while GDPPC had a positive effect. In another study by Zafar et al. (2019), the impact of EC, globalization and FD on the environment in 27 OECD countries in the period between 1990-2014 was analyzed. It was found that the EKC hypothesis was valid and globalization and FD had a negative impact on CO_2. In addition, the causality test applied in the study showed that there was a unilateral causality from CO_2 emission to FD. Shobande et al. (2022) conducted a study for 24 OECD countries and investigated the impact of FD and EC on environmental sustainability for the period 1980-2019 using the Standard Fixed Effects and Arellano-Bover/Bundell Bond dynamic panel approach. The empirical results revealed that FD and FDI had a negative impact on CO_2 within the scope of the basic model. Szymczyk et al. (2021) analyzed the relationship between GDPPC, EC, URBN, TO, and FD and CO_2 for OECD countries ranked high in the environmental performance index over the period 1990-2014. The findings indicated that there was a positive and statistically significant relationship between GDPPC, EC, URBN, and CO_2. The study also concluded that there was no statistically significant relationship between TO, and CO_2, while FD had a negative impact on CO_2. Dagar et al. (2022) investigated the impact of FD, natural resources, industrial production, REC and total reserves on ED for 38 OECD member countries. The results of the study for the period 1995-2019 indicated that REC and natural resources had a negative impact on ED, while FD, industrial production and total reserves had a positive impact on ED. Jianguo vd. (2022) investigated the impact of institutional quality, technological innovation, and FD on the environment for 37 OECD countries for the period between 1998 and 2018. Empirical results indicated that FD had a positive impact on CO_2. In addition, the study concluded that institutional quality and technological innovation reduced ED. In the study examining the impact of green finance and green innovation on the environment, Umar & Safi (2023) stated that the impact of green finance and innovation on CO_2 for the period 1990-2020 was negative and statistically significant. Erdogan et al. (2023), in their study for 25 OECD countries, examined the effects of economic growth and renewable and non-renewable energy consumption on environmental pollution with both first-generation and second-generation analysis methods. The findings obtained in the study show that in the long term, economic growth has an increasing effect on environmental pollution and renewable energy consumption has a reducing effect on environmental pollution.

Finally, Yuan et al. (2021), one of the few studies examining the relationship between FINI and CO_2, examined the relationship between FINI and green innovation in 23 OECD countries for the period 1994-2009. The results indicated that FINI supported green innovation in more technology-intensive sectors. The study also stated that the effect of FINI on green innovation had an incentive effect in countries with stricter environmental regulations and lower banking competition. Chisti & Sinha (2022) analyzed the impact of technology and FINI on CO_2 for BRICS countries using the second-generation Augmented Mean Group (AMG) and Common Correlated Effect Mean Group (CCEMG) approach. The results indicated that firstly, positive shocks from FINI had a negative impact on CO_2, while negative shocks had a positive impact. Secondly, positive shocks in technological innovation were found to be significantly effective in reducing CO_2, while negative shocks had no effect.

3. METHODOLOGY

The study aims to examine the impact of FINI, GDPPC and URBN on CO_2 for OECD countries for the period 2009-2019. In the study, common data for 14 OECD member countries (Belgium, Canada, Czechia, Finland, Finland, Germany, Italy, Lithuania, Norway, Portugal, S. Korea, Spain, Turkey, the UK, the USA) are obtained and the analysis covers these countries. In the study, the model created within the framework of Chisthi & Sinha (2022) is as follows;

$$lnCO_{2_{it}} = \alpha_0 + a_1 lnFINI_{it} + a_2 lnGDPPC_{it} + \alpha_3 lnURBN_{it} + u_{it} \quad (1)$$

Detailed information on the variables used in the analysis can be found in Table 1.

Table 1. Information on the Dataset

Variable Name	Description	Source
lnCO_2	CO_2 emissions (kg per 2015 US$ of GDP)	WDI
lnFINI	Total BERD / Financial and Insurance Activities 2015 US$	OECD
lnGDPPC	GDP per capita (constant 2015 US$)	WDI
lnURBN	Urban population	WDI

Methodologically, the stationarity of the series used in the study will first be investigated with Levin, Lin & Chu, (2002) (LLC), Im, Pesaran & Shin (IPS) unit root tests. Cointegration analysis between the series will be examined with the Pedroni and Kao cointegration test. FMOLS coefficient estimator will be used to determine the direction and coefficient of the cointegration relationship of the variables. The causality between the variables will be investigated with the Dumitrescu-Hurlin (D-H) causality test.

The Levin, Lin & Chu (2002) unit root test, which is used to determine the stationarity of the series in the study, claims that individual unit root tests have boundary power against the alternative hypothesis and that there are also quite persistent deviations from equilibrium. It is recognized that this will be even more severe in small samples. LLC proposes a more robust unit root test for each cross-section against individual unit root tests. In this test, the null hypothesis states that each individual time series has a unit root, while the alternative hypothesis states that each time series is stationary (Baltagi, 2005: 40). According to the Im, Peseran & Shin test, which proposes an alternative panel unit root test to the LLC, which proposes to apply the unit root test only to homogeneous cross-sections, the ADF is calculated for each individual in the panel and the average ADF test statistic is calculated. With T time-series and N cross-sections, the stochastic process yi,t is defined as follows in the first order autoregressive process (Göral, 2015:110).

In this study, the long-run cointegration of variables will be analyzed with the Pedroni cointegration test. In panel data analyses, it is widely used to test the existence of long-run cointegration between variables. The Pedroni cointegration tests (1999 & 2004) test the null hypothesis of zero cointegration for the case with multiple regressors and provide appropriate critical values for these cases. The tests allow for considerable heterogeneity across individual members of the panel, including both heterogeneity in the long-run cointegrating vectors and heterogeneity in the dynamics associated with short-run deviations from these cointegrating vectors.

The Pedroni cointegration test proposes two groups of tests to be applied to determine the cointegration relationship: panel tests and group tests. The formulation of test statistics is presented in Table 2.

Table 2. Pedroni Cointegration Test Statistics

	Within-dimension	
Part One	Panel v-statistic	$T^2N^{3/2}Zv_{N,T} \equiv T^2N^{3/2}\left(\sum_{i=1}^{N}\sum_{t=1}^{T}L_{1\,1i}^{-2}\,e_{i,t-1}^{2}\right)^{-1}$
	Panel p-Statistics	$T\sqrt{N}\,Z_{P_{N,T^{-1}}} \equiv T\sqrt{N}\left(\sum_{i=1}^{N}\sum_{t=1}^{T}L_{1\,1i}^{-2}\,e_{i,t-1}^{2}\right)^{-1}$
	Panel t-statistic (Nonparametric)	$Z_{tN,T} \equiv \left(\sigma_{N,T}^{*2}\,\sum_{i=1}^{N}\sum_{t=1}^{T}L_{1\,1i}^{-2}\,e_{i,t-1}^{2}\right)^{-1/2}\sum_{i=1}^{N}\sum_{t=1}^{T}L_{1\,1i}^{-2}\left(e_{i,t-1}^{*}\Delta e_{it}-\lambda_i\right)$
	Panel t-statistic Parametric	$Z_{tN,T}^{*} \equiv \left(S_{N,T}^{*2}\sum_{i=1}^{N}\sum_{t=1}^{T}L_{1\,1i}^{-2}\,e_{i,t-1}^{2}\right)^{-1/2}\sum_{i=1}^{N}\sum_{t=1}^{T}L_{1\,1i}^{-2}\,e_{i,t-1}^{*}\Delta e_{it}^{*}$
	Between-dimension	
Part Two	Group-p Statistics	$TN^{-1/2}Z_{P_{N,T^{-1}}} \equiv TN^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}e_{i,t-1}^{2}\right)^{-1}\sum_{t=1}^{T}\left(e_{i,t-1}\Delta\, e_{it}-\lambda_i\right)$
	Group-t Statistic (Nonparametric)	$N^{-1/2}Z_{P_{N,T^{-1}}} \equiv N^{-1/2}\sum_{i=1}^{N}\left(\sigma_i^2\sum_{t=1}^{T}e_{i,t-1}^{2}\right)^{-1/2}\sum_{t=1}^{T}\left(e_{i,t-1}\Delta e_{it}-\lambda_i\right)$
	Group-t Statistic (Parametric)	$N^{-1/2}Z_{P_{N,T^{-1}}} \equiv N^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}s_i^{*2}e_{i,t-1}^{2*}\right)^{-1/2}\sum_{t=1}^{T}e_{i,t-1}^{*}\Delta e_{it}^{*}$

Source: Pedroni, (1999).

In this study, the FMOLS method developed by Pedroni is used to analyze the effect of independent variables on dependent variables. This method was developed to examine the asymptotic properties of cointegration regressions in dynamic panels with common cointegration vectors and to overcome the complications of parameter heterogeneity and the presence of fixed effects among individual members in dynamic panels.

The panel regression model based on the FMOLS method is as follows

$$Y_{it} = \alpha_i + \beta x_{it} + \mu_{it} \quad (2)$$

$$X_{it} = X_{it-1} + \varepsilon_{it} \quad (3)$$

where the vector error process $\xi_{it} = \mu_{it}$, ε_{it} asymptotic covariance matrix Ω_i is stationary. Thus X_{it}, Y_{it} cointegration vector of the variables for each member of the panel β with Y_{it} is cointegrated if it is integrated of the first order. α_i allows the cointegration relationship to include member-specific fixed effects. In line with the cointegration literature, this method does not require the exogeneity of regressors. Also, as always X_i can be an m-dimensional vector of regressors that are generally not cointegrated with each other. In summary, FMOLS explores methods for testing and inferring cointegration vectors in heterogeneous panels based on FMOLS principles. When properly constructed to account for potential heterogeneity in idiosyncratic dynamics and the fixed effects associated with such panels, the asymptotic distributions for these estimators will be centered around the true value and free of disturbing parameters. Moreover, based on Monte Carlo simulations, it has been found that the t-statistic generated from the cross-dimensional group mean estimator in particular performs very well with relatively small sample size distortion (Pedroni, 2000: 98).

We use the Dumitrescu & Hurlin (2012) panel causality test, which proposes a simple Granger causality test for heterogeneous panel data models with constant (rather than time-varying) coefficients. Within the framework of a linear autoregressive data generating process, extending standard causality tests to panel data requires testing cross-sectional linear restrictions on the coefficients of the model. As always, the use of cross-sectional information can extend the set of information on causality from one particular variable to another. Indeed, for many economic issues, if causality exists for one country or individual, it is likely to exist for some other country or individual. In this case, causality can be tested more efficiently in a panel context with NT observations. However, the use of cross-sectional information involves taking into account heterogeneity across individuals in the definition of causality (Dumitrescu & Hurlin, 2012: 1452-1453). The Panel Causality test, which is a simple adaptation of the bivariate causality test developed by Granger, is based on the average of individual Wald statistics computed for cross-sectional units in the context of Granger causality. First, this statistic is shown to converge sequentially to a standard normal distribution. Second, the quasi-asymptotic distribution of the mean statistic is defined for a fixed sample T. However, a standard statistic based on the estimation of the moments of the Wald statistics is proposed. In the third stage, Monte Carlo tests confirm that standard panel statistics have very good small sample properties even in the presence of cross-sectional dependence (Arıcı, 2015: 84).

4. ANALYSIS RESULTS

In this section, the results of the analysis conducted to determine the relationship between FINI, GDPPC and URBN and CO_2 in OECD member countries will be evaluated. Firstly, the results of Levin, Lin & Chu (2002), Im, Peseran & Shin (2003) unit root tests, which test the stationarity of the series, which is the most important issue in time series and panel data analyses, are presented in Table 3.

Table 3. Panel Unit Root Tests Results

Tests	**LLC**		**IPS**	
Level	Constant		Constant	
	t-statistic	Probability	t-statistic	Probability
ln CO_2	-0.664	0.253	3.459	0.999
lnFINI	-0.588	0.278	-1.127	0.129
lnGDPPC	-1.362[c]	0.086	1.640	0.949
lnURBN	-2.134[b]	0.016	2.173	0.985
Difference Values				
$\Delta lnCO_2$	-9.814[a]	0.000	-6.828[a]	0.000
ΔlnFINI	-10..677[a]	0.000	-6.088[a]	0.000
ΔlnGDPPC	-9.155[a]	0.000	-4.424[a]	0.000
ΔlnURBN	-3.490[a]	0.000	-2.531[a]	0.005

Note: Δ : denotes the first difference of the series. ([a]) significant at 1% level, ([b]) significant at 5% level, ([c]) significant at 10% level.

Logarithms of the variables are taken and unit root tests are applied for both level and first differences. The maximum lag lengths that eliminate the problem of autocorrelation among errors are determined by the Schwarz information criterion. In addition, the Bartlett Kernel method is used along with the Newey-West bandwidth selection when calculating the LLC test. According to the results of the panel unit root test in Table 2, according to LLC and IPS unit root tests, (CO_2) carbon dioxide per capita and (FINI) financial innovation rate are non-stationary at level. In the results of other variables, (GDPPC) national income per capita and (URBN) URBN are found to be non-stationary according to the LLC method, but non-stationary according to the IPS method. Therefore, the difference process was applied to the series and it was observed that all series were stationary at the 1% level at the first difference level.

Table 4. Panel Cointegration Tests Results

Pedroni Panel Cointegration Test			**Weighted**	
	t-statistic	**Probability**	**t-statistic**	**Probability**
Panel v-statistic	-0.116	0.546	-1.110	0.866
Panel rho-statistic	0.958	0.831	1.394	0.918
Panel PP-statistic	-4.713***	0.000	-4.667***	0.000
Panel ADF-statistic	-4. 409***	0.000	-3.150***	0.000
Group rho-statistic	2.969	0.998		
Group PP-statistic	-8.234***	0.000		
Group ADF-statistic	-6.897***	0.000		
Kao Panel Cointegration Test	**t-statistic**	**Probability**		
ADF	-1.770**	0.038		

Note: *** indicates significance at 1%, ** at 5%, * at 10% level.

After determining that the series are stationary in the panel unit root test results, the cointegration relations of the series are analyzed through Pedroni and Kao cointegration tests. The results of the analysis are presented in Table 4. According to these results, panel PP and panel ADF statistics from within-group statistics, group PP and group ADF statistics from between-group statistics are significant at a 1% significance level, while other within-group

and between-group statistics are not significant. Although four of the seven statistics applied in the Pedroni cointegration test were significant, the Kao cointegration test was applied as an alternative to support the result. Accordingly, the results of the Kao cointegration test were found to be consistent with the results of the Pedroni cointegration test.

The direction and degree of cointegration relationship obtained in the study are analyzed by the FMOLS method. The results of the FMOLS method for OECD countries are presented in Table 5. According to the test results, FINI, GDPPC and URBN have a negative effect on CO_2 in OECD countries during the study period. Therefore, it is concluded that FINI, GDPPC, and URBN can reduce environmental pollution in OECD countries.

Table 5. FMOLS Estimation Results

Model	$lnCO_{2_{it}} = \alpha_0 + a_1 lnFINI_{it} + a_2 lnGDPPC_{it} + \alpha_3 lnURBN_{it} + u_{it}$	
Variables	**Coefficient**	**Probability**
lnFINI	-0.122*	0.084
lnGDPPC	-0.844***	0.000
lnURBN	-0.767***	0.000

Note: *** indicates significance at 1%, ** at 5%, * at 10% level.

When the results obtained are evaluated, it is seen that they are not compatible with the studies of Abbasi & Riaz (2016); Çetin & Ecevit (2017); Acheampong (2019); Khezri et al. (2021); Halkos & Polemis (2017); Ganda (2019); Çetin & Yüksel (2018); Dagar et al. (2022); Doğan et al. (2023), which examine the relationship between FD and CO_2. On the other hand, the results of the study are in line with Mohammed Saud et al. (2019); Zhoa & Yang (2020); Khan & Ozturk (2021); Kılavuz et al., (2021); Lv & Li (2021); Lee & Chen (2015); Ganda (2020); Zafar et al. (2019); Shobande et al. (2022); Shahbaz et al. (2023a). In addition, the results are consistent with Yuan et al. (2021); Chisti & Sinha (2022), which examine the relationship between FINI and CO_2. When the results of the relationship between economic growth and CO_2 emissions are evaluated, it is understood that it is compatible with the studies of Şeker et al. (2015); Shahbaz et al. (2023b); Çetin et al. (2020); Dong et al. (2018); Ertugrul et al. (2016). When the relationship between urbanization and CO_2 emissions is examined, it is determined that the results of the analysis are not compatible with the studies of Çetin et al. (2022); Raza et al. (2023), whereas they are compatible with the studies of Rasool et al. (2022); Ullah et al. (2023); Zheng et al. (2023).

Finally, the causality between the variables in the model constructed in the study is analyzed by the D-H panel Granger causality test. The results of D-H causality test are presented in Table 6.

Table 6. D-H Granger Causality Test Results

Null Hypothesis	**Wald Statistic**	**Z-bar Statistic**	**Probability**
$lnFINI \nrightarrow lnCO2$	2.236	1.117	0.263
$lnCO2 \nrightarrow lnFINI$	2.932**	2.047	0.040
$lnGDPPC \nrightarrow lnCO2$	5.235***	5.125	0.000
$lnCO2 \nrightarrow lnGDPPC$	3.530***	2.846	0.004
$lnURBN \nrightarrow lnCO2$	11.576***	13.599	0.000
$lnCO2 \nrightarrow lnURBN$	4.077***	3.577	0.000

Note: *** indicates significance at 1%, ** indicates significance at 5%, * indicates significance at 10% level.

The D-H causality test results in Table 6 show that there is a unilateral causality between FINI and CO_2 and this relationship is from CO_2 to FINI. In other results, there is a strong bilateral causality between GDPPC and URBN and CO_2. In line with these results, it is understood that URBN and GDPPC are effective factors on EP. The results obtained are consistent with the studies of Çetin & Ecevit (2015); Shahbaz et al. (2016); Çetin et al. (2018); Topcu et al. (2023).

5. CONCLUSION

Following the invention and diffusion components of innovation, FINI is also realized through product and process innovations that are subject to the demand of nations' economic systems. Since the development of the pollution trading market, FINI has been envisioned as a means to finance environmental projects. In the US, FINIs such as debt-for-nature swaps and individually transferable fishing quotas are among the policies introduced to prevent ED. In addition, allowing the trading of renewable energy certificates in the secondary market also plays an important role in renewable energy solutions. Thanks to these innovative financial products, a significant portion of developed countries have started to reduce their dependence on fossil fuels (Chisti & Sinha, 2022).

Although many studies have been conducted to examine the relationship between FD and ED, there are few studies with data prepared with a different method and perspective. This study analyzes the relationship between FINI and CO_2 for OECD countries in order to make a different contribution to the literature. The model also investigates the impact of GDPPC and URBN on CO_2. Pedroni and Kao cointegration method and FMOLS estimator, which are first generation data analysis methods, are used in the study. The analysis shows that GDPPC, URBN, and FINI have a negative impact on CO_2 in 14 OECD countries with common data for the period covering 2009-2019. Accordingly, it is evaluated that FINI may have an important role in preventing ED in these countries.

When the findings of the analyses and the literature are analyzed, policy recommendations can be summarized as follows. Firstly, policy makers should involve all stakeholders such as firms, managers, relevant public institutions and organizations and NGOs in the process of determining environmental policies. Secondly, financial resources should be transferred to research and development activities that reduce ED in order to use them more efficiently rather than consumer financing. Thirdly, the necessary legislation should be prepared for the necessary incentive policies and tax exemptions for the transition to a green economy.

AUTHORS' DECLARATION

This paper complies with Research and Publication Ethics, has no conflict of interest to declare, and has received no financial support.

AUTHORS' CONTRIBUTIONS

All sections are written by the author.

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APPENDIX

Appendix 1. List of Abbreviations

Acronyms			
OECD	Organization For Economic Co-Operation and Development	**CCEMG**	Common Correlated Effect Mean Group
CO2	Carbon Dioxide Emissions	**FDI**	Foreign Direct Investments
LLC	Levin-Lin ve Chu	**FINI**	Financial Innovation
IPS	Im-Pesaran ve Shin	**MENA**	Middle East and North Africa
FMOLS	Fully Modified Ordinary Least Squares	**ISIC**	International Standard Industrial Classification
NGOs	Non-Governmental Organizations	**ARDL**	Autoregressive Distributed Lag Model
SDGs	Sustainable Development Goals	**FD**	Financial Development
ED	Environmental Degradation	**AMG**	Augmented Mean Group
GDP	Gross Domestic Product	**URBN**	Urbanization

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Financial Wellbeing during Covid-19 Pandemic: Concerns about Medical Costs

Covid-19 Salgını Sırasında Finansal Refah: Tıbbi Maliyetlerle İlgili Endişeler

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ABSTRACT

Financial wellbeing which represents a great concern for individuals regardless of their social status or their current employment situation constitutes an important element of overall individual wellbeing. Within a broader structure of financial wellbeing, concerns about medical costs have gained a vital importance particularly following the pandemic. Identifying what factors influence this growing concern is critical to tackle with the problem and improve individual wellbeing. Hence, this study is expected to shed light on such an important individual and national concern. To that end, this paper utilizes Global Financial Inclusion Database which is based on national representative surveys of about 128,000 adults across more than 120 countries. Empirical analysis in which ordered probit model was applied aims to investigate if there exists an association between financial concerns about medical costs and COVID-19. Findings of the empirical investigation reveal that being in the group of those who are very worried about financial hardship due to Covid-19 outbreak increases the probability of reporting being very worried about medical cost payments by about 34.5 percentage points. Therefore, it is seen that pandemic detrimentally related to individuals' increased concerns over medical costs. These findings are expected to guide policy makers on the management of healthcare system and measures to improve individual wellbeing.

Anahtar Kelimeler:

Finansal Refah, Tıbbi Maliyetler, COVID-19, Bireysel Refah, Mikro Veri

Jel Kodları:

I31; I19; C81

ÖZET

Sosyal statüleri veya mevcut istihdam durumları ne olursa olsun bireyler için büyük bir endişe kaynağı olan finansal refah, genel bireysel refahın önemli bir unsurunu oluşturmaktadır. Finansal refahın daha geniş olan yapısı içinde, tıbbi maliyetlere ilişkin endişeler özellikle pandemi sonrasında hayati bir önem kazanmıştır. Bu büyüyen endişeyi hangi faktörlerin etkilediğini belirlemek, sorunla mücadele etmek ve bireysel refahı artırmak açısından kritik öneme sahiptir. Dolayısıyla bu çalışmanın böylesine önemli bir bireysel ve ulusal meseleye ışık tutması beklenmektedir. Bu amaçla bu çalışma, 120'den fazla ülkede yaklaşık 128.000 yetişkinin katıldığı ulusal temsili anketlere dayanan Global Financial Inclusion Database (Global Findex, 2021)'i kullanmaktadır. Sıralı probit modelinin uygulandığı ampirik analiz, tıbbi maliyetlere ilişkin finansal endişeler ile COVID-19 arasında bir ilişki olup olmadığını araştırmayı amaçlamaktadır. Ampirik araştırmanın bulguları, Covid-19 salgını nedeniyle maddi sıkıntıdan çok endişe duyanlar grubunda yer almanın, tıbbi masraf ödemeleri konusunda çok endişeli olduğunu bildirme olasılığını yaklaşık 34,5 puan artırdığını ortaya koymaktadır. Bu nedenle, pandeminin bireylerin tıbbi maliyetlerle ilgili artan endişeleri ile zararlı bir şekilde ilişkili olduğu görülmektedir. Bu bulguların, politika yapıcılara sağlık sisteminin yönetimi ve bireysel refahı iyileştirmeye yönelik önlemler konusunda rehberlik etmesi beklenmektedir.

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1. INTRODUCTION

As a very important element of overall wellbeing, financial wellbeing is a great concern for majority of people at both individual level and national level for developed and developing countries. This term might be defined as "…a condition where an individual is satisfied and comfortable with his or her financial situation. This condition is reached when an individual is satisfied with his or her ability to meet the basic needs of life. This includes, among other things, the ability to (i) meet current expenses from current income; (ii) save; (iii) maintain debt at sustainable levels; (iv) deal with financial problems; and (v) being generally satisfied with one's financial condition …" (Agyei et al., 2019:224). Financial wellbeing constitutes an essential aspect of overall wellbeing of individuals (Rahman et al., 2021).

Researchers in the field attempt to define what financial wellbeing is, how to measure it, and what factors influence it across different case studies. As one of these attempts, Taft et al. (2013) investigated the relationship between financial wellbeing, financial concerns, and financial literacy in Iran with a sample of 103 university professors. A questionnaire was used to examine these concepts in which a five-point Likert scale was used to measure financial literacy and financial concerns, while a ten-point scale was used to measure financial wellbeing. Apart from the demographic variables involved in the analysis, findings showed that there is a positive relationship between financial wellbeing and financial literacy; a higher level of financial wellbeing is followed by financial literacy; higher financial wellbeing reduces financial concerns.

In the measurement of the financial wellbeing, objective measures such as income level may not reflect the truth because of the fact that individuals' consumption values, habits, or their perceptions about their finances may differ, even though they have the same level of income (Prawitz et al., 2006). In their both qualitative and quantitative research, Netemeyer et al. (2018) aimed to explain the subjective financial wellbeing of US consumers. The qualitative part of the research was based on one-to-one interviews of 59 adult in six states, while quantitative part was based on hierarchical regression modelling for estimation of the effects. Financial wellbeing is conceptualized via stress that is related to the management of money today and a sense of security in one's financial future. Findings revealed that perceived financial wellbeing is one key predictor of overall wellbeing.
Individuals' values tend to change over years. Materialism is one of those on the rise. Literature provides evidence on the association between materialism and financial wellbeing. In this respect, Garðarsdóttir & Dittmar (2012) examined this relationship in the case of Iceland through an online survey technic. The sample consisted of 271 Icelandic non-student adults. Findings showed that higher materialism was associated with a greater tendency to spend, greater financial worries, higher compulsive buying scores, and less self-reported skills to manage money. Shim et al. (2009) question the relationship between financial wellbeing of young adults and positive financial behavioral intention, and association between financial wellbeing of this group and psychological and physical wellbeing, overall life satisfaction, and academic success. The findings of their cross sectional study suggested that parental education that can contribute to child's perception of behavioral control is important, while financial education at school alone is not.

Brüggen et al. (2017) defined financial wellbeing as "the perception of being able to sustain the current and anticipated desired living standard and financial freedom" (p.229), and highlighted its importance as it has a positive impact on happiness, quality of life, general wellbeing, quality of interpersonal relationships, and mental health. Individual characteristics such as self-control and other non-cognitive factors are explored by Strömbäck et al. (2017), if they have any effect on it. Using a representative sample of 2,063 Swedish respondents whose age was between 20 and 75, they showed that individuals who are good at self-control were less anxious about financial matters and more secure in their current and future financial situation.

Sub groups of society may perceive financial wellbeing differently. Malone et al. (2010) investigated the financial wellbeing of American women with a distinction of those with children, without children, in marriage, in cohabitation, in stepfamilies, and single. To do so, they used a nationwide survey of 368 women who were aged between 30 and 65 and with an income of $ 40,000 or more. Findings of the research reveal that single mothers, cohabiting women, and women in stepfamilies, which constitutes non-traditional family structure, are more worried about their financial future than those women in first marriage. Also, cohabiting women are significantly more likely to express fears of becoming a burden.

Using Chinese Survey of Consumer Finance (2014) data, Chu et al. (2017) consider positive investment return as referring financial wellbeing of households. Their empirical analysis reveals that there is an association between financial literacy and asset investing behavior, and households with higher financial literacy are more likely to get positive returns.

Financial wellbeing is also likely to influence the health of individuals. Through interviews of 9,731 households who are 16 and above, Arber et al. (2014) measure subjective wellbeing via two survey questions that are 1-Thinking of your household's total monthly or weekly income, is your household able to make ends meet, that is pay your usual expenses.. with great difficulty, with difficulty, with some difficulty, fairly easily, easily, or very easily, and 2- …whether your household could afford the following?-To pay for a week's annual holiday away from home?-To eat meat, chicken or fish (or vegetarian equivalent) every second day? -To pay an unexpected, but necessary, expense of £500? -To keep your home adequately warm? Findings of logistic regression in this study with participants in the UK show that economic strain and perceived material deprivation that are two indicators of subjective financial wellbeing were strongly associated with health, particularly in older ages. In a similar way, O'Neill et al. (2005) investigated financial wellbeing, health, and financial practices that were expected to guide educators and financial counsellors. Using a large national sample of 3,121 individuals who are financially distressed adults from the US, they concluded that financial distress and poor health are related.

Given the importance of the subject, this paper highlights concerns about medical costs that gain a vital importance particularly following the pandemic. The way of tackling with the pandemic was not identical across the world as some countries immediately introduced lockdown and other strict measures to hamper the spread of the virus, while some others preferred a softer approach, at least for a while. Barrafrem et al. (2020) examined Sweden and the United Kingdom on the individual assessments of 2021 cases about economic situation in household, nation, and the world. Study shows that an important number of people believes that their household economy will do better than national and global economy. Moreover, pessimism about household's economic situation in the future and being financially ignorant are associated with lower financial wellbeing, however, the national economic situation is not associated with that. During the pandemic, governments played a crucial role in the management of this outbreak. Trust in government, in this respect, became important for wellbeing of individuals. Barrafrem et al. (2021)'s study with more than a thousand online survey participants showed that distrust in the government to handle financial difficulties due to the pandemic was negatively associated with feeling financial security.

Botha et al. (2021) investigated individuals' perceived financial wellbeing in the case of Australia, using data from 2,078 residents. Authors argue that labor market shocks that are caused by COVID-19 are likely to be related to lower financial wellbeing via several channels such as lower income, lower credit ratings and borrowing ability, volatility, and psychological effects. Study shows that about 36 percent of Australians reported having at least one labor market shock as a result of the pandemic, and considerable portion of them reported having problems on their financial wellbeing. More clearly, having a given pandemic-related labor market shock is significantly associated with a 29 percent reduction in the financial wellbeing. Related to the labor market shocks during the pandemic, Vieira et al. (2021) highlight differences between private sector employment and public sector employment. Accordingly, it was concluded that public servants perceive fewer financial wellbeing losses and anxiety than private sector workers. The study suggests that countries with a large percentage of employment on temporary and informal jobs need to intervene in the economy via income transfers and reduction of unemployment to reduce losses in the wellbeing.

Covid-19 is likely to create huge financial pressures on individuals regarding healthcare costs. Therefore, this study examines if there exists an association between financial concerns about medical costs and COVID-19, utilizing Global Financial Inclusion Database (Global Findex, 2021) which is based on national representative surveys of about 128,000 adults across more than 120 countries. Addressing both the affordability of this cost and exposure concerns is necessary to ensure that individuals receive the health care as needed during the pandemic (Gonzalez et al., 2020). To do so, it is needed to clearly identify the determinants of these financial concerns. Hence, this study is expected to shed light on such an important individual and national concern.

The remaining sections of this paper are as follows: Subsequent to this section is Section 2 which presents the materials that are used in the empirical investigation and the methodology of the study while Section 3 provides the results and presents the findings of the investigation. Section 4, eventually, draws conclusions and policy recommendations.

2. MATERIALS AND METHODS

This paper uses the Global Financial Inclusion Database (Global Findex, 2021) which is based on national representative surveys of about 128,000 adults across more than 120 countries. Global Findex provides a rich source of information on saving, borrowing, making payments, managing financial risk, financial health and resilience, and digital payment adaption to understand how individuals accesses/used financial services during

Covid-19 (Demirgüç-Kunt et al., 2022). The survey contained six questions about the financial worries of individuals as follows:

How worried are you right now about each of the following? Are you very worried, somewhat worried, or not worried at all at the present time?

1. Not having enough money for your old age
2. Not being able to pay for medical costs in case of a serious illness or accident
3. Not having enough money to pay for monthly expenses or bills
4. Not being able to pay school fees or fees for education
5. Among the financial issues you mentioned, which one are you most worried about?
6. Are you very worried, somewhat worried, or not worried at all that you will experience, or continue to experience, severe financial hardship as a result of the disruption caused by Covid-19?

Question 1, Question 2, Question 3, Question 4, and Question 6 are questions with categorical answers. Those answer categories are as follows:

1. Very worried
2. Somewhat worried
3. Not worried at all

Answer categories to Question 5 which about prioritizing these concerns is different than the previous ones and it is as follows:

1. Money for your old age
2. Paying for medical costs in case of a serious illness or accident
3. Money to pay for monthly expenses or bills
4. Paying school or education fees

The distribution of responses across four options to Question 5 is presented in Figure 1. This figure is presented to show the importance of medical costs which is the subject of this paper. Accordingly, it is seen that about 43 per cent of the respondents picked medical concerns as their greatest financial worry. This very high level of worry in the sample draws our attention to investigate determinants of it. For this purpose, Question 2 above was utilized asking "How worried are you right now about not being able to pay for medical costs in case of a serious illness or accident?" as the dependent variable of this paper.

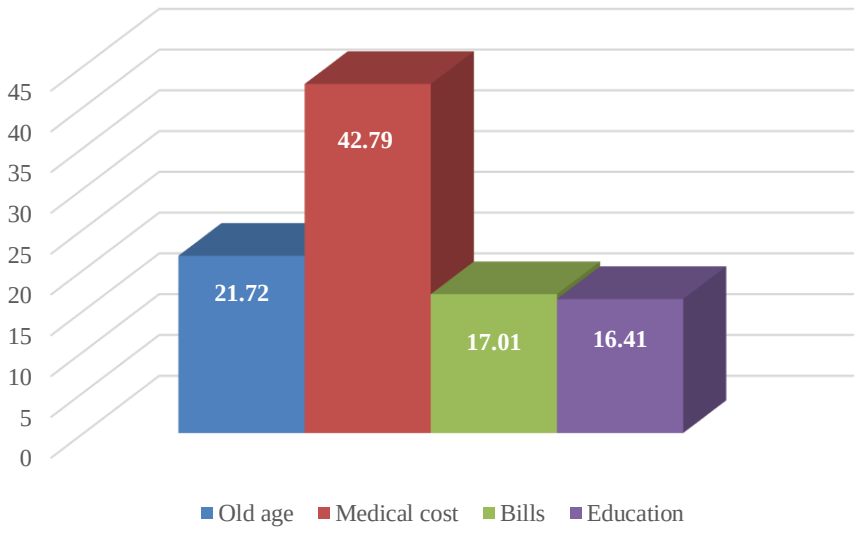

Figure 1. Financially Most Worried about, percentage
Source: Author's own calculation based on Global Findex data

More than 42 per cent of the sample expressed they are most worried about not being able to pay for medical costs in case of a serious illness or accident. Individuals' financial worries on medical cost is likely to be increased during the ongoing Covid-19 pandemic process. Therefore, this study focuses on the relationship between worries due to Covid-19 and worries due to medical cost. In other words, if the outbreak contributed individuals' financial concerns over medical costs is considered as a research question of this paper. Based on this question, following hypotheses is formulated:

H_0: There is no significant relationship between financial worries due to Covid-19 and worries about medical costs.

H_1: There is a positive significant relationship between financial worries due to Covid-19 and worries about medical costs.

These hypotheses are tested through an ordered probit model as underlying model is based on a latent variable:

$$Y_i^* = C_i\beta_0 + X_i\beta_1 + \varepsilon_i \ , \ i = 1,2,\dots.n \quad (1)$$

Where Y_i^* is the latent measure of individual i's financial concerns about medical costs. C_i presents individual i's concerns due to Covid-19, and β_0 is a vector of the coefficient to be estimated. X_i is the vector of observable characteristics, and β_1 is a vector of coefficients to be estimated. ε_i presents a white noise error term. Y_i is the observed outcome.

$$Y_i = a \ if \ \mu_a < Y_i^* < \mu_{a+1}, a = 1,2,\dots,A \quad (2)$$

where a is the category selected by the respondent. μ_a presents the threshold parameters to be estimated. It is assumed that ε_i is a zero-mean error term that is assumed to be distributed identically and independently. If an individual's Y_i^* falls within a certain range, their Y_i is assigned a numerical value that reflects the category in which their unobserved concerns lies. The threshold parameters are not observed, however, they can be statistically estimated.

An ordered probit model allows for the calculation of predicted probabilities for each concern category and marginal effects. When calculated at the means of the data, predicted probabilities indicate the chance of the average individual being financially worried about medical costs falling within each of the categorical worry levels. These provide valuable insight into individuals' wellbeing. Furthermore, parameter estimates might be used to calculate the marginal effects of explanatory variables on the predicted probabilities that indicates how a change in a particular explanatory variable influences the predicted probability of an individual's concern level for each category of it.

Following the presented methodological framework, this paper draws on the relevant literature and the data set to identify explanatory variables that might be used as indicators of financial concerns about medical costs. The initial specification covers basic socio-economic and demographic variables (i.e., gender, age, education level, income level, employment statues, and residential area), in addition to the main explanatory variable of COVID to measure if those financial concerns are significantly related to this outbreak. Specification 2 also includes financial indicators of having an account and having a debit card. Finally, Specification 3 involves mobile phone ownership and internet access as well. All of the specifications include a country dummy in order to control country-specific factors. Definition and summary statistics of all of the variables used across specifications are presented in Table 1 below.

Omitting observations with missing values for the relevant variables used in the empirical specification yields a sample of 120,106 adults from 122 countries. The distribution of the responses in the sample is presented in Figure 2.

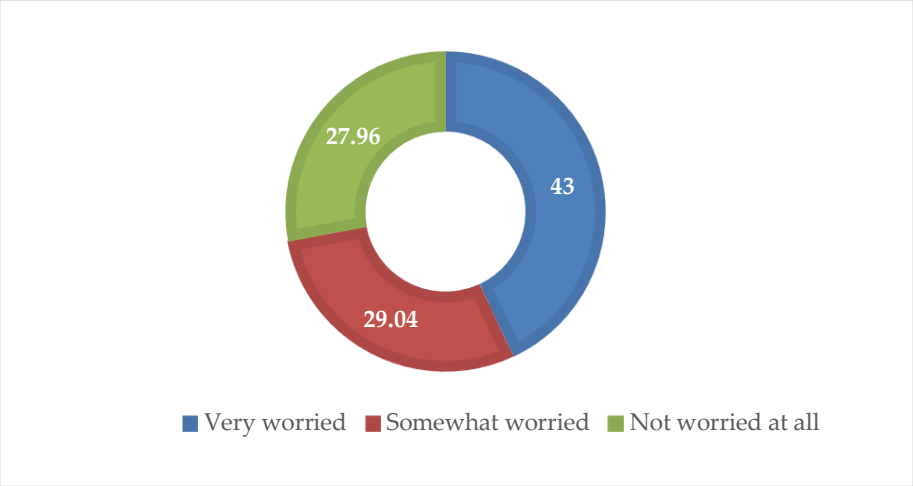

Figure 2. How Worried You Are About Medical Costs, Percentage
Source: Author's own calculation based on Global Findex data

According to Figure 2, 43 per cent of the sample expressed that they are very worried about medical costs. Those who are somewhat worried and not worried at all consist of about 28-29 per cent of the responses. It is seen that there is a very high level of concern about affording medical expenses. This very high concern draws our attention to investigate the determinants of it.

Descriptive statistics of the variables used in the empirical investigation are presented in Table 1 below. As mentioned earlier, it is seen that more than 43 percent of the respondents were very worried about medical costs. 62 percent of them are worried about COVID-related financial difficulties. 47 percent of the sample is male, while 53 percent is female. Individuals from 15 to 99 were included in the sample, and the mean age is 41 years. slightly more than a half of the sample completed secondary education, while a quarter of them completed primary or less, an another quarter completed tertiary education or more. 26 percent of the sample which is the largest share consists of the richest income quintile; 66 percent is in workforce; almost 69 percent has an account at a financial institution; 64 percent has a debit card; almost 90 percent has a mobile phone; and 73 pecent of them has internet access.

Table 1. Definitions and Summary Statistics for Selected Variables

Variable	Definition	Obs	Mean	SD	Min	Max
MedCost	How worried are you right now about not being able to pay for medical costs in case of a serious illness or accident					
	Very worried	120106	.435	.496	0	1
	Somewhat worried	120106	.287	.453	0	1
	Not worried at all	120106	.277	.448	0	1
COVID	Are you very worried that you will experience, or continue to experience, severe financial hardship as a result of the disruption caused by Covid-19					
	No	120106	.622	.485	0	1
	Yes	120106	.378	.485	0	1
Female	Gender dummy					
	Male	120106	.47	.499	0	1
	Female	120106	.53	.499	0	1
Age	Age in years	120106	41.787	17.459	15	99
Edu	Education level					
	Completed primary school or less	120106	.248	.432	0	1
	Completed secondary	120106	.511	.5	0	1
	Completed tertiary education or more	120106	.241	.427	0	1
Inc_q	Income quintile					
	Poorest 20%	120106	.160	.367	0	1
	Second 20%	120106	.172	.378	0	1
	Middle 20%	120106	.191	.393	0	1
	Fourth 20%	120106	.216	.411	0	1
	Richest 20%	120106	.260	.439	0	1
Emp	Employment					
	out of workforce	120106	.335	.472	0	1
	in workforce	120106	.665	.472	0	1

Table 1. Definitions and Summary Statistics for Selected Variables (Cont.)

Variable	Definition		Obs	Mean	SD	Min	Max
Acc	Has an account at a financial institution						
		No	120106	.311	.463	0	1
		Yes	120106	.689	.463	0	1
Debit	Has a debit card						
		Yes	120106	.542	.498	0	1
		No	120106	.458	.498	0	1
MO	Do you have a mobile phone that you use to make and receive personal calls?						
		Yes	120106	.899	.301	0	1
		No	120106	.101	.301	0	1
IA	Do you have access to the Internet in any way, whether on a mobile phone, a computer, or some other device?						
		Yes	120106	.731	.443	0	1
		No	120106	.269	.443	0	1

Note: Sample covers 122 economies and all of the specifications include a country dummy in order to control country-specific factors.

If the findings of this research is to be used to generalise to the population wholly, the coefficients then must be representative of the population values. To better reflect the population, we use the weight provided in the Global Findex data set. Therefore, all of the findings presented below is to be considered nationally representative.

3. FINDINGS

Estimates of the ordered probit model are presented in Table 2. Because the ordered probit model is not linear, the estimated coefficients are not marginal effects. Even though the sign and statistical significance of the parameter estimates are meaningful, they are not directly interpretable in terms of the magnitude. Therefore, marginal effects are calculated and given in the table that enables the interpretation of the coefficients in a meaningful way. As the probabilities for categories of MedCost must sum to one, while the change in probabilities for those categories must sum to zero.

It's been observed that nine coefficients (COVID, Female, Age, Edu, Inc_q, and Emp) in the first specification reveal statistically significant (at 1 per cent level) association with the dependent variable (i.e., worry about medical costs). The results indicate that being in the group of those who are very worried about financial hardship due to the Covid-19 outbreak increases the probability of reporting being very worried about medical cost payments by about 34.5 percentage points. Therefore, it is seen that the pandemic is detrimentally related to individuals' increased concerns over medical costs.

Compared to being male, being female increases the probability of being very worried by 3.5 percentage points. This effect might be stronger in countries where men are treated as the main breadwinner such as eastern countries. Some literature (see for example, Gray, 2014; Plagnol, 2011) shows that financial satisfaction increases when people get old. This is explained by lower revised expectations, adaptation, and lower debt level in later ages. However, later life is also characterized by a higher probability of experiencing severe illnesses and dependency which endures higher healthcare costs. Our findings indicate that 1 more year of age increases the probability of being very worried of medical costs by 1 percentage point

Those with the higher education level or higher income level (i.e., richer income quintile) are less likely to report being very worried about medical costs than those with lower education level or lower income level. This finding of lower concerns of high-educated or high-income individuals is in line with the existing literature, for example Weissman et al. (2020). Moreover, being a part of the workforce rather than out of it increases the probability of reporting being very worried about medical costs. Finally, we couldn't find any significant association between residential areas (i.e., rural, and urban) and worries about medical costs. The relationships between the explanatory variables in Specification 1 and the dependent variable are consistent across specifications.

Specification 2 and 3 includes additional explanatory variables about accessing digital technologies and the financial inclusion of individuals. While we couldn't find any significant effect of financial inclusion variables (i.e., having an account or having a debit card), access to the internet and owning a mobile phone reveal significant effect on such worry. Those who do not have a mobile phone rather than those with a mobile phone are less likely to be very worried about medical costs. Contrarily, having access to the internet increases to report of being very worried about medical costs.

Table 2. Findings of Ordered Probit Estimate, Marginal Effects

	Specification 1			Specification 2			Specification 3		
Variables	**Very worried**	**Somewhat worried**	**Not worried**	**Very worried**	**Somewhat worried**	**Not worried**	**Very worried**	**Somewhat worried**	**Not worried**
COVID	0.354***	-0.104***	-0.250***	0.354***	-0.104***	-0.250***	0.353***	-0.104***	-0.249***
	(0.004)	(0.002)	(0.003)	(0.004)	(0.002)	(0.003)	(0.004)	(0.002)	(0.003)
Female	0.042***	-0.006***	-0.036***	0.042***	-0.006***	-0.036***	0.042***	-0.006***	-0.036***
	(0.003)	(0.000)	(0.002)	(0.003)	(0.000)	(0.002)	(0.003)	(0.000)	(0.002)
Age	0.001***	-0.000***	-0.001***	0.001***	-0.000***	-0.001***	0.001***	-0.000***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Edu (Base:Completed primary school or less)									
Secondary	-0.022***	0.004***	0.019***	-0.023***	0.004***	0.019***	-0.021***	0.004***	0.018***
	(0.004)	(0.001)	(0.003)	(0.004)	(0.001)	(0.003)	(0.004)	(0.001)	(0.003)
Tertiary or more	-0.055***	0.008***	0.047***	-0.055***	0.008***	0.047***	-0.053***	0.007***	0.045***
	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)
Inc_q (Base: Poorest 20%)									
Second 20%	-0.024***	0.006***	0.018***	-0.024***	0.006***	0.019***	-0.024***	0.005***	0.018***
	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)
Middle 20%	-0.053***	0.011***	0.042***	-0.053***	0.011***	0.042***	-0.052***	0.011***	0.041***
	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)
Fourth 20%	-0.083***	0.016***	0.067***	-0.083***	0.016***	0.067***	-0.082***	0.015***	0.067***
	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)
Richest 20%	-0.140***	0.020***	0.120***	-0.140***	0.020***	0.120***	-0.139***	0.020***	0.119***
	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)

Table 2. Findings of Ordered Probit Estimate, Marginal Effects (Cont.)

	Specification 1			Specification 2			Specification 3		
Variables	**Very worried**	**Somewhat worried**	**Not worried**	**Very worried**	**Somewhat worried**	**Not worried**	**Very worried**	**Somewhat worried**	**Not worried**
Emp (Base: out of workforce)									
in workforce	0.035***	-0.005***	-0.030***	0.035***	-0.005***	-0.030***	0.033***	-0.005***	-0.029***
	(0.003)	(0.000)	(0.003)	(0.003)	(0.000)	(0.003)	(0.003)	(0.000)	(0.003)
Acc (Base:No)									
Yes				-0.001	0.000	0.001	-0.002	0.000	0.002
				(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)
Debit (Base: Yes)									
No				-0.003	0.000	0.002	-0.003	0.001	0.003
				(0.004)	(0.001)	(0.004)	(0.004)	(0.001)	(0.004)
MO (Base: Yes)									
No							-0.034***	0.004***	0.030***
							(0.005)	(0.001)	(0.005)
IA (Base: Yes)									
No							0.021***	-0.003***	-0.018***
							(0.004)	(0.001)	(0.004)
Observations	120,106	120,106	120,106	120,106	120,106	120,106	120,106	120,106	120,106
Pseudo R2		0.196			0.196			0.196	

Note: All of the specifications are weighted, and include country dummies to reflect country-specific factors across 122 economies in the sample. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The analyses above cover 122 economies across the world. The effect of Covid-19 on individual worries about medical costs may vary across different parts of the world. To see if there exists any difference across regions, we run Specification 1 across eight regions, that are South Asia, Europe & Central Asia (excluding high income), Middle East & North Africa (excluding high income), Latin America & Caribbean (excluding high income), High income: OECD, Sub-Saharan Africa (excluding high income), High income: non-OECD, and East Asia & Pacific (excluding high income).

Table 3 presents the findings of the ordered probit model for the eight sub-regions mentioned above. These analyses include the explanatory variables given in Specification 1. To make the presentation simpler, we only present the marginal effects of the category of being 'very worried about medical costs'. Therefore, the coefficient of COVID implies the size of the worry of being in the group of those who are very worried about financial hardship due to Covid-19 outbreak on the reporting being very worried about medical cost payments for each region. The effect is positive and statistically significant at 1 per cent significance level or all of the regions. The largest effect is found in Latin America & Caribbean (excluding high-income) with 0.478. This is followed by High income: non-OECD and East Asia & Pacific (excluding high income) with 0.404 and 0.402, respectively. The smallest effect of COVID is found in High income: OECD (with 0.295), Sub-Saharan Africa (excluding high-income) (with 0.297), and South Asia (with 0.298).

Table 3. Findings Ordered Probit Estimate across Eight Regions, Marginal Effects

Variables	South Asia	Europe & Central Asia (excluding high income)	Middle East & North Africa (excluding high income)	Latin America & Caribbean (excluding high income)	High income: OECD	Sub-Saharan Africa (excluding high income)	High income: non-OECD	East Asia & Pacific (excluding high income)
COVID	0.298***	0.381***	0.337***	0.478***	0.295***	0.297***	0.404***	0.402***
	(0.013)	(0.009)	(0.012)	(0.010)	(0.015)	(0.008)	(0.023)	(0.014)
Observations	7,780	17,301	8,866	14,041	31,351	24,077	7,786	7,918
Pseudo R2	0.134	0.156	0.120	0.177	0.118	0.108	0.076	0.170

Note: These analyses include the explanatory variables of Specification 1 mentioned above. All of the coefficients of COVID across regions refer to the category of being very worried.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4. DISCUSSION AND CONCLUSIONS

Medical costs are important for healthcare (Banegas et al., 2019) on its own, yet, its importance has been increased when the world has faced a very fast spreading and deadly virus, COVID-19 since the beginning of 2020. Thinking of an overall wellbeing, financial wellbeing consists of a crucial component of it. A healthy and functioning body is essential to maintain a decent life. Therefore, healthcare costs become an indispensable item that can affect financial wellbeing. In this respect, this study examined the impact of financial worries due to the COVID-19 pandemic on the concerns over medical costs. Global Financial Inclusion Database (2021) that provides a rich source of data at the individual level is utilized to investigate if there exists an association between those two.

Findings of the probit estimation indicate that being in the group of those who are very worried about financial hardship due to the Covid-19 outbreak increases the probability of reporting being very worried about medical cost payments by about 34.5 percentage points. This implies that H0 hypothesis which refers to no significant relationship between financial worries due to Covid-19 and worries about medical costs was rejected. It is seen that the pandemic is detrimentally associated with individuals' increased concerns over medical costs. Apart from the main independent variable of interest, there are several other independent variables that reveal a significant relationship with worries about medical costs. Being a male, older, low educated, and low income level increases the probability of being very worried about these costs. Additionally, having a mobile phone and access to the internet also increases the probability to report such worry. Last but not the least, there are regional differences on the effect of financial hardship due to COVID-19 with respect to individual worries about medical costs. Although all of the specifications reveal significant and positive associations of the variable of COVID, the coefficient for Latin America & Caribbean (excluding high income) is larger in magnitude. This implies that individuals in this region seem to be affected more because of the financial hardship as a result of COVID-19.

From a policy point of view, these findings might suggest a few policies. First, it is obvious that this pandemic has not affected only the physical health of individuals, but it has also caused an economic disaster across the world. This unexpected shock has left millions of people who are severely affected by healthcare and labour market aspects. Therefore, reducing the effect of financial hardship and access to the healthcare system must be the government's priority. Governmental efforts in this way would relieve concerns over medical costs. Secondly, as different age cohorts may expose the risk differently, risk groups such as elderly citizens should be treated more carefully. Even if some countries introduced priorities on vaccination or work place arrangements for particular subgroups of society such as elderly, pregnant, or chronic patients, it has not been common for all countries affected. Furthermore, social protection programs should be used to improve wellbeing of those in lower-income groups as the lower level of income was found to be associated with higher worries about medical costs.

Covering thousands of individual observations from 122 countries with different healthcare systems, the level of exposure to the virus, governmental actions to tackle the pandemic, and public attitudes towards obeying measures, etc., this paper provides considerable insights into the individual wellbeing. Nevertheless, it is still worth mentioning a few limitations of this investigation. First, this is a time series analysis that does not take time-specific changes across variables included in the model. Secondly, further robustness checks might be useful to understand if the relationship is causal. Therefore, future research may address these limitations.

AUTHORS' DECLARATION

This paper complies with Research and Publication Ethics, has no conflict of interest to declare, and has received no financial support.

AUTHORS' CONTRIBUTIONS

All sections are written by the author.

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APPENDIX

Appendix 1. Countries Included in the Sample

Economy	Freq.	Percent	Economy	Freq.	Percent
Afghanistan	997	0.83	Lebanon	1,015	0.85
Albania	989	0.82	Liberia	974	0.81
Algeria	942	0.78	Lithuania	893	0.74
Argentina	986	0.82	Malawi	983	0.82
Armenia	942	0.78	Malaysia	965	0.8
Australia	954	0.79	Mali	972	0.81
Austria	870	0.72	Malta	972	0.81
Bangladesh	979	0.82	Mauritius	970	0.81
Belgium	977	0.81	Moldova	947	0.79
Benin	980	0.82	Mongolia	971	0.81
Bolivia	979	0.82	Morocco	956	0.8
Bosnia and Herzegovina	986	0.82	Mozambique	883	0.74
Brazil	967	0.81	Myanmar	999	0.83
Bulgaria	970	0.81	Namibia	982	0.82
Burkina Faso	955	0.8	Nepal	991	0.83
Cambodia	981	0.82	Netherlands	968	0.81
Cameroon	976	0.81	New Zealand	951	0.79
Canada	947	0.79	Nicaragua	981	0.82
Chile	990	0.82	Nigeria	967	0.81
Colombia	977	0.81	North Macedonia	977	0.81
Congo, Rep.	895	0.75	Norway	991	0.83
Costa Rica	983	0.82	Pakistan	947	0.79
Cote d'Ivoire	979	0.82	Panama	948	0.79
Croatia	965	0.8	Paraguay	993	0.83
Cyprus	1,003	0.84	Peru	980	0.82
Czech Republic	974	0.81	Philippines	999	0.83
Denmark	996	0.83	Poland	948	0.79
Dominican Republic	909	0.76	Portugal	985	0.82
Ecuador	983	0.82	Romania	924	0.77
Egypt, Arab Rep.	996	0.83	Russian Federation	1,985	1.65
El Salvador	943	0.79	Saudi Arabia	1,017	0.85
Estonia	964	0.8	Senegal	972	0.81
Finland	999	0.83	Serbia	978	0.81
France	986	0.82	Sierra Leone	980	0.82
Gabon	1,003	0.84	Singapore	976	0.81
Georgia	976	0.81	Slovak Republic	995	0.83
Germany	909	0.76	Slovenia	985	0.82
Ghana	977	0.81	South Africa	978	0.81
Greece	993	0.83	South Sudan	808	0.67
Guinea	954	0.79	Spain	965	0.8
Honduras	975	0.81	Sri Lanka	969	0.81
Hong Kong SAR, China	957	0.8	Sweden	993	0.83
Hungary	974	0.81	Switzerland	870	0.72
Iceland	492	0.41	Taiwan, China	986	0.82
India	2,897	2.41	Tajikistan	933	0.78
Indonesia	1,047	0.87	Tanzania	978	0.81
Iran, Islamic Rep.	996	0.83	Thailand	985	0.82
Iraq	1,008	0.84	Togo	977	0.81
Ireland	974	0.81	Tunisia	959	0.8
Israel	941	0.78	Türkiye	940	0.78
Italy	977	0.81	Uganda	987	0.82
Jamaica	438	0.36	Ukraine	967	0.81
Japan	990	0.82	United Arab Emirates	916	0.76
Jordan	1,002	0.83	United Kingdom	935	0.78
Kazakhstan	889	0.74	United States	993	0.83
Kenya	992	0.83	Uruguay	980	0.82
Korea, Rep.	1,003	0.84	Uzbekistan	973	0.81
Kosovo	981	0.82	Venezuela, RB	999	0.83
Kyrgyz Republic	944	0.79	West Bank and Gaza	992	0.83
Lao PDR	971	0.81	Zambia	961	0.8
Latvia	969	0.81	Zimbabwe	994	0.83
Total	**120,106**	**100**			