The Effect of Financial Risks of Companies Listed in the BIST Sustainability Index on Stock Prices[*]

BİST Sürdürülebilirlik Endeksinde Yer Alan İşletmelerin Finansal Risklerinin Hisse Senedi Fiyatları Üzerine Etkisi

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Abstract

This study is aimed to investigate the impact of the financial risks of the enterprises in the sustainability index on the value of the stock. In line with this objective, financial risk values were calculated with the Altman Zskor model by using the financial statement data of the enterprises for the 2011-2020 periods. The impact of the financial risks of the enterprises in the sustainability index on the stock value was perused by panel data analysis in the study. As a result of econometric analysis, it was determined that the financial risk values of the enterprises affect the stock return rates negatively. In other words, as the financial risks of the enterprises decreased, the stock return rate increased.

Öz

Bu çalışma ile sürdürülebilirlik endeksinde yer alan işletmelerin finansal risklerinin hisse senedi değerine etkisinin araştırılması amaçlanmıştır. Bu amaç doğrultusunda işletmelerin 2011-2020 dönemlerine ait mali tablo verileri kullanılarak finansal risk değerleri Altman Zskor modeli ile hesaplanmıştır. Çalışmada sürdürülebilirlik endeksinde yer alan işletmelerin finansal risklerinin hisse senedi değerine etkisi ise panel veri analizi ile incelenmiştir. Ekonometrik analiz sonucunda işletmelerin finansal risk değerlerinin hisse senedi getiri oranlarını negatif yönde etkilediği tespit edilmiştir. Yani işletmelerin finansal riskleri azaldıkça hisse senedi getiri oranı artmıştır.

Keywords: *Sustainability, Financial Risk, Panel Data Analysis, Altman Model*

Jel codes: *C23, G32, G33, G17*

Anahtar Kelimeler: *Sürdürülebilirlik, Finansal Risk, Panel Veri Analizi, Altman Modeli*

Jel kodları: *C23, G32, G33, G17*

1. INTRODUCTION

Sustainability aims to protect the potential of the systems that take place in the world to continue their functions in the future in the same manner. As the level of public awareness of sustainability subject increases, the anticipations of investors, customers, and governments from companies become a current issue. The countries' perceptiveness to sustainability principles motivates businesses and guides their activities. Hence, the influence of sustainability activities on financial risk, financial performance, and stock prices of companies is also the subject of conducted studies and research.

Since the number of research conducted on the relationship between financial risk and stock price in Turkey is low, it is thought that this study will fulfil the void in this area and will form the foundation for future studies. Due to the negative effects of financial risk on the stock price, the outcomes obtained from the study will be beneficial for investors who are considering investing in the sustainability index, in terms of maximizing their profits and directing to less risky investments.

In the study carried out with an aim to reveal the effect of financial risks of companies, listed in the BIST sustainability index, on stock prices, firstly information about the concept of sustainability and its evolution was given. Secondly, while explaining the concept of financial risk, models based on ratios, which are used as early warning indicators in estimating financial risk, are included. Thirdly, the relationship between sustainability, financial risk, and stock price is discussed. In this section, in the first place, information is given about the relationship between financial risk and stock price in terms of normal companies. Afterward, the relationship between financial risk and stock price in terms of companies included in the sustainability index is explained. In this section, in which a literature review also takes place, information is given about the studies conducted for companies with normal financial risk and companies included in the sustainability index, regarding the relationship between financial risk and stock price.

To examine the effect of the financial risks of the companies on the stock price, the financial statement data of the companies between the years 2011 and 2021 were used. The financial risks of the companies are determined using the Altman Z-Score model. The impact of the calculated financial risk values on the stock return has been examined by the panel data analysis method. With an aim to determine the effect of financial risks of companies on stock returns, stationarity tests and unit root tests of the variables were executed. Lastly, in this section, the research findings on the effect of financial risks on the stock worth of the companies included in the sustainability index are given.

A general evaluation of the effects of the financial risks of the companies that take place in the sustainability index on the stock returns has been made in the conclusion section of the study.

2. THE CONCEPT OF SUSTAINABILITY AND ITS EVOLUTION

The concept of sustainability became popular in 1987 following the publication of the Brundtland Report under the "Our Common Future" title. The sustainability concept's first form dates to the early periods of the 1900s (Christofi et al, 2012:161). In accordance with the Brundtland Report, the concept of sustainability is defined as an ability to respond to the needs

of the present generation without compromising the capability of potential generations to meet their own needs (Brundtland Report, 1987: 16).

Likewise, sustainability is a concept in which the development efforts, which include protecting natural wealth without diminishing it and making it the centre of attention, of governments, business managers, local communities, voluntary organizations, non-governmental organizations, and other interested individuals are exhibited worldwide (Isaksson and Steime, 2009: 63). Brundtland is a report that accentuates the value underlined by the shareholder and encloses the concepts of corporate social responsibility and sustainability (Christofi et al, 2012: 162).

Congruent with Çamlıca and Akar (2014:102): Sustainability is the state of being enduring and preserving existence in the future as well. On the other hand, Soubbotina (2004: 9-10) defined sustainability as the equal devotion of conditions to the welfare of all parties at all times.

The concepts of Sustainability and Sustainable Development officially enticed the world's attention thanks to the Brundtland Report, which was shared with the world public in 1987. The concept of "sustainable development" first gained officiality by being defined in the report named "Our Common Future". The increase in environmental problems, particularly on a global scale, and the significance of a holistic view in the 1980s point out the importance of sustainability subject. This report, which attracts attention to the fact that the improvement of the living conditions of future generations is the responsibility of today's generations, was submitted to the UN General Assembly for approval in 1987 (Hall, Daneke & Lenox, 2010:441).

Along with Agenda 21, also anointed as the "Rio Declaration", attention was enticed to the subjects of social and economic effects of development, the preservation and use of resources, the planning of practices associated with sustainable development, and the sharing of the resources. The foundations of sustainable development are based on the following three dimensions:

- Protection of the environment

Since the increase of human welfare and its continuity is in question, it is necessary to ensure the continuity of the environment and its natural resources. The level of resource use, the regeneration rate of these resources; the rate of released pollutants should not exceed the rate at which natural resources process these pollutants. The protection of biodiversity, human health, quality of natural resources, and animal and plant life also take place in environmental sustainability (Kaypak, 2011:26).

- Economic effectiveness

Countries that strive to improve their welfare level produce goods and services and offer them to the market according to the demands, by using their potential resources and capacities effectively. An economic approach that conserves its ecological system highlights the use of renewable resources, and provides social justice is a component of sustainable development.

- Social equity

By the concept of justice in today's societies, every individual as well as future generations have the right to benefit from natural resources equally. With the concept of social equity, it is stressed that the basic and all other needs of societies can be fully met, and development can only be actualized within this manner (Çokmutlu, 2019: 41).

In 1992, the Fifth Program of Action was adopted, stating that laws should include provisions on environmental protection, and at the Population and Development Conference held by the UN in Cairo in 1995, the concept of sustainable development was associated with the general concept of population and

In 1996, at the UN Human Settlements [Habitat II] Conference held in Istanbul, it was attempted to adapt the concept of sustainable development to human settlements. In the Habitat Agenda the decision take place as follows, "*Sustainable Development is crucial for the development of human settlements and gives the required importance to the requirements and needs of environmental protection, social development, and economic growth. Human settlements should be planned, developed, and improved considering the principles of sustainable development*" (The United Nations, 1996: art. 29).

At the UN World Sustainable Development Summit held in South Africa, the town of Johannesburg, in 2002 (26 August - 4 September), matters such as battling poverty, health, education, agriculture, access to clean water, and protecting the environment were on the agenda (Kılıç, 2006: 87).

Beneath the administration of the United Nations, international conferences on Sustainable Development continued to be held. These meetings were conducted in the following order (Sipahi, 2010:334); I World Urban Forum (Nairobi) in 2002, II World Urban Forum (Barcelona) in 2004, United Nations World Summit in 2005, III World Urban Forum (Vancouver) in 2006, IV World Urban Forum (Nanjing) in 2008, and the V World Urban Forum (Rio de Janeiro) that was held in 2010.

The third international conference "United Nations Conference on Sustainable Development" / "Rio+20", under the leadership of the UN, was held in Rio de Janeiro, Brazil, between 20-22 June 2012. While reminding of the promise to put into practice the decisions taken at previous conferences, in the declaration titled "The Future We Want" it is stated that people are at the center of Sustainable Development, it was emphasized that they should take active participation in ensuring the harmony of economic, social and environmental factors that are required for the realization of Sustainable Development, and that they should have an active role in all segments of the society in the realization of Sustainable Development. (Rio+20 Conference, 2012).

Despite the interest in the environment in Turkey starting in the 1970s, even before the alignment process with the European Union, the environmental problems were incorporated into the development plans for the first time after the 1972 Stockholm Conference. The

establishment of the prime ministry undersecretariat for environmental affairs and the inclusion of national and international environmental activities in state policy dates back to 1978. Although the concept of environmental protection was included in the constitution upon the adoption of the 1982 Constitution of the Republic of Turkey and despite the importance of environmental protection being emphasized, no regulation could be made regarding its framework and targets (Özmehmet, 2008:16-17).

With the Environmental Law, the management of natural resources in 1983, Air Quality Control and Turmoil Control in 1986, Water Quality Control in 1988, Solid Waste Control in 1991, Environmental Impact Assessment in 1992, Medical Waste Control in 1993, Toxic Chemical Products and Substances Control, and Hazardous Waste Control Regulations have been published in our country (Okumus, 2002:10).

The progress of sustainable development policies in Turkey can be followed in the five-year development plans prepared by the State Planning Organization (DPT). The reflection of global environmental protection strategies is seen for the first time in Turkey in the Third Five-Year Development Plan. In the plan, which covers the years 1973-1977, after the 1972 Stockholm Conference, as a verification of the development of environmental awareness in Turkey, environmental problems were given a separate place in the development plans for the first time (Egeli, 1996: 30). In the "1979 Year Program" published in the Official Gazette dated 19 December 1978 and numbered 16494, the creation of an environmental pollution inventory was accepted as a principle, however, the preparation of environmental status reports and the creation of environmental inventories within the framework of this enactment, was only able to come to the fore after the establishment of the Environment Inventory Department under the Ministry of Environment in 1991 (Ministry of Environment, 1993).

The place of protecting resources and reducing pollution goals in the development plans was taken by new policies for the prevention of pollution which were determined in the 5th and 6th Five-Year Development Plans. In our country, the preparation of environmental and development indicators was included in the 7th Five-Year Development Plan (1995-2000), while the principles of improving sustainable development indicators were included in the 8th Five-Year Development Plan (2000-2005), and "Selected Sustainable Development Indicators" have been developed by TURKSTAT (Yıkmaz, 2011:26-30). At the 2002 Johannesburg Summit, Turkey presented its goals and actions in the pathway of development as a "National Report" and made its evaluation.

The Eleventh Development Plan has undertaken a guiding function by increasing economic and social resources and directing them to more productive areas, in the medium and long term, through the implementation of concentration strategies sought at common goals. By increasing the efficiency of our country in all areas, the Eleventh Development Plan envisages an economic and social development process that produces more value to gain competitive power at the international level with the national technology move. In the plan, the rule of law, fundamental rights and freedoms protected and developed by strong democracy are adopted as the carrier pillars of the development effort; stability and sustainability in the

economy, growth in welfare in the human, social and spatial development fields, and a continuous development orientation with its fair share are put forward as a priority objective. (Eleventh Development Plan 2019-2023:27).

In terms of environmental organizations, Turkey persists in its efforts within global activities. It has been seen as one of the best practices in the world by the United Nations Development Program because it creates objectives for Sustainable Development in a form that covers all environmental problems (Ökmen and Gormez, 2009: 119). Regardless, in terms of preparation for sustainable development goals, in the report introduced by the United Nations Sustainable Development Solutions Network, Turkey ranks 33rd among 34 countries. This situation indicates the need for Turkey to develop more strategies in the name of sustainable development.

3. THE CONCEPT OF FINANCIAL RISK

Financial risk is a more expansive concept that is defined as the inability of companies in paying off debts or being incapable of fulfilling obligations (İçerli and Akkaya, 2006:414), and parallelly includes financial deficit, financial distress, and bankruptcy costs (Ege et al, 2017:120; Selimoğlu and Orhan, 2015:25).

Financial risk can be defined as the inability of the establishment to settle its debts. The risk here emerges depending on whether the company finances its assets with equity capital or foreign capital. Financial risk is the failure of continuity of business earnings due to borrowing, the inability to adapt to the changes in economic and environmental conditions, and the incapability to obtain a level of earnings that can meet the obligations (Sarıkamış, 1998: 150). Financial risk is determined by financial leverage degree (Akmut, 1989: 21-22).

Financial risk is defined as the loss, monetary loss, loss of economic worth, or diminished benefits that may be reflected by the change that may arise between the current financial status and the financial status in the future. Financial risks, which are one of the most influential risk groups for companies, contain all elements that can affect the structures of companies. The markets are experiencing significant losses caused by the increasing uncertainties that happen in the light of: the tougher in competition conditions with globalizing markets, the ongoing changes in the conditions necessary for the continuity of the businesses, the unsuccessful choices of the management of the businesses, and the increase in the demand of loans and funds; and markets are experiencing significant losses due to the realization of the financial risks in which these uncertainties are at the source (Önem, 2010:48; Uğur, 2011).

Financial risk is the positive or negative deviation from the required value of the accounts in the companies' financial statements. It is the change in the active or passive assets of the companies because of the volatility in prices. In other words, financial risk can be defined as the risk that arises depending on factors such as imbalances in the financial structure, foreign resource ratio, and financing expenses (Hill, Stone, 1980:600). The business's financial risk increases depending on the following factors (Ceylan, Korkmaz, 2015: 501):

- Credit utilization,
- Volatility in sales,

- Fluctuation of raw material prices,

- Cash deficit,

Financial risk is corporate risk and is a factual law that is periodical, and occurs against people's will, possibly leading to both vulnerability and uncertainties (Zhang et al, 2008: 1044-1048). Even though the economic life of the companies, particularly incorporations, is infinite in theory, it is seen that some companies are not successful in practice and their existence comes to an end. The failure of a business refers to a process varying from the inability to meet its financial obligations, for some reason, to bankruptcy. Despite all the taken precautions, it may still be inescapable for the companies to fail to achieve their established goals and to take the liquidation decision by having to end their activities (Akgüç, 1998: 947).

Financial risk may arise because of the companies' ineptitude to perceive the changes in their environment over time and to address these changes. Many situations, such as the failure of the business, the incapability to fulfil its obligations, the loss of the credibility of the business, and its bankruptcy, are considered within the scope of financial risk (Sevil et al., 2013: 186).

Financial risk in companies usually surfaces in a form of a process, and the growth of the business stops during this process. The most apparent reason for this is that the enterprise does not take adequate precautions against the changes in its environment and is not able to adapt. This situation causes, by creating deviations in the long-term plans of the company, the objectives not to be realized at the desired level. (Sevil et al, 2013:186).

4. REVIEW OF LITERATURE

While there are only a few studies analysing the relationship between financial risk and stock price in foreign markets, Bansal and Dahlquist (2001) in their study, in which they used economic risk and financial risk premiums, concluded that the stock returns and stock market successes of the businesses trading in the stock exchanges of Central and South African countries, with low-risk premiums in question, have decreased. They found that risk premiums are the reason for a negative effect on stock price and stock market success.

Campbell et al. (2011) researched the determinants of corporate failure and the pricing of financially distressed stocks with a high probability of failure with a dynamic logit model, using accounting and market variables. They have found that since 1981, stocks containing financial risks have ensured abnormally low returns.

Cai and Zhang (2011:391-402) revealed that the change in the financial leverage ratio of the company has a negative directed and significant impact on the stock price. Sim et al (2011:201-216), beginning from the hypothesis that stocks with similar financial ratios will have similar price tendencies, studied 32 different financial ratios of 234 companies between 2000 and 2006. In the study, they concluded that stocks with similar financial ratios have similar price tendencies.

In Campbell, Hilscher, and Szilagyi (2011) study, in which the financial failures of companies that had unsuccessful stocks between 1991 and 2008 were estimated, the forecast of future financial failures was carried out in line with the market and using accounting-based measurement methods. As an outcome of the analysis, it has been determined that distressed stocks have variable returns and carry high risk. It is found that they tend to underperform in

comparison with reliable stocks during times of high market volatility and risk avoidance. Furthermore, it was revealed in the study that investors were not able to gain an additional income in line with the risks they accept.

Mateus (2004) found in their study that country-specific risk factors (financial, economic, and political) have a significant and negative effect on stock returns

In their research on the stock exchanges of 6 Latin American countries between the years 1985 and 1997, conducted to reveal the effect of financial risk on stock returns and stock market performance, Clark and Kassimatis (2004) stated that the financial risk premiums of five of the six specified countries have a significant effect about defining the stock market performance. Additionally, they concluded that the increase in financial risk negatively impacts the stock value.

It is seen that there are not many studies conducted to examine the relationship between financial risk and stock price in Turkish markets. Ayaydın and Karaaslan (2013), in their study regarding this subject, disclosed from the data of 12 banks in the banking sector in Borsa Istanbul for the 2003:1-2012:4 periods, that economic risk, political risk, financial risk, and country risk had a negative effect on stock prices.

From Turkey's economic, political, and financial risk value data for the years 1986-2006 prepared by the ICRG, Yapraklı and Güngör (2007) inferred that the stock prices traded in the Istanbul Stock Exchange (IMKB) were negatively influenced.

While studies that examine the relationship between the financial risk and stock price of the companies that take place in the sustainability index are not very common in the literature, Cheung and Roca (2013) examined the relationship between risk, return, and liquidity in companies included in and excluded from the Dow Jones Global Sustainability Index in 9 Asia Pacific countries between the years of 2002 and 2010. The returns of the companies included and excluded from the index decreased, and their transaction volumes increased; yet their systematic risks have not altered.

Charlo, Moya, and Muñoz (2015) compared the companies listed on the Spanish Stock Exchange by dividing them into 3 groups: included in the Sustainability Index, not included, and mixed. As a result, it has been seen that companies in the Sustainability Index make more profit at the same risk level and adapt faster to changes in the market.

As a result of the literature review, it is seen that there is not much research on the relationship between financial risk and the stock price of the companies that takes place in the sustainability index in our country.

5. METHOD

In this study, Z scores were calculated by taking the companies that take place in the BIST Sustainability Index into evaluation. The 10-year financial statement data of these companies between 2011 and 2020 were used and the data were obtained from the Public Disclosure Platform (KAP). The financial data of the companies are included in the calculation on an annual basis. Altman Z-Score model was used to determine the financial risk values of the companies. (Aksoy, 1993:160). Altman Z-Score Model is given in Equation 1.

Z = 1,2T1 + 1,4T2 + 3,3T3 + 0,6T4 + 0,999T5   (1)

T1- Net Circulating Capital Active Assets Ratio = Net Circulating Capital / Total Assets

T2 - Undivided Profit Active Assets Ratio = Undivided Profit/Total Assets

T3- Total Active Assets Earnings Ratio = EBIT/ Total Assets

T4- Financial ratio that includes market value = Current Value of Equity Capital / Total Debt

T5 - Asset Turnover = Net Sales / Total Assets

In the subsequent stage of the study, it was displayed to what extent the Z scores of the companies whose financial risks were calculated according to the Altman Z model defined the stock market prices of the companies. Therefore, panel data analysis was performed to explain the stock market prices of the companies that took place in the study. Panel data analysis was used to see the effect of Altman Z scores on the companies' market prices. The following model was established for panel data analysis:

GO = β0 + β1 RİSK + εi   (2)

In the research model, While the stock return rate (GO) is included as the dependent variable, financial risk (RISK) is included in the model as the independent variable. The return rate (GO) variable is included in the model by its natural logarithm

6. RESEARCH FINDINGS

In this part of the study, the results of the panel regression analysis conducted to determine the financial risk valuation findings and the relationship between the financial risk values and the stock return rate are included.

6.1. Findings of Financial Risk Assessment

The 10-year financial risk values of the companies included in the study, wrapping the years 2011-2020, were examined on an annual basis, before and after the entry into the sustainability index. Since the BIST Sustainability Index started to be published with the XUSRD code on November 4, 2014, it has been attempted to determine whether the index affects the financial risk values (Z Score) of companies, before and after the 2014/2015 period, with the equation (1). When the companies' financial risk values in Table 1 are examined, the findings are interpreted as follows, respectively:

Table 1. Financial Risk Values of Companies Included in the BIST Sustainability Index

Enterprises\Years	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ARÇLK	2,12	2,53	2,43	2,42	2,24	2,52	2,36	1,85	1,84	1,92
ASELS	1,76	1,93	1,66	1,99	1,84	2,85	4,67	3,23	2,61	3,04
EREGL	1,89	2,24	2,52	3,39	2,55	2,72	4,11	3,09	2,71	3,32
FROTO	4,87	4,76	3,75	3,68	3,87	3,74	4,39	4,4	4,4	4,59
OTKAR	2	2,29	2,13	2,51	2,28	2,62	2,48	2,13	2,98	2,94
PETKM	2,63	2,76	2,22	2,19	2,43	2,32	3,63	2,13	1,97	2,05
TOASO	2,14	2,31	2,51	2,51	2,23	2,49	2,81	2,66	3,21	2,56

When the financial risk values calculated for ARÇLK between 2011 and 2020 are reviewed, it is seen that the year 2019 has the lowest value with a value of 1,84, while the year 2012 has the highest financial risk value with a value of 2,53. Both values indicate that the financial risk is high. When the data of other years are examined, it is seen that all the values are in the value range in which the financial risk is defined as high. The ten-year financial risk average value of the company was 2,22, the lowest value was 1,84 and the highest value was 2,53. The financial risk average before the index was 2,35 and after the index, it was 2,10.

ASELS company's lowest risk value was 1,66 in the year 2013 and the highest value was 4,67 in 2017. Hence, we can state that the financial risk was significantly high in 2013 and there was no financial risk in 2017. When the other years are examined, it is seen that the financial risk values of the years 2018 and 2020 are 3,23 and 3,04, respectively, and they are in the value spans in which there is no financial risk. On the other hand, 2016 shows that financial risk is low with a risk value of 2,85 while in the years 2012, 2014, 2015 and 2019 financial risk stands high with values of 1,93, 1,99, 1,84, and 2,61, respectively. It is seen that the values for the years other than these are in the value range where the financial risk is very high. The ten-year financial risk average value of the company was 2,56, the lowest value was 1,66 and the highest value was 4,67. The financial risk average before the index was 1,84 and after the index was 3,28.

When ten-year financial risk values of EREGL company are studied, it is seen that the lowest value was 1,89 in 2011, indicating the high financial risk, while the highest value was 4,11 in 2017, which implies that there is no financial risk. Furthermore, the values of 3,39 and 3,09, respectively, for the years 2014 and 2018 show that there is no financial risk, however, when the data for the years other than these are examined, it is seen that the financial risk is high. The ten-year financial risk average value of the company was 2,85, the lowest value was 1,89 and the highest value was 4,11. The financial risk average before the index was 2,52 and after the index was 3,19.

When the ten-year financial risk values for FROTO are examined, the lowest financial risk value was 3,68 in the year 2014 and the highest was 4,87 in 2011. Thus, the financial risk values for all years, show that they are all realized in the range between these values and that this company has no financial risk. The ten-year financial risk average value of the company was 4,25, the lowest value was 3,68 and the highest value was 4,87. The financial risk average before the index was 4,19, and after the index, it was 4,30.

OTKAR's financial risk values were the lowest in 2011 with a value of 2,00 and the highest in the year 2019 with a 2,98 value. While the financial risk is high in 2011, there is no financial risk in the years 2019 and 2020. In other years, the financial risk is high. The ten-year financial risk average value of the company was 2,44, the lowest value was 2 and the highest value was 2,98. The financial risk average before the index was 2,24 and after the index was 2,63.

When the financial risk values for PETKM are examined, it is seen that the lowest financial risk value was 1,97 in 2019, and the highest financial risk value was 3,63 in 2017. Alternatively stated, we can say that there is no financial risk in 2017 and that financial risk is at a high level in 2019. We can state that the financial risk value from other years is high. The ten-year financial risk average value of the company was 2,43, the lowest value was 1,97 and the highest

value was 3,63. The financial risk average before the index was 2,45 and after the index was 2,42.

While TOASO's financial risk values were lowest in 2011 at 2,14, the highest financial risk was in the year 2019 with the value of 3,21, therefore financial risk was not observed in the said year. While the financial risk value was low in 2017 (2,81), the financial risk was high in other years. The ten-year financial risk average value of the company was 2,54, the lowest value was 2,14 and the highest value was 3,21. The financial risk average before the index was 2,34 and after the index was 2,75.

A detailed representation of the Financial Risk values of the companies included in the BIST Sustainability Index for the years 2011-2020 is given in Figure 1.
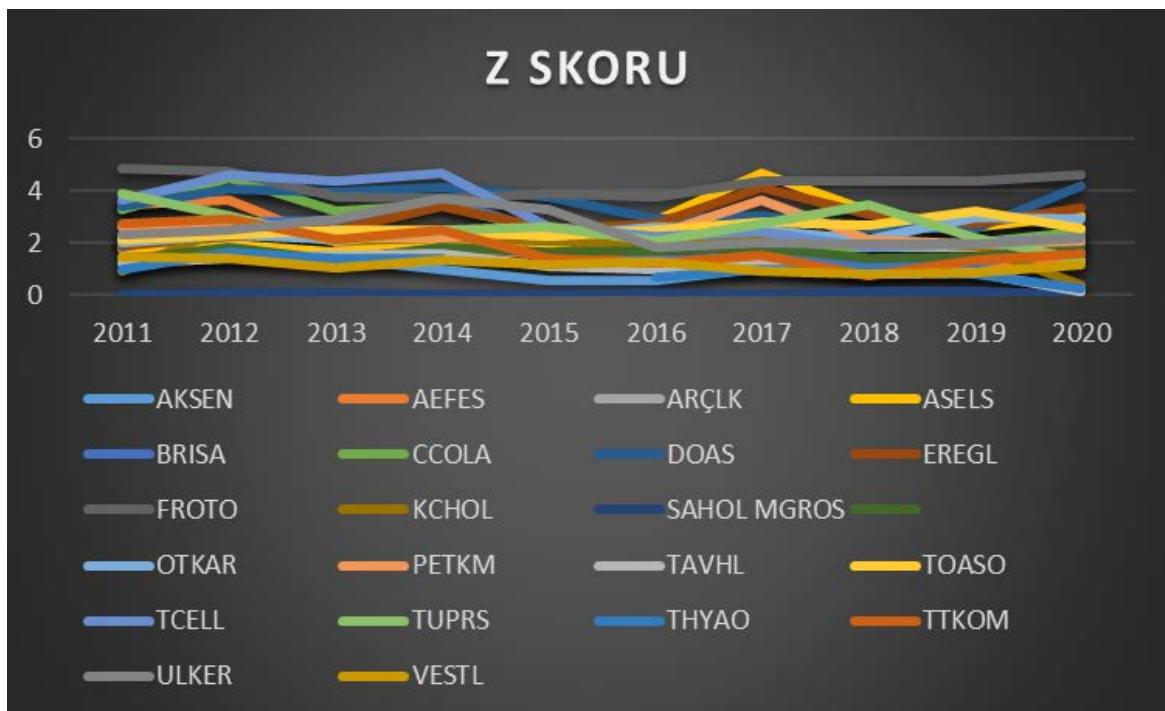

Figure 1. Financial Risk Values of Companies Included in the BIST Sustainability Index

After assessing the general financial risk status of the companies, panel data analysis was implemented with a goal to determine whether there is a connection between the financial risk values and the stock values of the companies and if there is, the direction and effect of such a connection.

6.2. Panel Data Analysis and Findings

Panel data are created by evaluating cross-sectional data and time-series data together. Therefore, unobservable effects, belonging to both units and time, can be determined (Tatoğlu, 2013: 2). As research hypotheses:

H1: There is a relationship between the financial risk values of the companies that take place in the sustainability index and their stock values.

We can express the model of the study with the equation under number (3).

$$\text{Model:} \quad GO = \beta_0 + \beta_1 \, RISK + \varepsilon_i \tag{3}$$

In the model, the Stock's Rate of Return (GO) is taken as the dependent variable, while financial risk (RISK) is taken as the independent variable.

Descriptive statistics for the variables in the model are given in Table 2.

Table 2. Variables Descriptive Statistics

Variables	Average	Standard Deviation	Minimum	Maximum	No of Observations
RISK	2.756	0,8174	1,66	4,87	70
logGO	0,1834	0,3475	-0,6931	0,91	70
GO	1,273	0,4311	0,5	2,5	70

For the period between the years 2011 and 2020, the average risk value of 7 companies was calculated as 2,756, and the average stock return was calculated as 0,1834. Moreover, the standard deviations of the variables are 0,8174, and 0,3475, and other statistical values take place in Table 2, respectively.

6.2.1. Panel Cross Section Dependence Test

If the cross-section dependency is not considered, the analyses conducted with classical panel data estimators can produce misleading or even inconsistent parameters (Chudik, Pesaran, 2013: 2). Therefore, testing the cross-section dependence on both a variable and a model basis comes into prominence.

Table 3. Cross Section Dependence Test

METHOD	CD (Pesaran 2004)	
Variables	Statistics	Probability (p)
GO	8,04*	0,0000
RISK	1,989 **	0,0470
Pesaran CD Test Statistics	**7,793***	**0,0000**
Friedman R	**37,16***	**0,0000**

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

H0: There is no dependency between the sections

H1: There is a dependency between the sections.

As a result of the analysis, the null hypothesis is rejected because the probability values of the GO and RISK variables are less than 0,05, which is the critical value. Scilicet, there is a cross-section dependency problem within these two variables. Consequently, second-generation unit root tests, which consider the cross-section dependence, were used while conducting the stationarity test for the GO and RISK variables.

In accordance with the results of the Pesaran CD test which can be observed in Table 3, since the series in our model are 0,0000<0,05, there is a determined cross-section dependency problem. Considering there is a cross-section dependency in the panel data analysis conducted for the model, this problem has been attempted to be resolved by using resistive estimators.

6.2.2. Panel Unit Root Test

The results acquired from the CADF test show the stationarity of the variable in each unit. CIPS statistics are calculated by taking the average of the t statistics obtained as a result of the CADF test

The CIPS statistics calculated as a result of the test are compared with the critical values defined in Pesaran (2007); if the obtained test statistic is greater than the table value within the absolute value, the basic hypothesis is rejected, and it is decided that the variable is stationary. Unit root test results regarding the variables used in the analysis in terms of companies are given in Tables 4, 5, 6, and 7.

Table 4. Results of Pesaran Panel Unit Root Test

Variables	Model	Pesaran CADF(CIPS) Statistics	Lag Length	Critical Table Value			Probability (p)
				10%	5%	1%	
GO	Stationary	2.421	1	-2,28	-2,470	-2,850	0,9920
	Stationary - With Trends	2.189	1	-2,870	-3,100	-3,510	0,9860
RISK	Stationary	-1.891	1	-2,28	-2,470	-2,850	0,3470
	Stationary - With Trends	1.849	1	-2,870	-3,100	-3,510	0,9680

When Table 4 is examined, it is understood from the probability values that the series contain unit-roots. (p>0,05)

Table 5. Results of Pesaran Panel Unit Root Test (When 1st Difference is Taken)

Variables	Model	Pesaran CADF(CIPS) Statistics	Lag Length	Critical Table Value			Probability (p)
				10%	5%	1%	
D1. GO	Stationary	-2.745	0	-2,280	-2,470	-2,850	0,0190**
	Stationary - With Trends	-2.758	0	-2,870	-3,100	-3,510	0,1920
D1. RISK	Stationary	-3,427	0	-2,280	-2,470	-2,850	0,0000*
	Stationary - With Trends	-3,263	0	-2,870	-3,100	-3,510	0,0420**

When Table 5, Pesaran Panel Unit Root Test Results, were analysed, it is understood that the GO variable was stationary in the stationary model, at the 0,05 significance level at the 1st difference of the series, however, it is understood from the probability values that it contains a unit root in the stationary-with trend model and that the RISK variable becomes stationary with a significance of 0,01 in the stationary model and with a significance of 0,05 in the stationary-with trend model. (p>0,05).

Table 6. Results of Pesaran Panel Unit Root Test (Stationary)

Variables	Model	Pesaran CADF(CIPS) Statistics	Lag Length	Critical Table Value			Probability (p)
				10%	5%	1%	
D2. GO	Stationary	-3.504	0	-2,280	-2,470	-2,850	0,0000*
	Stationary - With Trends	-3.811	0	-2,870	-3,100	-3,510	0,0040*
D2. RISK	Stationary	-3.564	0	-2,280	-2,470	-2,850	0,0000*
	Stationary - With Trends	-3.275	0	-2,870	-3,100	-3,510	0,0400**

When Table 6, Pesaran Panel Unit Root Test Results, are analysed, it is understood from the probability values that the GO and RISK variables in the model become stationary at the 2nd difference (p < 0,05).

6.2.3. Estimation of Panel Data Models

F test, Hausman test, and Breuch-Pagan LM (1980) tests are used to decide which of the panel data estimation models (stationary-effects model, random-effects model, or pooled model) will be used for estimation. Analysis results of these tests are shown in Table 7.

Table 7. Determination of the Estimation Model and F, LM and Hausman Tests

Tests	Test Statistics	Significance (P-Value)
F Test	1,43	0,2172
ALM(Var(u)=0)	0,00	0,4988
Hausman Test Statistics	0,00	0,9999

When the F test probability values in Table 7 are studied, a probability value of 1,0000>0,05 was acquired. Since the probability value is greater than 0,05, it can be stated that the pool model and its estimators will give more consistent results in comparison with the stationary-effects model and estimators related to the said model, in panel data analysis for the model. When the Hausman test results were examined, a probability value of 0,9999>0,05 was obtained. Since the probability value of the model is greater than 0,05, it can be stated that the random-effects model and its estimators will give more consistent results compared to the stationary-effects model and its related estimators, in panel data analysis. When the Breusch-Pagan LM test probability value is looked at, a probability value of 0,4988>0,05 was obtained. Since the probability value for the model is greater than 0,05, it can be stated that the pool model and its estimators in panel data analysis will give more consistent results compared to the random-effects model and estimators related to this model.

Table 8. Analysis Results Regarding the Relationship Between Financial Risk and Stock Return Rate

Variables	Coefficient	Standard Error	t- Statistics	P Value
STATIONARY	-0,04183	0,0150	-2,7500	0.739
RISK	0,7169	0,0800	8,9000	0,0000*
R-squared	0,4751			
F-Statistic	46,72			
Probability (F-Statistic)	0,0002*			
No of Observations	56			
No of Groups	7			
Method	Pooled OLS			

Dependent Variable: GO, Method: Panel Pooled OLS (Random-effects GLS regression) Sample Period: 2011-2020, Number of Cross Sections: 7, Total Number of Observations: 70

Note: *%1, **5%, ***10% indicate the level of significance.

When Table 8 is examined, the probability value of the F statistic being 0,0002 shows that the model is significant. The model's R-Squared value was acquired as 0,4751. Hence, the R-Squared value shows that the independent variables contained in the model can explain the changes in the dependent variable at a 0,4751 rate. When we look at the significance levels of

the variables, we can state that the coefficient of the RISK variable is statistically significant, and the value of the STATIONARY coefficient is statistically insignificant.

When the results are interpreted, we can note that a one-unit increase in the Financial Risk (RISK) value will lead to an increase in the Rate of Return (GO) by 0,7169 and that these increases are statistically significant.

7. CONCLUSION AND RECOMMENDATIONS

The anticipation that the financial risks of the enterprises listed in the sustainability index will be reduced in the long term and will have a positive impact on the stock price directs the attention of researchers to this subject. There are theories suggesting that the sustainability index reduces the enterprise risk in relation to its impact on the stock value of the enterprises and promotes long-term value creation. Many of the researchers express that being included in the index contains information, that this information has an impact on the stock value, and that being included in the index brings in abnormally positive returns. Some researchers suggest that sustainability practices have positive impacts on the stock value of the enterprises, while some of them assert that there is no such relation but even a negative impact. On the other hand, some researchers explain that the index has no significant impact on the enterprise risks and stock returns, while some of them obtained findings indicating that stock returns of the enterprises that were removed from the index were reduced, but risks remained. It was also suggested by the researchers that the risks of the enterprises listed in the sustainability index are more stable compared to those that are not included in the index, and they are not affected by the market fluctuations a lot.

Considering the estimated values, as a result, the probability value of 0.0002 for the F-statistic indicates that the model is significant. R-squared value of the model was obtained as 48%. Consequently, the R-Squared value indicates that the independent variables included in the model can explain the changes in the dependent variable by 48%. Considering the significance levels of the variables, we can express that the RISK variable coefficient is statistically significant, and the CONSTANT coefficient values are statistically insignificant.

Interpreting the results for each variable, we can express that a one-unit increase in the Financial Risk (RISK) value will lead to an increase of 0.72 in the Rate of Return (GO), and these increases are statistically significant.

In future studies, the long-term impact of the sustainability index on the financial risks, financial performances, and stock value of the enterprises can be investigated further. In addition, the level of impacts may be presented by comparing the pre-index and post-index status of these impacts

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