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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.

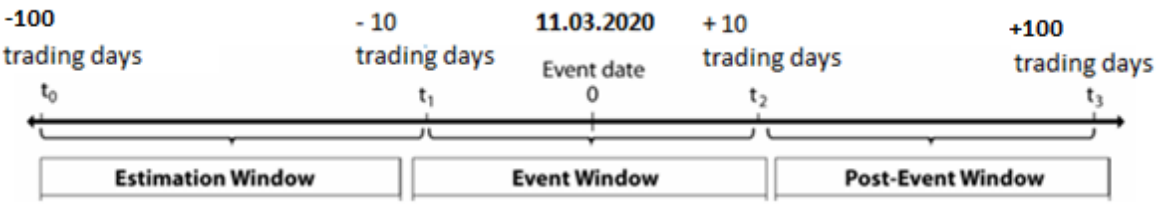

Figure 1. Event Study Timeline

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.

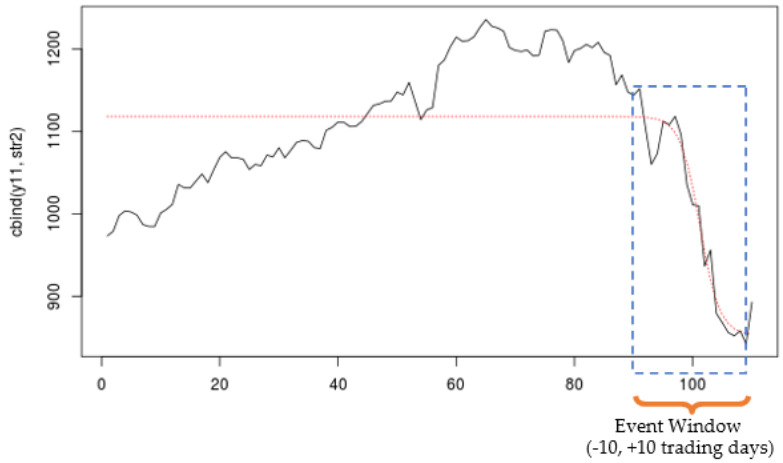

Figure 2. Logistic Smooth Transition Trend Model_A and Original Series (LNV test)

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.

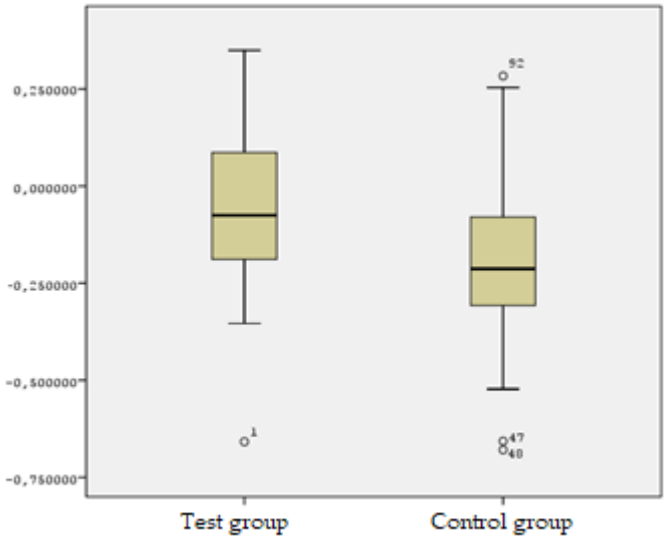

Figure 3. Box Plot Graph for the Cumulative Abnormal Returns for Test and Control Groups

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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