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The Effect of Country Credit Default Swap Premiums on Companies' Investment Policies: An Empirical Study in Borsa Istanbul

Ülke Kredi Temerrüt Swap Primlerinin Şirketlerin Yatırım Politikalarına Etkisi: Borsa İstanbul'da Ampirik Bir Araştırma

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Abstract: Credit default swaps (CDSs), which have become one of the main indicators of the economy in recent years, emerged in the mid-1990s as a result of synthetic securitization efforts that enabled banks to reduce the size of their balance sheets and move more capital, are transferring the risk of default among investors. The aim of this study is to research the impact of country CDS premiums on companies' investment policies which are vital for companies by using panel data analysis method. Companies listed on Borsa Istanbul (Bist 100) in the 2015- 2022 period were included in the research. The results of the variables were obtained by using Hansen's (1995) Covariate-Augmented Dickey Fuller (CADF) test, one of the second generation panel unit root tests. Breusch-Godfrey/Wooldridge and Durbin-Watson tests were used to test the autocorrelation assumption. For the test of the variable variance assumption, the Studentized Breusch-Pagan test was used. As a result, as expected a negative relationship was found between the country CDS premiums and the investments of the companies whose stocks are listed in Borsa Istanbul.

Keywords: CDS, BIST, Investment

JEL Classification: C23, G10, G11

Öz: Son yıllarda, ekonominin ana göstergelerinden biri haline gelen kredi temerrüt takasları (CDS'ler) 1990'ların ortalarında bankaların bilançolarının boyutunu küçültmelerini ve daha fazla sermaye taşımalarını sağlayan sentetik menkul kıymetleştirme çabalarının bir sonucu olarak ortaya çıkmıştır ve yatırımcılar arasında temerrüt riskini transfer etmektedir. Bu çalışmanın amacı, ülke CDS primlerinin şirketler için hayati önem taşıyan yatırım politikaları üzerindeki etkisini panel veri analizi yöntemini kullanarak araştırmaktır. Araştırmaya 2015- 2022 döneminde Borsa İstanbul'da (Bist 100) işlem gören şirketler dahil edilmiştir. Değişkenlere ilişkin sonuçlar ikinci nesil panel birim kök testlerinden Hansen (1995)'in Covariate-Augmented Dickey Fuller (CADF) testi kullanılarak elde edilmiştir. Otokorelasyon varsayımının sınanması için Breusch-Godfrey/Wooldridge ve Durbin-Watson testleri kullanılmıştır. Değişen varyans varsayımının testi için ise, Studentized Breusch-Pagan testi kullanılmıştır. Sonuç olarak, beklendiği gibi, ülke CDS primleri ile hisse senetleri Borsa İstanbul'da işlem gören şirketlerin yatırımları arasında negatif yönlü bir ilişki bulunmuştur.

Anathar Kelimeler: CDS, BIST, Yatırım

JEL Sınıflandırması: C23, G10, G11

1. Introduction

The globalization of markets, businesses expanding into foreign markets, and increasing competition have led to an escalation in market risk. Companies aim to identify the financial risks they face, develop policies to manage these risks, and utilize various tools to either hedge or transfer the risks to a third party. Derivative products are preferred by companies

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due to their offering of off-balance sheet hedging opportunities in addition to on-balance sheet methods in financial risk management (Yücel et al., 2007). The use of derivative products, especially in terms of financial risk management, has significantly increased in recent years. Apart from financial risk management, derivatives also enhance market resilience against financial shocks, and promote financial innovations and market developments (Leo, 2012).

One of the primary functions of derivative products is to enable market participants to cost-effectively hedge risks associated with movements in underlying asset prices. Derivative transactions are utilized by a wide range of entities, including commercial banks, investment banks, central banks, fund managers, insurance companies, and various other non-financial organizations (Leo, 2012). Derivative products, which are agreements between two parties contingent on the value of the underlying asset, are utilized for risk management, hedging against risks, as well as for investment and arbitrage (Anbar & Değer, 2011). However, rapid technological advancements and the digitalization of markets have largely mitigated price differentials between markets, making it nearly impossible to profit from arbitrage (Bukhari, 2020).

Derivative products can be classified into two main groups: financial derivatives and credit derivatives. Financial derivatives include forwards, futures, options, and swaps. Credit derivative products, often referred to as synthetic credits, encompass total return swap contracts, credit spread derivatives, credit-linked notes, collateralized debt obligations, and credit default swaps (CDS) (Scheerer, 2000).

The motivation of this study was to investigate how the change in CDSs, which are credit derivatives, affects the decision-making processes of companies and risk management in companies. The effect of CDSs on the investment decisions of BIST 100 companies was investigated by panel data analysis. In the study, cross-sectional dependence was tested by applying Pesaran's CD, Breusch-Pagan and Breusch-Pagan scaled tests and it was seen that the data had cross-sectional dependence. The stationarity of the series was tested using the CADF unit root test and the test result showed that the series were stationary. The model to be applied with the F test, the Breusch-Pagan test and the Hausman specification test was selected. Breusch-Godfrey/Wooldridge and Durbin-Watson tests were used to test the autocorrelation assumption, and Studentized Breusch-Pagan test was used to test the variable variance assumption. Finally, model predictions were obtained by using the Arellano estimation model, one of the resistant estimators. With this research, the importance of CDSs in the decision-making processes of stock exchange companies and how CDSs will affect

companies in their risk management strategies will be better understood. Below, credit derivatives and subsequently CDSs are explained in detail.

1.1 Credit Derivatives

The use of financial instruments such as credit derivatives, which permits commercial banks to transfer credit risk to a third party in exchange, thereby avoiding additional costs for creating reserves, has become one of the ways to prevent adverse outcomes. Although, in spite of the numerous advantages of hedging, credit derivatives, like other financial innovations, also directly create extra risks. For instance, these risks showed themselves during the 2008 global financial crisis and because of that credit derivatives‘ positive impact has reduced (Petruk & Stadniichuk, 2020).

In simple terms, credit derivatives represent a contract between two market participants, essentially transferring credit risk from one party to the other (Tözüm, 2009). The value is derived from the credit performance of one or more companies, independent agencies, or debt obligations. Banks and other financial institutions have found hedging methods for interest rate and exchange rate risks, and credit derivatives have similarly emerged in response to the need for hedging and diversification tools for credit risks. However, credit derivatives are also growing due to demand from those who want to take on credit risks with low-cost instruments (Mengle, 2007).

Banks and insurance companies are the primary participants in the credit derivatives market. Banks are protection buyers and insurance companies are protection sellers. Over time, other players have entered the market, including hedge funds, investment and pension funds, as well as industrial and commercial companies. Credit derivatives are a very important tool for banks to manage credit risk, allowing them not only to close unwanted risk positions but also to reduce pre-existing ones. This is one reason why credit derivatives are called 'synthetic collateral'. They not only help mitigate risks faced by customers but are also an option to traditional credit risk hedges (Zoccoletti, 2018).

Credit derivatives have addressed two long-standing issues in banking. Firstly, it is rarely feasible to hedge credit risk when extending credit. The inability to take short positions hinders banks from hedging credit risk due to the preference of borrowers for long-term loans. The second problem can be seen as the inability to diversify credit risk. Banks that have worked with large-volume clients for many years have not been able to increase the volumes of other clients and have chosen to diversify by acquiring other banks. However, the use of credit derivatives also has certain disadvantages. The most significant among these is that the

party assuming credit risk after the credit transfer may not be as specialized as the party who transfers the risk. Additionally, while credit derivatives are used to distribute risk, less experienced organizations may concentrate risk instead of diversifying it in order to attain higher returns (Mengle, 2007). The main subject of the research, CDSs, is further elaborated in the next section.

1.1.1 Credit Default Swaps

In the mid-1990s, as a result of synthetic securitization efforts that allowed banks to shrink their balance sheets and carry more capital, JP Morgan Chase facilitated the emergence of CDSs. Synthetic securitization, which is a form of credit that transfers risk to investors, does not allow risky assets to be moved off the balance sheet. CDSs, which can be considered as a derivative of synthetic securitization, can show the risk outside the balance sheet (Aydın et al., 2016). CDS is a kind of insurance transaction and can be thought of as the credit derivative that most resembles insurance contracts (Tözüm, 2009). In other words, CDSs are guarantee contracts that insure loans (Bukhari, 2020). In this transaction, the creditor, who transfers their risk to the counterparty (usually large investors), is required to pay a premium, which is determined according to the CDS spread. When the CDS spread is high for a high-risk asset, it is lower for an asset with lower risk (Akkaya, 2017).

Three parties, including the protection seller, protection buyer, and an intermediary, are required for credit default swaps. The party selling the protection is the investor who assumes the risk. The protection buyer, on the other hand, is the owner of the risky asset. Before the swap transaction, the protection seller has engaged in a lending event and wishes to transfer the risk of the borrower defaulting to the party assuming the risk through an intermediary. The protection seller usually makes premium payments to the party assuming the risk at quarterly intervals (rarely semi-annually and annually), and in the event of the actual borrower defaulting, the party assuming the risk, the protection seller, covers all the losses (Hancı, 2014). Essentially, the protection buyer can replace their own money in the event of default by the actual debtor, so the CDS contract insures the protection buyer against the loss of the default (Longstaff et al., 2012).

In recent years, CDS spreads have begun to be considered as an important indicator. CDS contracts have the following typical features (Mateev and Marinova, 2019):

- ✓ CDSs are mostly used as a measure of credit risk.

- ✓ There are different views on whether CDSs contain liquidity risk premiums. According to some researchers, CDSs are less sensitive to liquidity than corporate bonds. According to others, CDSs do not carry any liquidity premium.
- ✓ Unlike corporate bonds, CDSs are based on standardized terms and more sensitive to changes in credit terms.

CDS premiums are one of the leading indicators in assessing the risk perception of international investors regarding the country in which they will invest. Accurate determination of country credit risk is of great importance in the decision-making stages of investors both in direct investments and portfolio investments (Kılcı, 2017). While CDS premiums decrease with positive information, negative information increases CDS premiums. In other words, if the risk of the underlying asset increases, CDS premiums increase (Çakır, 2019). In addition, the deterioration of economic indicators in a country or the appearance of political uncertainty will also induce an increase in CDS premiums (Çakır, 2019). It is very important that CDS pricing remains stable in order to achieve financial stability. Financial markets experience instability during sudden increases and volatilities, and this increases borrowing costs (Carr and Wu, 2007). Since investors will avoid investing in markets with high volatility, the volatility of CDS premiums should be kept to a minimum.

2. Literature Review

In their study, Carr and Wu (2007) investigated the relationship between country CDS premiums and currency implied volatilities, using data from two emerging markets (Mexico and Brazil). As a result of the analyses using the quasi-maximum likelihood method, they found that there are strong positive concurrent correlations between CDS premiums and currency volatilities.

In their study, Longstaff et al. (2012) investigated how counterparty credit risk is priced in the CDS market. Based on the fact that there is little information about the price of counterparty credit risk, they examined the CDS transaction prices and quotations of 14 different companies that sold credit protection to the same company simultaneously. In the study in which the panel regression method was applied, it was investigated to what extent the credit risk of a company offering to sell credit protection was reflected in the prices at which the company could sell protection, and it was determined that the counterparty credit risk was priced in the CDS market. If a seller's credit risk is high, it will reduce the price of credit protection he or she can sell in the market.

Balduzzi et al. (2015) tested whether the negative changes in the market valuations of banks during financial crises and the consequent increase in banks' funding costs affect company decisions. They found that increases in CDSs resulted in lower investment for start-ups and relatively small-sized companies.

In his thesis, Wu (2018) investigated whether the economy and its participants were affected by CDS. In his study, he first examined how CDSs affect the yield difference between corporate and government bonds. Using both theoretical and empirical approaches, he has attempted to show how company-specific CDSs affect yield distribution under different bond issuance conditions. The author then discussed the relationship between company investments and CDSs. After the start of the use of CDS, companies with high liquidity increased their investments, while companies with low liquidity decreased their investments.

Bartram et al. (2019) examined CDSs around the world through their investment and financing effects. They used Bolton and Oehmke's (2011) model to extend to account for the uncertainty about whether actions taken by the reference organization would trigger CDS obligations. By evaluating the companies within the framework of their internal dynamics, they analyzed the effect of CDS application on decision-making within the company. Between 2001 and 2015, they tested the model’s predictions which they developed using a specimen of more than 56,000 companies in 50 countries. As a result, they found significant evidence that companies' use of CDS influences decisions within the company, including leverage, investment, and the risk of investments undertaken by the company. They found that when uncertainty about companies' liabilities is reduced and property rights are eased, the impact of CDS is higher. They also found that CDS was more likely to be implemented in companies that used bank financing more frequently and had less sense of ownership in countries with weak creditor rights.

Mateev and Marinova (2019) investigated the volatility between CDSs and the stock market through empirical tests. In their study, they used a specimen of 109 companies in European countries between January 2012 and January 2016. They investigated the type and direction of the volatility relationship with the dynamic conditional correlation model, and the volatility spread and direction between CDS and stock prices with the BEKK-GARCH model. As a result of the study, they found strong evidence supporting the hypothesis that the volatility of CDS and stock prices can be modeled under the assumption of dynamic conditional correlation. Volatility spread hypothesis tests have provided evidence that the

European CDS market has a dominant lead over the equity market and that the volatility spread is bidirectional.

Bukhari (2020) examined the relationship between the country CDS premium and the stock market index using correlation analysis. The stationarity of the series was tested by the Extended Dickey-Fuller test. The long-term relationship between the variables was examined with the Johansen cointegration test, and the direction of the relationship between the variables was investigated with the Granger causality test. Finally, the antecedent relationship between variables was tested by variance decomposition analyses and effect response functions within the framework of vector autoregression model. In the study, CDS premiums and BIST 100 Index were taken into account weekly from January 2010 to December 2019. As a result, it was found that the changes in the BIST 100 Index affected the CDS premiums. It was emphasized that the positive or negative effects caused reactions in the BIST 100 Index, and as a result, there was a change in the country's CDS premium, and the BIST 100 Index return was a leading indicator of CDS premiums.

Nar (2021) analyzed the relationship between CDSs and net portfolio investments in Turkey. In the study, stationarity was analyzed primarily using Extended Dickey-Fuller and Phillips-Perron unit root tests. Then, an error correction model was estimated and the short- and long-term coefficients and their significance were examined. The ARDL limit test, which allows the cointegration relationships between stationary variables to be examined at different levels, was applied. As a result of the analysis, it was seen that there is a significant causality relationship between CDS premiums and portfolio investments in Turkey in the short term. While the increase in CDS premiums decreases portfolio investments, the decrease in CDS premiums leads to an increase in portfolio investments. However, it was concluded that the relationship between CDS premiums and portfolio investments remained limited in the long run, a finding reminiscent of the fact that Turkey grew predominantly with short-term external borrowing.

3. An Empirical Study in Borsa Istanbul on the Effect of Credit Default Swaps on Companies' Investment Policies

In this study, it is investigated by panel data analysis method whether CDSs, which are a globally accepted risk indicator that can instantly measure the risk level in countries, affect investment decisions of the companies in Borsa Istanbul. Since CDSs can affect investment decisions both positively and negatively, it is important to measure this impact. After the 2008 global financial crisis, the importance of measuring risk for both organizations and countries

has been better understood. For this reason, many supervision and regulation mechanisms have been developed to control risks. In this context, intensive academic studies on CDSs have been carried out and continue to be carried out around the world.

In the research, January 2015 was determined as the start date and December 2022 as the end date. Companies in the BIST 100 Index were included in the research. A panel data study was conducted by taking into account the annual investment data of these companies between 2015 and 2022 and Turkey's five-year CDS data. The annual average of the daily closing values of CDS premiums is taken. CDS premiums were obtained from the Bloomberg data screen and datastream program on a daily basis, and the investment amounts included in the financial statements of the companies were obtained from the public disclosure platform (www.kap.org.tr). R Studio 4.1.3 statistical program was used for unit root tests and panel data analysis.

While selecting variables other than CDS, support was obtained from studies examining macroeconomic and company-specific factors affecting investments. In their study, Nguyen and Dong (2013) investigated the effect of financial leverage ratio and company size on investment activities and found that these two variables are among the main factors affecting investment decisions. Also Ruiz-Porras and Lopez-Mateo (2010) documented that the effects of company size is mostly positively significant on investment decisions. Hussain et al. (2020) examined the investment decisions of 21 companies in the fuel and energy sectors and stated that ROA and ROE also affect the company‘s investment decisions, as well as company size. They also included corporate tax rate, exchange rate and interest rate in their research because they are additional indicators that have an extraordinary impact on investment decisions and expect them to affect companies' performance. Albu (2006), like Hussain et al (2020), investigated the relationship between interest rate and investments by adding the growth rate to his study. Kurtaran (2007) says that as GDP increases, foreign direct investments increase and countries that want to increase investments should strive to increase GDP. Basu and Das (2015) found that profitability has a positive impact on investment in both the short and long term. In their research in the Indian organized manufacturing sector, they have shown that profitability is one of the important factors in encouraging investment. Ziarko (2015) evaluated the impact of ROA, ROE and return on sales (ROS) on investment decisions on 15 companies listed on the Warsaw Stock Exchange. In addition, the effect of company size on investments was also investigated. Uzay (1999) investigated the effect of inflation on investments and stated that inflation, which will adversely affect capital accumulation in the long run, will have a negative effect on investments. In his study, Şenesen (1984) emphasizes

that an inflationary environment affects the investment decisions of enterprises in many different ways, and that the key variable in many of these effects is the sensitivity of the net cash flows of the investment to inflation. Igbal and Nawaz (2010) investigated the relationship between inflation and investment using annual data of the inflation rate for Pakistan from 1961 to 2008. They found that the inflation rate below the threshold level had a positive but insignificant effect on investment, while above the threshold level had a negative and significant effect. Changes in oil prices, which is another variable in our study, are expected to have different consequences for the countries that export oil and those import it. In her study, Aldibekova (2018) revealed that oil prices greatly affect the Russian economy and that the increase has a positive effect on investments. She stated that the same situation is also valid for Kazakhstan, which is one of the oil exporting countries. In the study of Dağlı and Sevim (2015), it was revealed that oil prices have a statistically significant and negative effect on business investments in terms of petrochemical enterprises in Turkey. Considering that Turkey is an oil-importing country, it coincides with Aldibekova's study.

As a result of the researches conducted in the literature, independent variables were selected and they are included in Table 1.

Table 1. Variables of the research

Dependent variable	**Definition**	**Formula**	**Source**
IR	Investment ratio	(Tangible assets + Intangible assets) / Total assets	www.kap.org.tr
Independent Variables	**Definition**	**Formula**	**Source**
CDS	Country credit default swap premiums	Five-year CDS premiums	Bloomberg data screen and datastream program
ROE	Return on equity	Total net profit / Average equity	www.finnet.com.tr
ROA	Return on assets	Total net profit / Average assets	www.finnet.com.tr
LOGTA	Logarithm of total assets	Logarithm of total assets as of the end of the year	www.finnet.com.tr
FLR	Financial leverage ratio	Total liabilities/Total assets	www.finnet.com.tr
PPI	Producer price index	Annual average of monthly data	www.tcmb.gov.tr
ARE	Average USD Rate	Annual average of daily data	www.finnet.com.tr
GR	Growth rate in gross domestic product	Annual growth rate	www.data.tuik.gov.tr
CTR	Corporate tax rate	Annual corporate tax rate	www.turmob.org.tr
CLIR	Commercial loan average interest rate	Annual average of monthly data	www.tcmb.gov.tr
OP	Oil prices	Annual average brent oil price*Average USD sales rate	www.tcmb.gov.tr

Companies listed on the stock exchange, publish their financial reports regularly and are more sensitive to market conditions and economic factors. The investment decisions of these companies, which generally operate in sectors where competition is intense, become more evident as a result of this competition. In addition, the fact that companies listed in the stock market interact more with investors and the public enables better analysis of the social and economic effects of investment decisions. For the reasons mentioned, the companies in the BIST 100 index were selected in this study. In addition, listed companies are subject to certain regulations, and these regulations provide an important framework for examining the factors that affect investment decisions. 91 companies in the BIST 100 Index were included in the research and the effect of country CDS premiums on the investment policies of the companies was examined. Between 2015 and 2022, nine companies were excluded from the model due to missing observations in their data. In the study, the investment amounts of the companies were taken as the dependent variable. As an independent variable, company-specific variables such as IR, ROE, ROA, LOGTA, FLR and macroeconomic variables such as CDS, PPI, ARE, GR, CTR, CLIR and OP were taken into account. In this context, hypotheses of the research are given in Table 2.

Table 2. Hypotheses of the research

Main Hypothesis	
H1	Country CDS premium has a negative impact on the investment decisions of companies in the BIST 100 Index.
Sub-Hypotheses	
H1	There is a positive relationship between return on equity and investment decisions.
H2	There is a positive relationship between return on assets and investment decisions.
H3	There is a positive relationship between company size and investment decisions.
H4	There is a negative relationship between company indebtedness and investment decisions.
H5	There is a negative relationship between the inflation rate and investment decisions.
H6	There is a negative relationship between the exchange rate and investment decisions.
H7	There is a positive relationship between the growth rate in gross domestic product and investment decisions.
H8	There is a negative relationship between the corporate tax rate and investment decisions.
H9	There is a negative relationship between commercial loan interest rate and investment decisions.
H10	There is a negative relationship between oil price and investment decisions.

In this study, panel data analysis was used and the effect of country CDS premiums on the investment decisions of the companies in the BIST 100 Index was examined. Three panel data models were created to examine the impact of CDSs on investment decisions. In all models, first of all, descriptive statistics for the variables were calculated. Then, with the Jarque Bera test, it was examined whether the data on the variables came from the normal distribution. Spearman correlation was used to determine the relationships between variables. Pesaran's CD, Breusch-Pagan and Breusch-Pagan scaled tests were applied to test cross-sectional

dependence. One-way unit-effect models were predicted. After estimating fixed effects and random effects models, it was determined which model was valid with the Hausman specification test. In the next step, the basic assumptions in the panel data analysis were tested, and resistant standard errors were obtained against the distorted assumptions.

The three panel data models created by using the investment data of the companies in the BIST 100 Index are as follows:

$$lnIR_{it} = \beta_0 + \beta_1 CDS_{it} + \mu_i + u_{it} \qquad i = 1, \dots, 91 \quad t = 2015, \dots, 2022$$

$$lnIR_{it} = \beta_0 + \beta_1 CDS_{it} + \beta_2 ROE_{it} + \beta_3 ROA_{it} + \beta_4 PPI_{it} + \beta_5 ARE_{it} + \beta_6 CLIR_{it} + \mu_i + u_{it}$$
$$i = 1, \dots, 91 \quad t = 2015, \dots, 2022$$

$$lnIR_{it} = \beta_0 + \beta_1 CDS_{it} + \beta_2 lnLOGTA_{it} + \beta_3 FLR_{it} + \beta_4 GR_{it} + \beta_5 CTR_{it} + \beta_6 OP_{it} + \mu_i + u_{it}$$
$$i = 1, \dots, 91 \quad t = 2015, \dots, 2022$$

First of all, descriptive statistics were calculated. These are; mean, median, minimum, maximum, standard deviation, skewness and kurtosis. Afterwards, the Jarque Bera test statistic was applied. The results are shown in Table 3.

Table 3. Descriptive statistics

Variables	Mean	Median	Min.	Maks.	Standart Deviation	Skewness	Kurtosis	Jarque Bera	p-value	Sample Size
IR	0,26	0,24	0,00	0,84	0,21	0,47	-0,77	458,00	0,000***	728
ROE	17,12	16,53	-2,19	339,54	87,72	-22,11	556,94	952,00	0,000***	728
ROA	8,62	5,97	-21,98	71,94	11,41	1,98	6,330	170,00	0,000***	728
LOGTA	9,89	9,80	7,76	12,22	0,84	0,44	-0,02	241,00	0,000***	728
FLR	0,57	0,59	0,00	1,16	0,26	-0,11	-0,80	208,00	0,000***	728
CDS	360,94	337,00	205,00	659,00	139,00	956,00	254,00	111,00	0,000***	728
PPI	31,78	17,36	4,31	128,09	38,25	1,87	2,09	565,00	0,000***	728
ARE	6,92	5,63	2,87	16,98	4,36	1,32	0,72	231,00	0,000***	728
GR	30,97	18,19	11,72	107,02	30,23	1,90	2,06	571,00	0,000***	728
CTR	21,78	22,00	20,00	25,00	1,68	0,58	-0,61	527,00	0,000***	728
CLIR	18,21	18,31	12,76	24,08	3,93	0,03	-1,57	748,00	0,000***	728
OP	468,56	323,00	141,00	162,00	460,00	186,00	203,00	546,00	0,000***	728

Not: ***, **, * refers to the significance of %1, %5 and %10, respectively.

According to the results of the Jarque Bera test, it is seen that the distribution of the data of all variables does not come from the normal distribution at the 99% confidence level ($p<0.01$). The distribution of data on variables often does not conform to the normal distribution. Therefore, a statistical analysis technique should be used to determine the direction and degree of the relationship between variables. In the study, Spearman correlation analysis was used to examine the relationships between the variables and the results are shown in Table 4.

Table 4. Spearman correlation matrix

	IR	ROE	ROA	LOGTA	FLR	CDS	PPI	ARE	GR	CTR	CLIR	OP
IR	1,00	-0,15	-0,04	-0,21	-0,11	-0,14	-0,12	-0,16	-0,12	-0,15	-0,05	-0,14
ROE	-0,15	1,00	0,86	0,06	-0,14	0,31	0,38	0,38	0,39	0,35	0,22	0,38
ROA	-0,04	0,86	1,00	-0,19	-0,49	0,23	0,28	0,28	0,28	0,25	0,15	0,28
LOGTA	-0,21	0,06	-0,19	1,00	0,48	0,30	0,28	0,33	0,28	0,32	0,15	0,31
FLR	-0,11	-0,14	-0,49	0,48	1,00	0,01	0,02	0,02	0,02	0,03	0,02	0,02
CDS	-0,14	0,31	0,23	0,30	0,01	1,00	0,60	0,90	0,55	0,85	0,24	0,76
PPI	-0,12	0,38	0,28	0,28	0,02	0,60	1,00	0,81	0,93	0,85	0,79	0,95
ARE	-0,16	0,38	0,28	0,33	0,02	0,90	0,81	1,00	0,79	0,93	0,40	0,90
GR	-0,12	0,39	0,28	0,28	0,02	0,55	0,93	0,79	1,00	0,78	0,62	0,83
CTR	-0,15	0,35	0,25	0,32	0,03	0,85	0,85	0,93	0,78	1,00	0,50	0,93
CLIR	-0,05	0,22	0,15	0,15	0,02	0,24	0,79	0,40	0,62	0,50	1,00	0,67
OP	-0,14	0,38	0,28	0,31	0,02	0,76	0,95	0,90	0,83	0,93	0,67	1,00

The statistics and values in Table 3 and Table 4 may not be sufficient to clarify the relationship between the variables. Since the results of the analyzes performed by ignoring the cross-sectional dependency will be inconsistent or deviant, it is necessary to examine the cross-sectional dependencies of the series before starting the panel data analysis. In addition, stationarity (unit root) and autocorrelation tests are also needed. Three different tests, Pesaran's CD, Breusch-Pagan and Breusch-Pagan scaled, were applied and cross-sectional dependence was tested. The results are given in Table 5.

Table 5. Cross section dependency test results

	Pesaran's CD	p-value	Breusch-Pagan	p-value	Breusch-Pagan scaled	p-value
IR	38,68	0,000***	10306	0,000***	68.63	0,000***
ROE	72,29	0,000***	10105	0,000***	66.40	0,000***
ROA	60,35	0,000***	9468.3	0,000***	59.37	0,000***
LOGTA	172,08	0,000***	29697	0,000***	282.9	0,000***
FLR	-	-	-	-	-	-
CDS	181	0,000***	32760	0,000***	316.75	0,000***
PPI	181	0,000***	32760	0,000***	316.75	0,000***
ARE	181	0,000***	32760	0,000***	316.75	0,000***
GR	181	0,000***	32760	0,000***	316.75	0,000***
CTR	178,69	0,000***	31949	0,000***	307.78	0,000***
CLIR	181	0,000***	32760	0,000***	316.75	0,000***
OP	181	0,000***	32760	0,000***	316.75	0,000***

According to Table 5, it has been concluded that the data for all variables have cross-sectional dependence at the level of $\alpha = 0{,}01$. The fact that the test results indicate that there is a cross-sectional dependency reveals that unit root tests should be performed considering this situation. Unit root test was applied with the assumptions that second-generation unit root tests can give more reliable results in data sets with cross-sectional dependency and that the variables are generally stationary in panel data analysis. Results for each variable were obtained using Hansen's (1995) Covariate-Augmented Dickey Fuller (CADF) test, one of the second generation panel unit root tests, and shown in Table 6.

Table 6. CADF Unit Root Test Results

Variables	IR	ROE	ROA	LOGTA	FLR	CDS	PPI	ARE	GR	CTR	CLIR	OP
CADF	-78,33	-24,86	-17,27	-90,34	-8,91	-46,55	-37,81	-37,5	-36,19	-17,76	-34,9	-38,45
p-value	0,000 ***	0,000 ***	0,000 ***	0,000 ***	0,000 ***	0,000 ***	0,000 ***	0,000 ***	0,000 ***	0,000 ***	0,000 ***	0,000 ***

Not: ***, **, * refers to the significance of %1, %5 and %10, respectively.

According to the results in Table 6, the hypothesis showing the existence of the unit root is rejected for all variables at the level of $\alpha = 0{,}01$. In this case, it can be said that all the variables considered in this study are stationary. In the selection of the appropriate panel data model, F test was applied to compare the pooled regression model and the fixed effects model, Breusch-Pagan test was applied to compare the pooled regression model and the random effects model, and Hausman test was applied to compare the fixed effects model and the random effects model, and the results are given in Tables 7, 8 and 9.

Table 7. F Test Results

Dependent variable	Independent Variables	Test Statistics	p-value	Result
IR	CDS	60,94	0,000***	Fixed effects
	CDS, LOGTA, FLR, GR, CTR, OP	61,012	0,000***	Fixed effects
	CDS, ROE, ROA, PPI, ARE, CLIR	65,272	0,000***	Fixed effects

Not: ***, **, * refers to the significance of %1, %5 and %10, respectively.

Table 8. Breusch-Pagan Test Results

Dependent variable	Independent Variables	Test Statistics	p-value	Result
IR	CDS	1978,8	0,000***	Random effects
	CDS, LOGTA, FLR, GR, CTR, OP	1973,7	0,000***	Random effects
	CDS, ROE, ROA, PPI, ARE, CLIR	2016,5	0,000***	Random effects

Not: ***, **, * refers to the significance of %1, %5 and %10, respectively.

Table 9. Hausman Specification Test Results

Dependent variable	Independent Variables	Test Statistics	p-value	Result
IR	CDS	0,00	1,00	Random effects
	CDS, LOGTA, FLR, GR, CTR, OP	1,6741	0,94	Random effects
	CDS, ROE, ROA, PPI, ARE, CLIR	0,016	1,00	Random effects

Breusch-Godfrey/Wooldridge and Durbin-Watson tests were used to test the autocorrelation assumption, which includes the problem of serially correlated error terms. The fact that there is a variable variance problem in the panel data model causes the estimators to be deviant. The Studentized Breusch-Pagan test was used to test the varying variance assumption. Table 10 shows the correlation and varying variance test results.

Table 10. Correlation and Varying Variance Test Results

Dependent variable	Independent Variables	Test	Test Statistics	p-value	Result
IR	CDS	Breusch-Godfrey/Wooldridge	224,45	0,000***	There is an autocorrelation between error terms
		Durbin-Watson	1,005	0,000***	There is an autocorrelation between error terms
		Studentized Breusch-Pagan	9,575	0,000***	The variance of the error terms is not constant with respect to units
	CDS, LOGTA, FLR, GR, CTR, OP	Breusch-Godfrey/Wooldridge	231,57	0,000***	There is an autocorrelation between error terms
		Durbin-Watson	0,95	0,000***	There is an autocorrelation between error terms
		Studentized Breusch-Pagan	28,06	0,000***	The variance of the error terms is not constant with respect to units
	CDS, ROE, ROA, PPI, ARE, CLIR	Breusch-Godfrey/Wooldridge	232,44	0,000***	There is an autocorrelation between error terms
		Durbin-Watson	0,963	0,000***	There is an autocorrelation between error terms
		Studentized Breusch-Pagan	69,27	0,000***	The variance of the error terms is not constant with respect to units

Not: ***, **, * refers to the significance of %1, %5 and %10, respectively.

Since assumptions were not provided for random effect models, model predictions were obtained using Arellano clustering methods, which are resistant estimators, and the results are given in Tables 11, 12 and 13.

Table 11. Arellona Forecasting Model 1

	IR			
	Coefficient	**Std. Error**	**Statistic Value**	**p-value**
CDS	-2,30	0,347	-6,6219	**0,000*** **
R^2	0,16305			
Statistic Value	43,85***			

Not: ***, **, * refers to the significance of %1, %5 and %10, respectively.

When the estimation results of the model in Table 11 are examined, the coefficient of determination (R2) of the model is calculated as 0,16305. This means that the model explains %16,30 of the change in the investments of the companies in the BIST 100 Index. In the model, the CDS coefficient was calculated as negative and statistically significant at %99 confidence level. When the CDS premiums increases by one unit, the investments of the companies in the BIST 100 Index decrease by 2,30 units.

Table 12. Arellona Forecasting Model 2

	IR			
	Coefficient	**Std. Error**	**Statistic Value**	**p-value**
CDS	-1,65	0,047	-3,46	**0,000*** **
LOGTA	-461,71	326	-1,4145	0,1572
FLR	-610,97	397	-1,5365	0,1244
GR	-3,672	6,12	-0,5998	0,5486
CTR	-59,14	22,86	-2,5872	**0,0096*** **
OP	0,463	0,426	-1,0964	0,2729
R^2	0,1985			
Statistic Value	47,1314***			

Not: ***, **, * refers to the significance of %1, %5 and %10, respectively.

When the estimation results of the model in Table 12 are examined, the coefficient of determination (R2) of the model is calculated as 0,1985. This means that the model explains % 19,85 of the change in the investments of the companies in the BIST 100 Index. In the model, the CDS coefficient was calculated as negative and statistically significant at %99 confidence level. When the country CDS premiums increases by one unit, the investments of the companies in the BIST 100 Index decrease by 1,65 units. The CTR coefficient was negative and statistically significant at %99 confidence level. When the CTR increases by one unit, the investments of the companies in the BIST 100 Index decrease by 59,14 units. There was no statistically significant relationship between IR and LOGTA, FLR, GR and OP.

Table 13. Arellona Forecasting Model 3

	IR			
	Coefficient	**Std. Error**	**Statistic Value**	**p-value**
CDS	-0,618	0,362	1,7038	**0,088***
ROE	-0,152	0,143	-11,153	0,286
ROA	-14,95	4,78	-31,498	**0,001*** **
PPI	15,09	2,99	47-973	**0,000*** **
ARE	-195,71	37,77	-50,645	**0,000*** **
CLIR	-14,25	6,11	,25,110	**0,019** **
R^2	0,2212			
Statistic Value	73,041***			

Not: ***, **, * refers to the significance of %1, %5 and %10, respectively.

When the estimation results of the model in Table 13 were examined, the coefficient of determination (R2) of the model was calculated as 0,2212. This means that the model explains

%22,12 of the change in the investments of the companies in the BIST 100 Index. In the model, the CDS coefficient was calculated as negative and statistically significant at %90 confidence level. When the country CDS premiums increases by one unit, the investments of the companies in the BIST 100 Index decrease by 0,61 units. The ROA coefficient was negative and statistically significant at %99 confidence level. When the ROA increases by one unit, the investments of the companies in the BIST 100 Index decrease by 14,95 units. The PPI coefficient was calculated as positive and statistically significant at %99 confidence level. When the PPI increases by one unit, the investments of the companies in the BIST 100 Index increase by 15,09 units. ODC coefficient was negative and statistically significant at %99 confidence level. When the ARE increases by one unit, the investments of the companies in the BIST 100 Index decrease by 195,71 units. The CLIR coefficient was calculated as negative and statistically significant at %95 confidence level. When the CLIR increases by one unit, the investments of the companies in the BIST 100 Index decrease by 14,25 units. There was no statistically significant relationship between IR and ROE.

4. Conclusion

In recent years, CDS premiums have become an important indicator of risk perceptions. CDSs are used not only for companies, but also against the risk of bankruptcy of countries and the risk of non-payment of state-guaranteed Eurobonds. CDSs have an important place in terms of showing the expectations for the financial situation of the countries and determining the risks of non-repayment of debts. The fact that CDS premiums, which are especially followed by investors which invests in financial markets, act simultaneously with market data and reflect changing risk conditions to prices instantly, enables both companies and countries to make a healthy assessment of possible credit risks in the market. High CDS premiums indicate that risks in the country's economy are increasing. This situation will increase the uncertainties about the future, and confidence in the country will decrease. The profits of companies operating in the country are adversely affected by this situation. Since the increase in CDS premiums will increase the cost of borrowing countries, companies also avoid investing in an environment where risks and uncertainties increase.

In this study, the effect of country CDS premiums on the investment decisions of the companies included in the BIST 100 Index was investigated. Since country CDS premiums can affect the investment decisions of companies, it is important to measure this effect. The effect of CDSs on the investment decisions of BIST 100 companies was investigated by panel data analysis. In the study, cross-sectional dependence was tested by applying Pesaran's CD,

Breusch-Pagan and Breusch-Pagan scaled tests and it was seen that the data had cross-sectional dependence. The stationarity of the series was tested using the CADF unit root test and the test result showed that the series were stationary. F test was applied to choose between fixed effect models and pooled regression models, Breusch-Pagan test was applied to choose between random effect models and pooled regression models, Hausman specification test was applied to choose between fixed effect models and random effect models and also to determine which of the models to use. Breusch-Godfrey/Wooldridge and Durbin-Watson tests were used to test the autocorrelation assumption involving the problem of serially correlated error terms, and the Studentized Breusch-Pagan test was used to test the variable variance assumption. Finally, model predictions were obtained by using Arellano estimation model and bidirectional clustering estimation model methods. As a result of the analysis, it was found that when the value of country CDS premiums increased by one unit, the investments of the companies included in the BIST 100 Index decreased by 2.30 units. Since the increase in country CDS premiums means an increase in risks, it has negatively affected the investment decisions of the companies in the BIST 100 Index.

When the international literature is examined, Balduzzi et al. (2015) tested whether the negative changes in the market valuations of banks during financial crises and the consequent increase in the funding costs of banks affect company decisions. They found that increases in CDSs resulted in lower investment for start-ups and relatively small-sized companies. The finding is consistent with this study. Generally, it is seen that the relationship between CDSs and investments is investigated not by country CDS premiums, but by taking into account companies' own CDS premiums. Wu (2018) empirically examined the existence of the relationship in question. The findings show that after the CDS contract was signed, the investments of strong companies were positively affected, while the investments of weak companies were negatively affected.

Return on equity, return on assets, company size and GDP growth rate are expected to have a positive impact on investment decisions, while company indebtedness, inflation rate, exchange rate, corporate tax rate, commercial loan interest rate and oil price are expected to have a negative impact on investment decisions. When the effects of variables mentioned above, other than CDS included in our research on investment decisions are examined; company size has a positive effect according to Ruiz-Porras and Lopez-Mateo (2010) and Hussain et al. (2020), profitability has a positive effect according to Hussain et al. (2020), Basu and Das (2015) and Ziarko (2015), oil prices have a negative effect according to Dağlı and Sevim (2015), positive effect according to Aldibekova (2018), growth rate has a positive

effect according to Kurataran (2007), leverage ratio has a negative effect according to Nguyen and Dong (2013), but no significant relationship was found between the relevant variables and investment decisions in our study. According to the analysis findings; as expected, a negative relationship was found between the exchange rate, corporate tax rate, commercial loan interest rate and investment decisions. These results coincide with those of Albu (2006) and Hussain et al. (2020). Considering the study results of Şenesen (1984), Uzay (1999) and Iqbal and Nawaz (2010), a negative relationship with the inflation rate was expected, but the analysis results revealed the opposite relationship. The reason for this can be explained as the fact that companies increase their investments by taking into account future inflation expectations due to high inflation expectations or the expectation of higher returns on investments due to low/negative real interest rates.

When the negative effects of the increase in CDS on investment decisions are evaluated, it can be concluded that investors need to evaluate country risk profiles well and diversify their portfolios to distribute their risks. Companies need to manage their credit risks effectively and choose policies that will minimize their potential risks. In addition, companies should provide transparent and accurate information about credit risks to their investors and other stakeholders. Policy makers should take regulatory measures and develop policies that support financial stability so that both companies and investors can manage their risks correctly. In this way, it will be possible to be prepared for the risks that may be encountered in crisis situations and the negative effects that will arise from the increase in CDS can be minimized and more robust financial decision-making processes can be adopted. In future studies, sectoral research can be conducted to contribute to the relevant literature. Additionally, by considering different countries, it can be investigated how the impact of CDS on investment policies may differ under different economic conditions.

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