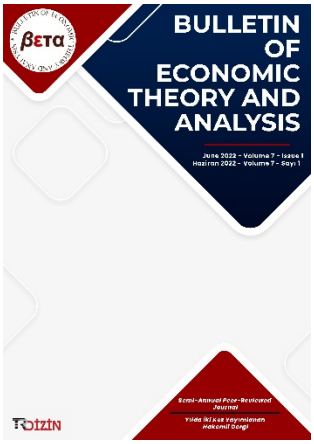

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Effects of Türkiye's Credit Rantings and Credit Default Swaps (CDS) on BIST ALL

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ABSTRACT

In the study, the relationship between Turkey's Credit Default Swaps (CDS) premiums and credit ratings of Standard and Poor's (S&P), Moody's Investors Service (Moody's) and Fitch Ratings (CRA) and the BIST ALL index listed in Borsa Istanbul and The aim is to observe their effects on each other. The universe of the study; consists of 3956 daily Turkey CDS credit risk premiums and BIST ALL data and 93 credit ratings given by CRAs in the period 2009:1–2024:4. The effect of the increase or decrease in CDS and credit scores on the closing values of the BIST ALL index was analysed with Johansen cointegration and Granger causality tests. Findings obtained in the study; Increasing the credit rating and outlook of CRAs causes an increase in BIST ALL closing values in the short term. The change in Türkiye CDS premiums triggers changes in BIST ALL closing values in the short and long term. Finally, the study concluded that the change in CDS premiums has a negative effect on BIST ALL, while the increase in credit score and outlook has a positive effect on BIST ALL.

Keywords
CDS,
Türkiye credit rating,
Johansen cointegration,
Granger causality test,
BIST ALL index

JEL Classification
F33, G10, G20, G24.

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Türkiye Kredi Dereceleri ve Kredi Temerrüt Takasları (CDS)'nın BIST ALL'a Yansımaları

ÖZ

Çalışmada, Türkiye Kredi Temerrüt Takasları (CDS) primleri ve Standard and Poor's (S&P), Moody's Investors Service (Moody's) ile Fitch Ratings (Fitch) kredi derecelendirme kuruluşlarının (CRA) kredi notlaryle Borsa İstanbul'da listelenen BIST ALL endeksi arasında ki ilişkinin ve birbirlerine olan etkilerinin gözlemlenmesi amaçlanmaktadır. Çalışmanın evreni; günlük 3956 Türkiye CDS kredi risk pirimi ve BIST ALL verileri ile CRA'larının 2009:1–2024:4 dönem periyotunda verdiği 93 kredi notundan oluşmaktadır. CDS ve kredi notlarının artışının veya düşüşünün BIST ALL endeksi kapanış değerlerine etki etme durumu Johansen eşbütünleşme ve Granger nedensellik testleri ile analiz edilmiştir. Çalışmada ulaşılan bulgular; CRA'ların kredi notu ve görünümünde artış yapmaları kısa dönemde BIST ALL kapanış değerlerinde artışa sebep olmaktadır. Türkiye CDS primlerindeki değişim BIST ALL kapanış değerlerinde kısa ve uzun dönemde değişimi tetiklemektedir. Son olarak çalışmada, CDS primlerindeki değişimi BIST ALL üzerinde negatif yönlü etkiye, kredi notu ve görünümündeki artış ise BIST ALL üzerinde pozitif yönlü etkiye sahip olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler
CDS,
Türkiye kredi notu,
Johansen eşbütünleşme,
Granger nedensellik testi,
BIST ALL endeks

JEL Kodu
F33, G10, G20, G24.

1. Introduction

All investors, whether individual, corporate or country, aim to maximise investment profits while minimising investment risks. When it comes to risks, derivative products are financial instruments that enable them to be transferred effectively between all parties. Successful risk management is possible with financial measurements along with the use of appropriate financial tools. With increasing competition in the markets, financial instruments that enable risk transfer have begun to be widely used.

Credit derivatives, which are used to hedge risks and for speculative purposes, started to be used by the International Swaps and Derivatives Association in 1992. The most used credit derivative instrument in the market is CDS; It was introduced to the financial markets by JP Morgan in 1994. Increasing credit risks are liquidated through CDS. In addition to this feature of CDS, it is also applied as a country risk indicator. The main reason why such contracts are widely used is that they can be applied in a wide range of areas, from financial assets to a country.

Particularly, with the financial crisis that started in Thailand, whose impact became evident in the second half of 1997, and then quickly spread to a wide geography called the Asian Tigers,

the interest of other countries that carry out financial transactions with the countries at the centre of the crisis in CDS has become even more important. Latin America. Despite the various economic agreements it made, Argentina could not escape the effects of the crisis. S&P downgraded Argentina's country credit rating at the end of 2001 and declared a moratorium on the country (Cossin and Jung, 2005: 13). During the financial crisis in the mortgage market in 2007 in the United States (US) and the European Debt Crisis between 2010 and 2014 in the European Union (EU), the reliability of credit rating scores used to measure the credit risk of countries has been a matter of considerable debate. In this period, CDSs began to be widely used in measuring country credit risk, along with criticism that credit rating scores did not reflect real data in measuring the credit risk of countries (Filippos, 2017: 4). Similar criticisms of CRAs are also included in the work of Haan & Amtenbrink (2011).

Credit rating; It is the display of information prepared by rating experts in summary and simple-to-use qualitative or quantitative symbols. Credit reserving companies accepted by national or international authorities; The score values obtained as a result of determining the investment values of countries, companies or securities and measuring their credibility represent the credit rating score. Credit rating score; It is a type of statement made for assigning a credit rating score to a country, company or city government. Positive/negative/stable outlook descriptions; Without any change in the credit rating score, the outlook announced for the debtor is considered "stable", the possibility of the rating increasing in the future is considered "positive", and the possibility of the rating decreasing is considered "negative". Credit rating increases; It is a statement about increasing the credit rating previously given to a country or company. Credit rating downgrades; These are statements made regarding the downgrading of previously given credit ratings of countries or companies. Confirmation statements are statements that confirm and continue the credit rating previously given to a country or company.

The purpose of credit scoring is to share the necessary information to ensure the efficiency of international financial markets. The creditworthiness of debtors is determined by the scores given by international CRAs. Thus, the investment attraction capacity of countries or companies and the costs they will bear are determined. Although many CRAs are operating in international financial markets, S&P, Moody's, and Fitch are the most effective organisations in the credit rating sector with their knowledge and the models they have developed.

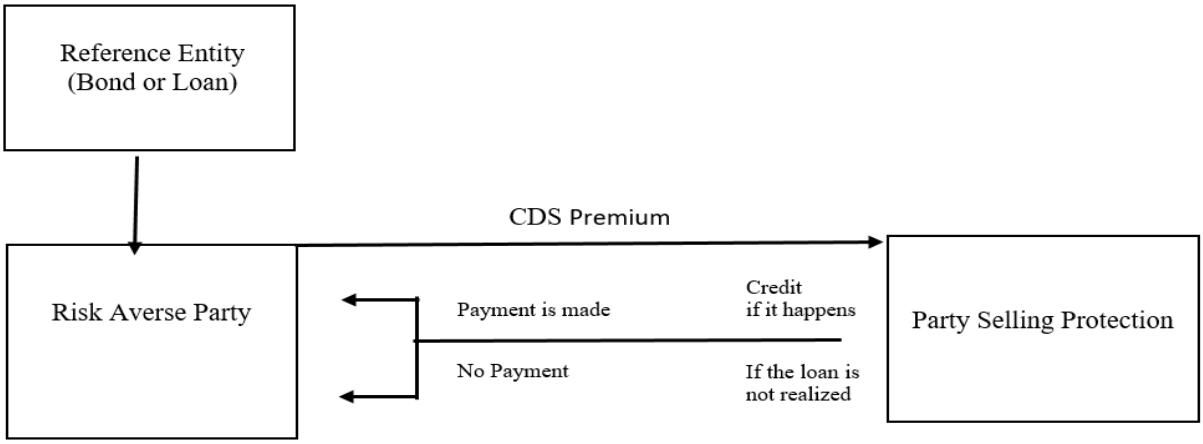
Credit ratings and CDSs can have a regulatory effect on stock markets. Many national or international investors make transactions in line with credit rating announcements and CDS. However, the effects of credit scores and CDS on the financial structure of countries and companies in developed or developing economies continue to be examined (Luitel & Vanpée, 2018; Haspolat, 2019; Ballester & González, 2021; Ballard et al., 2021; Meles et al., 2023).

In this study, short and long-term relationships between BIST ALL, which includes 530 companies in Borsa Istanbul, Türkiye's CDS premiums, and Türkiye's credit rating and outlook of S&P, Moody's, and Fitch CRAs, and the BIST ALL closing values of CDS and credit rating increase, are examined. The impact situation was examined between 2009 and 2024. The study showed that; The increase in the credit rating and outlook of CRAs leads to an increase in BIST ALL closing values in the short term. The change in Türkiye CDS premiums also causes changes in BIST All closing values in the short and long term.

2. Theoretical Background

Investors trading in financial markets aim to provide high returns with minimal risk. One of the risks that may occur in capital markets is credit risk. One such source of risk; is the situation where overdue receivables are not repaid. Managing risks is an important element for investors. Investors can minimise the risks that may arise in the markets by using derivative products. The most frequently used product among credit derivative instruments in the world is CDS. While CDS means insuring credit risk, it ensures that the lender, that is, the investor, is protected from risk in case the debtor country or company cannot fulfil its obligations. Possible losses that may arise in financial assets in cases of credit rating decrease, bankruptcy and default can be shared between the parties with CDS.

CDS is a method to control the credit risk of investors, lenders or financial institutions, as they are financial contracts that provide insurance against credit-related risks. The basic element of CDS is the transfer of credit risk from one party to another (Neal, 1996: 19). The CDS transaction structure is given in Figure 1.



Şekil 1. CDS Transaction Structure (Choudhry, 2006).

As can be seen in Figure 1, a CDS contract is an agreement between two parties, the borrower and the lender. The protecting party in the agreement undertakes to pay a certain amount to the buyer in the event of a possible non-payment of the debt instruments. However, for a certain period, the party purchasing the protection must also pay a premium to bear the risk of the protector not paying. Thus, as a result of the CDS contract, credit risk is minimized. As the risk in the markets of the debtor, whether a company or a country, increases, CDS premium payments increase in proportion to this. Foreign investors make investment decisions by considering country risk.

With the development of international financial markets, risks have begun to emerge between investors who have accumulated funds and users who need funds. Rating agencies were established to solve these problems. Especially in the XIX. CRAs, which are among the financial institutions of the 21st century, came to the fore with the 2008 financial crisis, when volatility in financial markets increased, and large CRAs came to the fore due to their role in the crisis. Although there is no complete list, it is estimated that there are hundreds of credit rating companies operating at national and international levels in financial markets (White, 2016: 205). Among CRAs, the largest and most respected by many investors are international CRAs; S&P, Moody's and Fitch dominate the credit rating market by using the models they developed with the knowledge and experience they have accumulated in the market for years (Nye, 2014). .02 regulated by the Securities and Exchange Commission (SEC). According to the report dated 2024; The share of the S&P, Moody's and Fitch trio in the US rating market in 2022 reached 91.1% (Securities and Exchange Commission, 2024: 29). Similarly, in the EU market as of 2022; They dominated the EU

market with a total of 92.97%, with the shares of S&P 50.13%, Moody's 32.79% and Fitch 10.05% (European Securities and Markets Authority, 2023: 8). In the light of these data, S&P, Moody's and Fitch have large shares in the highly competitive US and EU markets, where many CRAs operate.

The key role that CRAs have in the international financial system cannot be limited solely to the reduction of information asymmetry in favour of investors and the certification of debtors through easily understandable data provided in the form of credit ratings. In addition, credit rating scores are used as a basis for determining the legal capital that must be maintained by all financial institutions and fulfil a semi-regulatory public function. Thus, they directly affect the stability of financial markets. CRAs also affect the markets and country economies with the rating scores they assign to countries. CRAs have come under criticism for their role during financial crises. In addition, CRAs were also accused of not foreseeing the Asian crisis and deepening the crisis by downgrading countries while they were going through financial crises. Moreover, during the crisis period in the European region, CRAs were criticized for downgrading the rating of European sovereign states (Haan & Amtenbrink, 2011: 2-7). Despite all this, the rating score created by CRAs as a result of the measurements they make is generally accepted as highly subjective and followed and used in local and international markets, as it is an indicator of the risk-return balance of debt-based assets. Credit ratings to existing and potential investors; While guiding the value of loans to be given or assets to be purchased, it also plays an important role in determining the price to be paid for the relevant asset and the interest rate, which is a cost element (Gavras, 2012: 35). CRAs are a company, country or city government, etc. It expresses its opinion about a debtor's ability and willingness to meet its financial obligations in a timely manner. However, credit scores are not recommendations for investors to buy, sell or hold, nor are they a measure of asset value or an investment indicator.

Credit ratings consist of two components; The first is the credit rating score expressed by a series of letters or signs, while the other is the rating report containing detailed information about the evaluated asset on which this credit rating is given (Schroeter, 2011: 615). While S&P and Fitch emphasise that credit rating scores indicate the probabilities of default, Moody's says; It states that the expected credit loss amount, which is a result of the probability of default and the expected loss amount in case of default, is taken into account (Pagano & Volpin, 2010: 416).

Credit ratings are scores that express relative opinions, from strongest to weakest, about the creditworthiness of a borrower or the credit quality of a debt instrument. CRAs use their own methodology and rating scale to measure credit risk.

In the "AAA, AA, A, BBB, BB, B, CCC, CC, C and D" rating scale announced by S&P, which has been operating since 1860, the highest credit rating is "AAA, AA, A, BBB", while the investment level is considered to be speculative. owner country, company etc. It uses “BB, B, CCC, CC and C” for “+” or “–” signs can also be added to credit scores between the “AA” credit score and the “CCC” credit score. The meaning of the “+” sign indicates being close to the credit score at the top, and “-” indicates being close to the credit score at the bottom.

Founded in 1909, Moody's; announces the credit rating scores used in the analysis of credit risk regarding financial obligations that will expire in one year or more, with the letters "Aaa, Aa, A, Baa, Ba, B, Caa, Ca, C". Along with these letter grades, Moody also adds the numbers "1, 2, 3" next to each letter regarding the credit score. “1” indicates the highest level, “2” indicates the middle level, and “3” indicates the lowest level. While Moody's high-grade investment grade credit ratings are indicated as "Aaa, Aa1, Aa2, Aa3, A1, A2"; It indicates the medium investment grade level with “A3, Baa1”. Low investable levels, which are speculative, are expressed as “Baa2, Baa3, Ba1, Ba2, Ba3, B1, B2, B3”; The level at which it is not possible to make an investment decision is indicated by the credit scores "Caa1, Caa2, Caa3, Ca, C".

Fitch, which has been conducting rating activities since 1913, has its credit rating indicator chart in the range of "AAA" and "D". “AAA” to “BBB” indicate high-grade investment grade levels, while the “BB and B” range indicates speculative investable levels, and “CCC” and “D” indicate long-term non-investment grade levels. Like S&P, Fitch can place “+” or “-” signs next to the letters indicating credit scores. The rating scales of the three well-established CRAs are shown in Table 1.

Table 1

Rating Scale of CRAs

Descriptions	**S&P**			**Moody’s**			**Fitch**		
Highest grade	AAA			Aaa			AAA		
High grade	AA+	AA	AA-	Aa1	Aa2	Aa3	AA+	AA	AA-
Upper medium grade	A+,	A	A-	A1	A2	A3	A+	A	A-
Lower medium grade	BBB+	BBB	BBB-	Baa1	Baa2,	Baa3	BBB+	BBB	BBB-
Non-investment/speculative grade	BB+	BB,	BB-	Ba1	Ba2	Ba3	BB+	BB	BB-

Highly speculative	B+	B	B-	B1	B2	B3	B+	B	B-
Extremely speculative	CCC+	CCC	CCC-	Caa1	Caa2	Caa3	CCC		
Imminent default	CC			Ca			CC		
Default	R	SD	D	C			C	RD	D

Source. Keskin (2020: 22).

Credit ratings given by Fitch, Moody's and S&P for Türkiye are given in Table 2.

Table 2

Türkiye's Credit Ratings Given by S&P, Moody's and Fitch

Grade Announcement Date	Credit Rating Company						Grade Announcement Date	Credit Rating Company					
	S&P		Moody's		Fitch			S&P		Moody's		Fitch	
	Not	View	Not	View	Not	View		Not	View	Not	View	Not	View
08.03.2024					B+	+	18.06.2009			Ba3	+		
13.01.2024			B3	+			17.09.2009	BB-	=				
30.11.2023	B	+					13.11.2008	BB-	-				
29.09.2023	B	=					31.07.2008	BB-	=				
09.09.2023					B	=	03.04.2008	BB-	-				
31.03.2023	B	-					09.05.2007					BB-	=
30.09.2022	B	=					27.06.2006	BB-	=				
12.08.2022			B3	=			23.01.2006	BB-	+				
08.07.2022					B	-	14.12.2005			Ba3	=		
12.02.2022					B+	-	11.02.2005			B1	+		
10.12.2021	B+	-					13.01.2005					BB-	=
02.12.2021					BB-	-	25.08.2004					B+	+
19.02.2021					BB-	=	17.08.2004	BB-	=				
11.09.2020			B2	-			08.03.2004	B+	+				
21.08 2020					BB-	-	09.02.2004					B+	=
01.11.2019					BB-	=	21.10.2003			B1	=		
12.07.2019					BB-	-	16.10.2003	B+	=				
14.06.2019			B1	-			25.09.2003					B	+
17.08.2018			Ba3	-			06.08.2003					B-	+
17.08.2018	B+	=					28.07.2003	B	=				
13.07.2018					BB	-	25.03.2003					B-	-
01.05.2018	BB-	=					07.11.2002	B-	=				
07.03.2018			Ba2	=			10.07.2002			B1	-		
17.03.2017			Ba1	-			09.07.2002	B-	-				
27.01.2017	BB	-					26.06.2002	B-	=				
27.01.2017					BB+	=	05.02.2002					B	=
04.11.2016	BB	=					29.01.2002	B-	+				
23.09.2016			Ba1	=			15 01.2002			B1	=		
19.08.2016					BBB-	-	30.11.2001	B-	=				
20.07.2016	BB	-		-			02.08.2001					B	-
18.07.2016			Baa3	- watch			11.07.2001	B-	-				
06.05.2016	BB+	=					27.04.2001	B-	=				
11.04.2014		-	Baa3	=			17.04.2001	B-	- Watch				
07.02.2014	BB+	-					06 04.2001			B1	- watch		
16.05.2013		=	Baa3				08.06.2009	B+	- Watch				
27.03.2013	BB+	=					02.04.2001					BB+	- watch
05.11.2012		=			BBB-		23.02.2001	B	- Watch				
20.06.2012		+	Ba1				22.02.2001		=			BB-	

01.05.2012	BB	=			21.02.2001	B+	- Watch	B1			
23.11.2011		=		BB+	05.12.2000	B+	=				
24.11.2010		+		BB+	21.09.2000		=	B1			
05.10.2010		+	Ba2		21.09.2000		=			BB-	
19.02.2010	BB	+			24.07.2000			B1	+ watch		
08.01.2010		=	Ba2		27.04.2000		=			BB-	
27.10 2009		+ watch		BB-	25.04.2000	B+	+				
03.12.2009		=		BB+	10.04.2000					B+	+ watch

Note. Positive +, stable =, negative -

3. Literature

There are studies in the literature examining the relationship between CDSs and the stock market. These studies were investigated using different periods and different analysis methods. Examples of these studies are included in Table 3.

Table 3

Examples of Studies Examining The Relationship Between CDSs and The Stock Market

Author	Subject	Data Set Period	Method	Result
Fung et al. (2008)	Analysis of the relationship between CDS and share markets.	USA, Thailand, Philippines, China, Malaysia and Korea (2001-2007)	The Vector Autoregression (VAR) model	There is a negative relationship between CDS and equity markets.
Chan et al. (2009)	Relationship between Asian CDS and stock markets.	Asian Countries (2001-2007)	Cointegration And Causality test	In China, South Korea and Thailand. There is a bidirectional causal relationship CDSs affect the Malaysian stock market. In Indonesia, there is a two-way interaction between the data.
Coronado et al (2012)	Relationship between CDSs and stock indices.	Spain, Portugal, Germany, Greece, United Kingdom, Italy, France and Ireland (2001- 2011)	Vector Autoregressive model and Panel data model.	There is a negative and strong relationship between CDSs and stock prices.
Asandului et al (2015)	CDS and stock market relations in Eastern European countries.	5 Eastern European Countries (2004-2014)	Johansen cointegration and VAR	CDSs affect the stock market.
Apergis (2017)	The role of CDSs on stock prices	Greece (2005-2015)	Granger causality test	There is a causal relationship between CDSs and stock returns.
Shear et al. (2017)	Relationship between CDS and KSE 100 index.	Pakistan (2004-2014)	Granger causality test	There is a causal relationship between KSE100 and CDS.
Topaloglu & Ege (2020)	Relationship between CDS and Borsa Istanbul 100 Index.	Türkiye (2010-2019)	Time series analysis	As country risk increases, share market return decreases.
Bratis et al (2023).	Links of CDS and stock markets.	Germany, France, Portugal, Italy, Ireland, Spain and Greece	VAR	The CDS market interacts bidirectionally with stock returns after the debt crisis (2010-2014).

		(2009–2014)		
Varlık & Öbekcan (2023)	Effects of central bank credibility on country risk Premium.	Türkiye (2008 –2022)	ARDL	CBRT increase in credibility It reduces the CDS premium. exchange rate Increases in inflation and inflation increase the CDS premium.
He & Zhang (2024).	Relationship between country CDSs, stocks, etc.	G7 and BRICS countries (2010-2022)	Regression analysis and Network analysis	CDS dominates its markets in total risk level.

Common features of the studies in Table 3: There is a relationship between CDS and stock values of both developed and developing countries.

Research on the effects of credit ratings on the stock market and countries has taken its place in the literature. Examples from these studies are included in Table 4.

Table 4

Examples of Studies on The Effects of Credit Ratings on The Stock Market and Countries

Author	**Subject**	**Data Set Period**	**Method**	**Result**
Cantor & Packer (1996)	The impact of credit rating changes on the bond market.	45 developed and developing countries (1995)	Event study analysis	Rating announcements have an immediate impact on the market.
Gropp & Richards (2001)	The extent to which banks' bond and stock returns are affected by CRA ratings.	32 banks in the EU (1989-2000)	Fama analysis	CRAs influence bank stocks through their rating actions.
Frost (2007).	Effects of CRAs on capital markets.	USA (2000-2002)	Empirical test	Rating agencies have deficiencies regarding public disclosure practices.
Abad et al. (2013)	Changes in CRAs' ratings Effects on Share Liquidity	Spain (2000-2010)	Event study	Improvements and declines in credit scores affect stock markets.
Lee et al. (2016)	Effects of CRAs' ratings on the stock market.	Australia and 39 Countries (1990-2009)	Regression analysis	Country rating changes significantly affect stock liquidity.
Balcilar et al. (2021)	Forecasting the credit rating announcements issued by the three established CRAs in the BRICS and PIIGS stock markets.	BRICS and PIIGS countries (1992–2016)	Mathematical Analysis, Causality test	Markets act according to credit rating announcements. Stock values are predictable.
Abidi et al. (2023)	Market impacts of CRAs.	16 countries in the Euro area. (2015-2017)	Regression, Matematiksel Models	In the European region, the corporate bond market is negatively affected by CRAs.

The difference of this study from the literature is that it examines the effects of CDS, S&P, Moody's and Fitch CRAs, which are active in international markets, and BIST ALL, which is the

index that includes the largest number of companies, with 590 companies, and the time it takes for the markets to come to balance.

4. Data and Methodology

While the data set for the study, which covers the periods 2009:1–2024:4, was obtained from the official page of BIST ALL, Borsa Istanbul (BIST, 2024), the credit ratings given to Turkey were compiled by the author from S&P, Mood's and Fitch reports.

In the study, the short and long-term relationships between BIST ALL and Türkiye's CDS premiums and CRAs, Türkiye's credit rating and outlook, and the reason for the CDS and credit rating increase in BIST ALL closing values were examined. Increase in credit score or outlook 1; other cases are coded as 0. For the purpose of the study, Johansen cointegration and Granger causality analyzes were used.

Johansen's cointegration test was developed by Johansen (1988). It is a model created to express a fixed combination of two or more series whose levels are not fixed, to test the cointegration element. The Granger causality test developed by Kónya (2006) can calculate the cross-sectional dependence between all series in the panel.

In the study, normal distributions of the series were checked before cointegration analyses, and single normal distributions were ensured by making logarithmic transformations. Since the series must be stationary at the same level (integrated of the same degree) to perform the cointegration analysis, the Extended Dickey-Fuller (ADF) (Dickey and Fuller, 1979) unit root test was applied, and it was observed that both variables contained unit roots at the level, but were stationary when their first differences were taken. In the unit root test, all three models without a constant term, with a constant term and with a constant term and trend were tested and reported in Table 6.

Lag Exclusion Wald Tests (VEC) were used to determine the appropriate lag length in the cointegration analysis. Since the null hypothesis in the test is that "the relevant delay should be excluded", when $p>0.05$, the hypothesis is accepted and the relevant delays are excluded; When $p<0.05$, the null hypothesis is rejected and the relevant delay is accepted.

Since heteroscedasticity, autocorrelation and distribution with multiple norms must be ensured for the validity of the model test, the White test (White VEC Residual Heteroskedasticity)

is used for the heteroscedasticity problem, LM test (VEC Residual Serial Correlation LM Test) is used for the autocorrelation problem and Cholesky (Lutkepohl) is used for the multiple normal distribution condition. Multiple normal distribution test was applied. The White test (White VEC Residual Heteroskedasticity), which performs the heteroscedasticity problem, tests the null hypothesis that "the series have common variance" and the hypothesis is accepted when $p>0.05$ for the chi-square test statistic. LM test (VEC Residual Serial Correlation LM Test) tests the null hypothesis of "there is no serial relationship/correlation" for each delay within the specified delay range, and the hypothesis is accepted when $p>0.05$ for the LM test value. Cholesky (Lutkepohl) decomposition, which is used in mathematics to separate the Hermit matrix, is used in statistics to solve normal equations in linear least squares problems. In the analysis evaluated using the Jarque Berra test statistic, the null hypothesis "residuals of the series show a normal distribution" is tested separately for each component, but when the Joint test result is $p>0.05$, it is understood that multiple normal distribution is achieved.

Johansen cointegration test was performed to determine the number of cointegration equations, and Trace and Max-Eigen test results were taken into account to determine the number of vectors. Johansen (1988) recommends a trace test and maximum eigenvalue test to determine the number of cointegration vectors and emphasizes that these calculated test statistics should be compared with the obtained critical values or p values should be taken into account. In the tests, cointegration numbers are determined for models without a constant term, with a constant term, and with a constant term and trend, as well as testing the null hypothesis of "there is no cointegration". The null hypothesis is tested separately for Trace and Max-Eigen statistics, and when the values of these tests exceed the critical values ($p < 0.05$), the hypothesis of no cointegration relationship is rejected.

Finally, in the study, the prediction model was tested by considering the linear vector error corrected (VECM) cointegration model. Since only the effects of CDS and credit ratings on BIST were examined in this study, the vector error corrected (VEC) Granger causality / Block Exogeneity Wald test was performed to question whether only two variables were the cause of BIST closing values. When BIST is the dependent variable in the test, the null hypothesis for each independent variable regarding which of the independent variables should be excluded from the model is "the relevant independent variable should be excluded". When the chi-square test statistic

is p<0.05, the null hypothesis is rejected and it is understood that the relevant independent variable should remain in the model and is the cause of the dependent variable.

4.1. Empirical Findings

Table 5 shows the descriptive statistics of the series included in the model.

Table 5

Descriptive Statistics of The Series

Series	Abbreviation	Log	Min.	Maks.	Mid.	SS	J-B(p)
BIST ALL[1]	BIST	LNBIST	413,62	35664,74	5380,728	9152,231	0,252(0,881)[a]
CDS[2]	CDS	LNCDS	119,08	857,790	326,995	170,001	1,535(0,464)[a]
CREDIT[3]	CRDT	-	0	1	-	-	-

Note. [1]: BIST ALL closing value, [2]: Türkiye credit risk premium,[3]: When credit score and outlook increase 1; in other cases 0 [a]: After logarithmic transformation J-B: Jarque-Bera

Extended Dickey-Fuller (ADF) unit root test was used to determine the stationarity of the logarithmically transformed series. Table 6 gives the unit root test results.

Table 6

Unit Root Statistics of Series

Sherry	Model	Unfixed	Fixed
LNBIST	At the level	1,883	-2,657
	1st difference	*-10,300***	*-11,457***
LNCDS	At the level	-0,100	-2,210
	1st difference	*-8,532***	*-8,442***

Note. *: Significant at 5% level, **:Significant at 1% level.

According to the ADF unit root test results in Table 6, both variables are not stationary at the level of both the models with and without a constant term, and both variables are stationary at their first difference [I(1)] in both the models with and without a constant term. has been detected. Accordingly, cointegration will be sought in the relationship between variables. Table 7 shows the results of the Wald lag exclusion test (VEC Lag Exclusion Wald Tests) performed to determine the appropriate lag length for the cointegration model.

Table 7

Delay Length Determination Results

Delay	Joint (p)
Dlag1	11,907 (**0,018**)
Dlag2	10,223 (**0,037**)
Dlag3	10,123 (**0,038**)
Dlag4	7,921 (0,094)
Dlag5	5,968 (0,205)
Dlag6	4,112 (0,391)

Note. Appropriate delay length has been tested up to 11 delays and the first 6 delays are shown in the table.

According to the Wald error-corrected delay length exclusion test results in Table 7, the hypothesis that the first three delays should be excluded was rejected ($p<0.05$), and the hypotheses that the subsequent delays should be excluded ($p>0.05$) were accepted. Accordingly, the most suitable delay lengths are 1-3. delays.

Table 8 shows the results of heteroscedasticity, autocorrelation and multiple normal distribution in the vector error correction model (VECM) cointegration model.

Table 8

Heteroscedasticity, Autocorrelation and Multiple Normal Distribution Results

	Statistics	p	Result
Heteroscedasticity (White VEC Residual Heteroskedasticity)	93,875	0,705	There is no heteroscedasticity problem
Otokorelasyon (VEC Residual Serial Correlation LM Test)	14,268	0,113	There is no autocorrelation problem (Lag 2)
Multiple normal distribution (VEC Residual Normality Test / Cholesky (Lutkepohl)	10,518	0,104	Residuals are normally distributed

The model has no heteroscedasticity problem ($X2=93.87$; $p>0.05$), no autocorrelation problem (LM-Stat=14.27; $p>0.05$) and multiple normal distribution condition is met (Joint J-B=10.52). ; $p>0.05$) was determined.

In Table 9, the Johansen cointegration test was performed to determine the number of cointegration equations, and Trace and Max-Eigen test results were taken into account to determine the number of vectors. Johansen (1988) recommends a trace test and maximum eigenvalue test to determine the number of cointegration vectors and emphasizes that these calculated test statistics should be compared with the obtained critical values or p values should be taken into account. Table 9 shows the Trace and Max-Eigen test results for determining Johansen cointegration vector numbers and ranking unconstrained cointegration.

Table 9

Cointegration Vector Numbers and Sequences Test Results

	- No S No T	- S Yes No T	Linear S Yes No T	Linear S Yes T Yes	Quadratic S Yes T Yes		
Trace	1	1	1	1	1		
Max-Eigen	1	1	1	1	1		
H0 Hipotezi	**Eigenvalue**	**Trace**	**p**	**H0 Result**	**MaxEigen**	**p**	**H0 Result**
There is no cointegration	0,569	53,542	0,000	Rejection	35,327	0,000	Rejection
Up to 1	0,286	18,214	0,093	Acceptance	14,175	0,091	Acceptance
Up to 2	0,092	4,040	0,406	Acceptance	4,040	0,406	Acceptance

Note. S: Constant term, T: Trend.

According to the Johansen cointegration test results, it was determined that the hypothesis of no cointegration was rejected ($p<0.05$) and there was at least one cointegration equation. Since the study searches for a linear relationship, a linear vector error corrected (VECM) cointegration model with constant terms and maximum third lags was taken into consideration. Vector error corrected short and long-term forecast results are given in Table 10. Since the relationship between the increase in CDS and credit scores and BIST ALL was examined in the research, only the cointegration model in which the BIST ALL variable was the dependent variable was taken into account.

Table 10

Short and Long Term Forecast Results with Vector Error Correction

Forecast Period	**Coefficient**	**SH**	**t**
Long Term			
LNCDS(-1)	-6,047	1,162	-6,042**
CREDIT(-1)	-0,089	0,088	-1,012
C	26,355	6,818	3,865**
Short term			
COINTEQ	***-0,162***	***0,031***	***-5,228***
D(LNPRICE(-1))	-0,026	0,130	-0,202
D(LNPRICE(-2))	-0,069	0,125	-0,555
D(LNPRICE(-3))	-0,001	0,077	-0,006
D(LNCDS(-1))	-0,708	0,205	-3,447**
D(LNCDS (-2))	-0,606	0,197	-3,067*
D(LNCDS (-3))	-0,369	0,155	-2,385*
D(CREDIT(-1))	0,065	0,049	1,330
D(CREDIT (-2))	-0,046	0,051	-0,903
D(CREDIT (-3))	0,130	0,046	2,821*
R^2	0,444		
ΔR^2	0,288		
F	2,844		

Note. *:Significant at 5% level, **:Significant at 1% level.

The fact that the error correction coefficient (COINTEQ) is negative (between 0 and -2) and significant shows that the variables are cointegrated, and the inverse of the coefficient (1/coefficient) gives information about how long it will take for shocks to occur in the short term to balance. In other words, it means that shocks experienced in the short term are balanced in the long term. When the test results in Table 10 were examined, it was determined that the error correction coefficient of the estimated model was negative and statistically significant (Cointeg=-0.162; t=-5.228; p<0.01). According to the cointegration coefficient, the shocks that occur in the short term in the increase in credit scores and CDS premiums balance in the long term (after approximately 6 periods) (1/0.162=6.157). When long-term equations are examined, a 1% increase in CDS premiums leads to an approximately 6% decrease in BIST closing values in the long term. When short-term relations are examined, the increase in CDS premiums causes a negative change in BIST ALL closing values in all three delays. It was determined that the increase in credit scores was not related to BIST closing values in the first two delays but caused a positive change in BIST ALL closing values in the third delay.

The results of the vector error corrected (VEC) Granger causality / Block Exogeneity Wald test used in the causality/externality relationship between variables are given in Table 11. In test statistics, the null hypothesis (H0) is "Variable X is not the cause of Y / should be excluded". In this case, when the p-value of the X2 statistic is less than 0.05 (p<0.05), it is understood that the independent variable is the cause of the dependent variable and can be included in the model.

Table 11

VEC Granger Causality / Block Exogeneity Wald Test Results

	X^2	sd	p
When LNBIST is the dependent variable:			
D(LNCDS)	13,976	3	**0,003**
D(LNCREDIT)	9,226	3	**0,026**
All of them	19,391	6	**0,004**

According to the externality tests in Table 11, it is seen that the increase in credit score and CDS premiums are both external independent variables, and the null hypothesis that they are not the cause of the dependent variable is rejected at the 0.05 level. Therefore, it is consistent that both independent variables are included in the model, and the increase in credit scores and CDS premiums are the reasons for the change in BIST ALL closing values.

5. Conclusion

In the relationship between debt instrument issuers and investors, such as countries, companies and local governments that purchase CRAs services; While investors prefer investments that will provide the highest return with the lowest risk and the highest repayment guarantee, institutions that go into debt rely on credit ratings to borrow at the lowest possible cost.

The most basic information that an investor wants to know about the financial instrument of the country or company in which s/he will invest is whether the relevant party will be able to pay its debt when it comes due. While meeting the need for investors to obtain information, credit ratings, as a tool to ensure transparency in the markets, have become a double-sided necessity for investors and those who want to borrow. CDS, on the other hand, is a kind of credit risk insurance that investors use to avoid credit risk, that is, in case of non-repayment of due receivables, as a financial instrument that protects the lender from risk in case the debtor country or company cannot fulfil its responsibilities. However, credit scores are not a recommendation to buy, sell or hold for investors, nor are they a measure of asset value, nor are they an investment indicator.

In this study, the credit ratings given by S&P, Moody's and Fitch CRAs for Türkiye and the impact level of Türkiye's CDS premiums on BIST ALL, where 530 companies traded in Borsa Istanbul are indexed, and the balancing status of the markets in the 2009-2024 periods were analyzed. According to the findings of the research; Increasing the credit rating and outlook of CRAs leads to an increase in BIST ALL closing values in the short term. The change in Türkiye CDS premiums causes changes in BIST ALL closing values in the short and long term. The imbalance was caused by the increase in credit scores and the change in CDS premium balances after approximately 6 periods. The change in CDS premiums has a negative effect on BIST ALL, while the increase in credit rating and outlook has a positive effect on BIST ALL.

When the results of the study are evaluated; Fung et al. (2008), Chan et al. (2009), Coronado et al (2012), Abad et al. (2013), Varlık & Öbekcan, (2023), He & Zhang (2024), Frost (2007) are similar to the results of their studies. However, it does not coincide with the findings of Cantor & Packer (1996).

In the study, the effects of Turkey's Credit Ratings and CDS on the companies listed in Borsa Istanbul were evaluated, and for future studies, it could be expanded to include countries that have close economic relations with Turkey and are in the same category and future stock prices

were predicted with CDS and credit ratings. It is considered that it will be possible to carry out studies that will.

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