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RESEARCH ARTICLE

A Study on the Relationship between CDS Premiums and Stock Market Indices: A Case of the Fragile Five Countries

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Abstract
International investors should have a pioneering knowledge of the country's risk level before investing their savings in a country. For this purpose, Credit Default Swap (CDS) Agreements that serve as insurance against investor's risk of not collecting their receivables have been developed. These contract premiums are called CDS premiums. The relationship between the Fragile Five countries' CDS premiums and the stock market index prices has been examined by various researchers. The present study is unique because it is one of the pioneering studies examining the relationship between the CDS premiums of the Fragile Five countries and their Stock Market Indices. First, augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were performed for this purpose. Then, the Granger Causality test, Johansen Cointegration, and Pearson Correlation analyses were conducted to reveal the relationship between two variables. The results obtained in the study indicated that for India and Turkey, among the Fragile Five, there was a causality relationship between the stock market indices and the CDS premiums, a short-term relationship. In addition, there was a long-term cointegration relationship between the CDS premiums and the stock market indices of Turkey.

Keywords

Credit default swap, Causality, Cointegration, Financial risk, Correlation

Introduction

International financial markets have shown significant development in recent years with the advancement of technology. With this development, the inflow and outflow of capital to countries have accelerated. Investing in financial markets has become much more advantageous for investors, in terms of both cost and time.

In emerging markets, all investors want to make a profit from their savings by investing in a good investment. For this reason, they provide credit opportunities to those who need a loan through various instruments traded in the financial markets. On the other hand, these credit opportunities, bring about certain risks such as credit risk that the investor would not

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want to bear. The existence of the products based on interest, foreign exchange, stocks, and commodities enables financial derivatives to gain popularity day by day in the financial markets (Bhaskar, 2003).

Since the investors who want to make a profit by using the savings have to protect their assets against the possibility of loss due to threats, they use credit derivatives minimizing the credit risk to be faced. In the financial markets, the investor who buys protection in return for an individual premium protection seller the opportunity to earn compensation in case the credit event does not occur. In general, the credit derivatives include Total Return Swaps, Credit Spread Options, Loan-linked Securities, Collateralized Debt Obligations, and Credit Default Swap (CDS) contracts. Among these, the most commonly one used in the financial markets are CDS contracts.

The CDS contracts allow transferring the credit risk of the underlying asset subject to the agreement to another person by selling. The core asset can be private sector bonds issues by companies or government bonds issued by the countries. The CDS premiums of countries arise through the CDS contracts made on the bonds issued by the governments. These CDS premiums are regarded as the most critical indicator of country risks in recent years.

Literature Review

There is no specific study in the literature examining the relationship between the CDS premiums of only the Fragile Five countries and their stock markets. However, there are some studies including some of these countries. Many studies in the literature investigate the relationship between the CDS premiums and the stock markets of various countries, including developed and developing countries. The studies on the subject in the literature will be summarized under two sub-headings in the present paper.

Studies On The Fragile Five Countries

Pan and Singleton, 2008, investigated the relationship between the CDS premiums of Turkey, Korea, and Mexico and 10-year US government bonds, interest rates, exchange rate volatility, and the VIX Volatility Index (fear index) by the regression analysis. Using the data covering the period of March 19, 2001–August 10, 2006. Their results showed that the most robust relationship was between the CDS premiums of the analyzed countries and the VIX index.

Chan et al., 2009, examined the national CDS premiums and stock market index values of seven Asian countries, namely China, Japan, Korea, Indonesia, Malaysia, Philippines, and Thailand, using the data for the time period of January 2001-February 2007, and discussed the dynamic relationship between the CDS premiums and the stock prices. They found a very high and significant negative correlation between the CDS premiums and the stock indices for six of the seven Asian countries except China.

Özkaplan, 2010, used the data covering the time period of between March 3, 2002 and January 22, 2010. To examine the relationship between Turkey's CDS premiums and BIST-100 index as well as Dow Jones and Eurobond, and FX indices by VAR (Vector Auto Regression) analysis and regression analysis. They concluded that there was a significant relationship between the CDS premiums and the variables such as BIST-100 index, Dow Jones and Eurobond.

Balı and Yılmaz, 2012, examined the relationship between the closing prices of the weekly ISE-100 index and CDS premiums for January 2002- April 2012 using the correlation analysis and regression analysis, and found a correlation between the CDS premiums and the ISE-100 index.

Hancı, 2014, investigated the volatility of Turkey in the period from January 2008 to December 2012 using the BIST-100 index daily returns and the CDS premiums with the help of GARCH models. She determined that there was an inverse relationship between the CDS premiums, an indicator of country risk, and the stock prices of companies traded on the stock market. In addition, she stated that there was very high volatility between CDS premiums and BIST-100 index returns, and that it took a long time, to resist the shocks and return to the averages, and concluded that this high volatility, indicating the level of fragility had a great impact on the production.

Şit et al., 2014, analyzed how the CDS premiums and the political risks in Turkey impacted the stock market, using the monthly from data 2005 to 2014. They conducted the VAR, and action-reaction analyses and the Granger causality test, and determined that the effect of Turkey's stock exchange and political risks on the CDS premiums was not significant. However, the causality analysis results revealed the existence of various causality relationships among the variables.

Yenice and Hazar, 2015, studied relationships between the country's CDS premiums and the daily closing prices of the stock market in some emerging countries, namely Indonesia, China, Malaysia, Turkey, Brazil, and Argentina by using the Regression Analysis. The data used in the study belonged to the period of April 2009 and April 2014. They reported that, the correlation between the CDS premiums and the closing prices was highest in Malaysia and lowest in Indonesia. On the other hand, the relationship between Turkey's CDS premium and the stock prices was neither too strong nor too weak. They were of the opinion that this might be due to some measures taken as a result of financial crises frequently encountered.

Kadooğlu, 2015, analyzed the relationship between the 5-year CDS premiums of 10 developed and developing countries covering the period of January 2010-January 2015 and the index closing prices of the stock markets using the Regression Estimation Models. The results of the study, indicated that the correlation between CDS premiums and index closing prices

both in developed and developing countries was significant. However, they stated that this relationship was more robust in the developed countries compared to the developing countries.

Başarır and Keten, 2016, assessed the long and short-term relationships between the CDS premiums and the exchange rates as well as the stock indices by employing the Johansen Co-integration and the Granger Causality, analyses using the monthly data between January 2010 and January 2016 of 12 developing countries included in the JP Morgan EMBI index. They found that there was a bidirectional causality relationship between the CDS premiums and the stock indices in the short run. In addition, a one-way causality relationship was observed from the CDS premiums to the exchange rates. There was no long-term relationship between the CDS premiums and the exchange rates and the stock indices in the specified period for the countries analyzed in the study.

Değirmenci and Pabuçcu, 2016, compared Turkey's 5 year (2010-2015) CDS premiums and the BIST-100 indices and 100 daily closing prices of the same years with the use of NARX, the Granger causality and the VAR analysis methods. It was found that there was a two-way Granger causality relationship between the CDS premiums and the stock prices, and the two variables mutually affected each other. They were able to determine in advance to what extent the changes in the CDS premiums and the BIST-100 indices would affect each other and what measures need be taken. In this context, they stated that the study's models could be used as an early warning mechanism.

Kadooğlu A. et al., 2016, examined the daily data of 10 developing and developed countries over the period January 2010-January 2015 using the Regression Analysis Estimation models to determine the interaction between the stock market index values and the CDS premiums. They found that among the countries with strong financial structure, the most sensitive relationship was in Ireland, and that Indonesia had the weakest relationship in the developing countries.

Eren and Başar, 2016, studied whether specific macroeconomic indicators and the CDS premiums affected the BIST-100 Index analyzing the monthly data between December 2005 and March 2014 with the ARDL test. They found that the effect on stock prices turned out to be negative in the expected direction. Although it was observed that the CDS premiums hurt the stock prices in the short run, it was concluded that the effect was positive in the long run and an increase in the CDS premiums caused a decrease in the stock prices in the short run.

Bektur and Malcıoğlu, 2017, investigated the interaction between the BIST 100 Index and Turkey's CDS premiums using the daily data between December 10, 2000 and February 17, 2017 period, with the Hacker Khatami-J (2006) Causality Test and the Khatami-J (2012) Asymmetric Causality Test. According to the results of the Hacker-Hatemi-J (2006) test, there was a one-sided interaction between the CDS premiums and the BIST-100 Index value. In

addition, it was determined that there was a causality relationship from the CDS premium to the BIST-100 index. On the other hand, the Hatemi-J test indicated that the positive shocks occurring in the CDS premiums provided information that would help predict BIST100 index values in advance. However, the positive shocks occurred in the BIST-100 Index did not provide helpful information to explain the positive shocks occurring in the CDS premium.

Şahin and Özkan, 2018, analyzed the existence of the relationship between the CDS premiums, the BIST-100 Index, and the exchange rates in the long- and short-term. In this context, the Panel Data Analysis was performed using the monthly CDS premiums of Turkey, the BIST-100 Index values, and the exchange rates over the period 2012-2017. The results of the analysis revealed that there was a two-way causality relationship between the CDS premiums and the BIST-100 Index, while no causality relationship was detected between the exchange rates and the BIST-100 Index.

Sovbetov and Saka, 2018, investigated the long and short-term interaction between the BIST-100 Index and the CDS premiums for the period January 2008-May 2015, using the ARDL model. As a result, they found an inverse relationship between the CDS premiums and the BIST-100 Index in both the long- and short-term.

Sadeghzadeh, 2019, explored the relationship between the CDS premiums and the stock index prices with the Panel Causality and the Panel Cointegration analyses, using the stock market index and the CDS data for UK, China, USA, Korea, France, and Turkey over the period 2007-2018. They determined that there was a long-term cointegration relationship between the stock market indices and the CDS premiums in the countries except the UK and USA. In addition, it was found that there was a mutual causality relationship between the stock indices and the CDS premiums considering the short-term period.

Atmışdörtoğlu, 2019, examined the relationships between the CDS premiums and the stock market indices, the USD exchange rate parity and 2-year government bond interest rates for China, Russia and Turkey. The daily data from April 08, 2010 to March 15, 2019 period were analyzed in the study using the VAR method. According to the study's findings, it was determined that the most effective variable among the specified variables was stock market index, while the interest rate and the exchange rate did not have a significant effect. Also, it affected the changes in the CDS premium. The standard deviation of the stock index values among the countries analyzed indicated that this effect was quite high in Turkey.

Studies On The Other Countries

Using the relevant data for the USA over the period 2001-2007, Fung et al., 2008, analyzed the relationship between the stock market index and the CDS premiums with the VAR analysis method. They found a mutual feedback relationship between the stock market index

and the CDS premiums in terms of volatility and pricing. They also stated that this relationship was highly dependent on the credit quality of the underlying asset.

Norden and Weber, 2009, examined the interaction between the CDS premiums and the stock market, and bond prices by employing the VAR analysis method using the data of the period 2000-2002. As a result of the study, it was observed that there was a significant interaction between stock returns and the CDS and bond prices, and the effect of the change in the CDS premiums was more pronounced on the stock market prices than the bond prices. In addition, the authors also noted that the effect of the CDS premiums on the stock prices was significantly related to the average credit quality of the enterprises and their bond issues.

Using the data covering the period of 2004-2009, Apergis and Lake, 2010, investigated the relationship between the international stock market indices of the USA, Germany, England, and Greece and the European CDS index in terms of average and volatility with the MVGARCH-M model. They found that the stock returns in the US and European markets negatively related to the changes in the European CDS premiums. In addition, they stated that information leaking from within an enterprise affected the CDS premiums before affecting the stock markets, that the CDS markets led the stock markets, and that the volatility in CDS premiums had a positive impact on the stock index returns.

Asandului et al., 2015, analyzed the data of the period between 2004 and 2014 using the Johansen Cointegration analysis to determine whether there was a relationship between the CDS premiums of the five Eastern European countries (Poland, Czech Republic, Romania, Bulgaria, and Hungary) and their stock markets. They found that before and after financial crises, the CDS premiums affected the pricing in the stock markets, and that there was an inverse relationship between government bonds and stock exchanges in financial crises.

Esen et al., 2015, analyzed the relationship between the 52-week data covering April 22, 2013- April 15, 2014 of the CDS premiums and the stock exchanges belonging to 13 G20 countries using the Panel Cointegration and the Panel Causality tests. As a result of their studies, they observed a causality relationship between the stock exchanges and the CDS premiums for seven countries, namely Russia, Italy, England, France, Argentina, South Korea, and Germany. In addition, they concluded that the increase in stock exchanges in general reduced the financial risk of the countries, in other words their CDS premiums.

Fonseca and Gottschalk, 2018, examined the relationship between the CDS premiums of four Asia-Pacific countries (Korea, Hong Kong, Japan and Australia) and their stock markets between 2007 and 2010 using the VAR analysis method, and reported that the CDS premiums were affected by stock returns and volatility in these returns.

General Literature Review

As can be seen in the literature review given in detail above, many studies have been conducted to examine the relationship between CDS premiums and stock market data, stock market index data and other various economic variables. These studies in general included the regional studies or analysis among the countries with different economic development. Considering the results in those studies, it can be seen that different results were obtained depending on the analysis method used. It is striking that the relational approaches such as causality and correlation were generally used in the analyses conducted. The present study focuses on the causality and the short- and long-term cointegration relationships between the CDS premiums and the national stock market indices, as well as the correlation relationship of countries with different regions and economic cultures known as the Fragile Five. In other words, the study is considered to be an original study examining the relationship between the CDS premiums and the stock market indices for the Fragile Five countries.

Credit Default Swaps (CDS)

As a result of the developments in the international markets, many types of investment instruments have emerged, and some of those have become a guiding indicator for the investors. The presence of problematic loans is known to be the most important reason of the 2008 Global Financial Crisis, at the same time, the fact that the risks were not appropriately measured is considered another reason. The CDS contracts are regarded as loan derivatives. Today, any foreign investor would want to analyze some financial data of the country to invest before making an investment decision. Among these data, the essential loan derivative product to be analyzed is Credit Default Swaps (Koy, 2014).

The CDS, which protects the creditor against the loss or loss of value of the asset related to the collateral, is the most commonly used contract type among credit derivatives and has a financially lean structure. The CDS is when any creditor insures his/her receivables for a fee. The fee paid to a third party for this insurance transaction is called the CDS Spread or the CDS premium. In this way, the creditor party off-loads the risk of non-payment of its receivables to the CDS seller (Danaci et al., 2017). The CDS premiums are calculated using the method shown below.

CDS Premium = (Nominal Value of Contract x Base Point x Number of Days / 360)

Source: (Reyhan, 2019)

According to the research results regularly published by the British Banks Association every two years, more than 50% of the contracts in the credit derivative markets are CDS contracts. The main reason why the CDS contracts are so much preferred in international markets and their remarkably fast growth is that these contracts offer their users the oppor-

tunity to effectively manage the credit risk they have to bear, just like an insurance policy. Another reason is that the CDS contracts are bought and sold for hedging purposes only, rather than the formation of the large transaction volumes due to the continuous buying and selling of those who are interested in this business in the markets (Kunt, 2008).

CDS Premiums as an Indicator of Country Risk

International investors, who will invest in a country in the form of portfolio investment or direct investment, should make a correct assessment of the country's risks in the process before making an investment decision. The CDS premiums are generally used to measure the country's risk and evaluate the risks of the country in which foreign investors will invest (Kilci, 2017).

Since the ratings, which are used as an indicator of country risk, are not flexible like CDS in instant price changes in the markets, the investors have started to use the CDS premiums as an indicator of country risk, especially after the 2008 Global Financial Crisis. While the ratings of rating companies provide information about the solvency of an asset such as country, institution, company, and bond; the CDS premiums provide information about the repayment adequacy of the loans used by the country, institution, or companies (Conkar and Vergili, 2017).

The CDS contracts have four main elements: credit element, nominal amount, risk premium (spread), and expiry (Çakır, 2019).

• The credit element is related to the credit risk of the financial asset subject to the transaction in the CDS contracts.

• The nominal amount determines the amount of credit risk transferred from one party to another.

• The spread refers to the periodic premium payments that are generally made every six months. However, in practice, it is seen that payments are sometimes made every three months.

The expiry date refers to the date on which the CDS contracts expire. In general, a reference length or a coverage period of a CDS contract is five-years in the market. Premium payments can also be completed after the possibility of default or the expiry of the contract period.

Table 1 shows the real-time values of the CDS premiums of the five fragile countries in the period under review.

Table 1
Fragile Five Countries CDS Premiums

Date	Indonesia	Brazil	S.Africa	India	Turkey
Mar.19	103,8	238,2	196,8	95,1	419
Feb.19	104,4	217,3	174,8	80,3	300,6
Jan.19	113	227,7	173,5	80,4	299,8
Dec.18	136,6	269,4	221,1	80,4	358,8
Nov.18	140,9	269,9	228,2	80,4	386,5
Oct.18	156,9	263,8	233,9	80,3	383,3
Sep.18	129	317,7	200,3	80,4	371,2
Aug.18	124,5	360,4	228,1	80,3	582
July.18	112	274,2	180,1	80,3	317,5
June.18	137,5	331,9	212,4	80,3	290
May.18	117,1	288,4	174,1	80,3	267,4
Apr.18	104,1	232,8	159,6	80,4	193,5
Mar.18	102,9	221,1	149,1	80,4	191,4
Feb.18	86	213,4	143,9	80,3	166,3
Jan.18	82,3	201	143	80,3	165,8
Dec.17	86,7	217,1	157,8	80,3	166,6
Nov.17	93,7	225,7	178,5	80,3	197,6
Oct.17	94,2	224,8	182,9	80,3	184,4
Sep.17	105,2	247,5	184,5	80,3	184,3
Aug.17	100,7	248,4	168,6	80,3	159,8
July.17	110,8	266,7	180,8	80,3	181,6
June.17	117,7	297,9	197,6	80,3	193,2
May.17	124	293,4	188,3	80,3	196
Apr.17	125,2	276,6	191,3	136	203,9
Mar.17	125,7	282,1	215,2	136	235,4
Feb.17	128,5	282,1	189,4	136	237,9
Jan.17	146,6	311,1	209,4	136	262,5
Dec.16	156,6	363	213,2	136	268,3
Nov.16	168,6	363	236,5	136	283,2
Oct.16	153,3	340,5	239,6	135,9	251,7
Sep.16	151,6	336,7	251,2	135,9	258
Aug.16	142,5	333,1	254,6	134,3	241,6
July.16	160,9	360,9	248,1	152,4	271,7
June.16	184,2	388,1	277,4	152,5	239,6
May.16	188,4	435,1	310,9	152,5	264,5
Apr.16	188,2	404,2	277,5	152,4	236,2
Mar.16	195,5	430,2	296,3	152,4	252,9
Feb.16	230,3	519,5	348,6	150,6	293,3
Jan.16	228	533	341	150,6	275,6
Dec.15	230,5	552,8	331,3	150,6	267,5
Nov.15	218,7	511,5	263,2	150,6	261,6
Oct.15	217,7	510,6	252,2	150,6	252,2
Sep.15	271,9	535,8	292	148,8	312
Aug.15	225,6	414,3	246,3	148,8	260,7
July.15	181,2	350,2	216,6	148,8	233,9
June.15	174,9	312,9	208,2	148,8	223,1
May.15	163,8	299,6	203,4	148,8	208,4
Apr.15	159,9	302,5	208,8	148,8	223,2

Table 2
G7 Countries CDS Premiums

Date	Usa	Germany	Canada	Italy	England	Japan	France
Mar.19	120,8	15,1	33,3	107,4	22,2	35,8	31,9
Feb.19	114,3	15,1	33,3	100	19,2	39,6	27,5
Jan.19	131,5	14,6	33,3	127,1	20,2	45,2	33,4
Dec.18	135,2	13,6	33,3	104,9	18,8	39,5	30,9
Nov.18	145	12,6	33,3	103,5	18,2	37,8	30,9
Oct.18	174,9	14	33,3	110,9	17,3	47,3	30
Sep.18	150,6	12,3	30,7	91,6	17,2	43,4	28
Aug.18	153,1	12,1	30,7	85,2	17,1	51,7	25,5
July.18	169,3	12,1	30,7	86,7	18,2	50,1	23,8
Jun.18	193,5	12,6	30,7	102,5	19,8	49,6	26
May.18	195,5	23	30,7	130,6	29,2	51,3	31,9
Apr.18	160,7	18,3	32,2	116,7	41,3	47,3	30,4
Mar.18	161,8	17	32,2	113,8	40,3	36,7	34,4
Feb.18	170,5	18	32,2	114,8	37,5	34,2	34,9
Jan.18	154,3	19	32,2	138,4	42,8	41,2	38,8
Dec.17	150	15,6	29,9	120,2	35,5	35,9	29,9
Nov.17	137,6	15,6	29,9	123	34,3	33,2	26,5
Oct.17	163,5	17,1	31,4	139,1	34,3	35,7	27
Sep.17	153,8	18,6	31,4	135,7	39,5	33,7	28,4
Aug.17	177,5	21	31,4	158,8	39,3	33,2	37,3
July.17	154,9	20,1	31,4	142,6	32,6	30,2	34,4
Jun.17	165,6	18,6	31,4	153,8	29,6	28,4	37,8
May.17	141	18,1	31,4	146	30	24,4	36,8
Apr.17	128,5	15,1	32,7	126	30,5	25,2	26
Mar.17	117,6	14,6	32,7	113,2	26,7	25,6	21
Feb.17	119,4	13,6	32,7	108,8	25,5	26,6	19,5
Jan.17	113,3	12,6	32,7	89,6	21,8	25,7	15,6
Dec.16	102	10,4	32,7	82,5	18	26,5	12,6
Nov.16	101	10,6	32,7	94,6	21,5	29,9	15,3
Oct.16	110,1	10,6	33,8	93,6	24,9	39,2	16,1
Sep.16	106,4	9,6	33,8	81,8	24,9	34,2	14,3
Aug.16	102	7,9	33,8	74,1	20,7	30,5	11,9
July.16	105,6	7,4	33,8	76,3	20	26,9	12,1
Jun.16	97	6,6	33,8	62,8	16	18,8	11,6
May.16	105,9	7,2	33,8	67	16,7	20,4	12,1
Apr.16	108,6	7,9	34,8	70,5	18,8	22,7	11,9
Mar.16	114,7	7,8	34,8	61,6	17,5	25,2	11,9
Feb.16	139,6	8,9	34,8	138,4	25,1	24,2	18,6
Jan.16	133,2	8,8	34,8	131	24,1	25,3	18,1
Dec.15	113,2	7,7	34,8	129,1	24,2	26,7	16,6
Nov.15	118,7	8,4	34,8	163,1	29,1	25,9	16,8
Oct.15	112,2	8,2	34,8	151,1	28,8	25,9	17,1
Sep.15	144,1	8,9	34,8	162,2	29	24,1	18,7
Aug.15	148	9,7	34,8	147,2	35,4	18	19,6
July.15	154,4	10,8	34,8	127,2	39,7	24,6	22,4

Date	Usa	Germany	Canada	Italy	England	Japan	France
Jun.15	134,3	10,2	34,8	123,8	36	21,9	22,1
May.15	122,5	9,6	34,8	126,6	35,4	21,8	18,2
Apr.15	121,4	9,8	36,3	127,8	33,5	22,4	16,9

Table 2 shows the real-time values of the CDS premiums of the G7 countries in the period under review.

Methodology

The study analyzed the relationship between the CDS and the stock market indices in five countries (Brazil, India, South Africa, Indonesia, and Turkey) with the most fragile economy, called "Fragile Five".

In the study, by using the 5-year CDS premiums of the Fragile Five countries and the closing price data of the stock market indices;

• The stationarity of the series,

• The causality and cointegration relationships between the variables,

• The interaction between the CDS premiums of the specified countries and their stock markets were examined.

Furthermore, the results were interpreted by various methods and analyzes. As a result, it was tested whether there was a significant relationship between the national stock market index values and the CDS premiums of these countries.

In this study, the CDS premiums of Brazil, India, South Africa, Indonesia, and Turkey were used together with the stock market price data of those countries. For this purpose, month-end closing prices of the stock markets were taken for the period of April 2015 - March 2019.

The 5-year CDS premiums of five countries subject to analysis were collected from the Datastream data terminal, and the stock market index values from the Matrix data terminal. The CDS premiums were in US Dollars, while the index values for the stock markets were obtained in the currency of the country analyzed.

The stock market indices included in the study are indices defined as a benchmark index for each country. In this context, the indices, namely BVSP for Brazil, BSESN for India, JTOP for South Africa, IDX Composite for Indonesia, and BIST-100 for Turkey were used.

The analyses were conducted with the help of the E-Views 9 software package. In the

study first, the stationarity tests were performed. The use of Augmented-Dickey-Fuller (ADF) method and the Phillips-Perron (PP) method further increased the reliability of the study.

Then, the Johansen Cointegration analysis was used in the study to reveal the long-term cointegration relationship between the variables. Additionally, the direction of causality among the variables was determined by the Granger Causality analysis. Finally, the Pearson Correlation Coefficients were found to analyze the direction and strength of the relationship between variables.

Analysis and Findings

Unit Root Analysis

The stationarity tests of the data used in the study were carried out separately by using ADF and PP unit root tests in both level values and first differences in the fixed and fixed trend models. The results obtained are shown in Table 3.

Table 3
Fragile Five-stock market Index Stationary Test Results

Fragile Five Countries Index Data			**ADF**		**PP**	
			Test Statistics	**Probability**	**Test Statistics**	**Probability**
Brazil	Fixed	Level	0.038	0.9572	0.148	0.9662
		Difference 1	-4.247	**0.0018**	-6.390	**0.0000**
	Fixed and Trended	Level	-4.441	0.0053	-3.465	0.0551
		Difference 1	-4.178	**0.0111**	-6.435	**0.0000**
Indonesia	Fixed	Level	-0.423	0.8965	-0.547	0.8721
		Difference 1	-5.562	**0.0000**	-5.614	**0.0000**
	Fixed and Trended	Level	-2.595	0.2842	-2.710	0.2374
		Difference 1	-5.597	**0.0002**	-5.651	**0.0001**
South Africa	Fixed	Level	-2.039	0.2697	-2.063	0.2601
		Difference 1	-7.182	**0.0000**	-7.327	**0.0000**
	Fixed and Trended	Level	-2.825	0.1958	-2.877	0.1787
		Difference 1	-7.105	**0.0000**	-7.231	**0.0000**
India	Fixed	Level	-0.248	0.9245	0.040	0.9574
		Difference 1	-6.026	**0.0000**	-6.879	**0.0000**
	Fixed and Trended	Level	-2.822	0.1970	-2.708	0.2382
		Difference 1	-6.173	**0.0000**	-7.027	**0.0000**
Turkey	Fixed	Level	-1.380	0.5840	-1.335	0.6055
		Difference 1	-7.170	**0.0000**	-7.170	**0.0000**
	Fixed and Trended	Level	-1.813	0.6824	-1.813	0.6824
		Difference 1	-7.072	**0.0000**	-7.075	**0.0000**

As can be seen from Table 3, the ADF test results indicated that the Brazilian index value was not stationary in the level value in the fixed model, but stationary in the first difference. In the fixed trend model, it was observed to be stable in the level value. For the other countries

in Table 3, India, Indonesia, South Africa, and Turkey, it was found that the level values were not stationary in both the fixed model and the fixed trend model. However, all other countries except Brazil were stationary in their first difference. According to the PP test, all countries were stationary at the 1st difference level in both the fixed and the fixed trend models.

Table 4
Fragile Five-CDS premiums Stationary Test Results

Fragile Five Countries CDS Premiums			**ADF**		**PP**	
			Test Statistics	**Probability**	**Test Statistics**	**Probability**
Brazil	Fixed	Level	-1.184	0.6735	-1.465	0.5420
		Difference 1	-5.993	**0.0000**	-6.029	**0.0000**
	Fixed and Trended	Level	-2.439	0.3554	-2.577	0.2917
		Difference 1	-5.999	**0.0000**	-6.035	**0.0000**
Indonesia	Fixed	Level	-1.126	0.6975	-1.161	0.6831
		Difference 1	-6.537	**0.0000**	-6.540	**0.0000**
	Fixed and Trended	Level	-2.314	0.4183	-2.314	0.4183
		Difference 1	-6.485	**0.0000**	-6.482	**0.0000**
South Africa	Fixed	Level	-1.674	0.4372	-1.674	0.4372
		Difference 1	-7.621	**0.0000**	-7.650	**0.0000**
	Fixed and Trended	Level	-2.399	0.3753	-2.399	0.3753
		Difference 1	-7.571	**0.0000**	-7.603	**0.0000**
India	Fixed	Level	-1.115	0.7022	-1.115	0.7022
		Difference 1	-6.601	**0.0000**	-6.601	**0.0000**
	Fixed and Trended	Level	-1.651	0.7568	-1.691	0.7393
		Difference 1	-6.541	**0.0000**	-6.541	**0.0000**
Turkey	Fixed	Level	-2.361	0.1579	-2.226	0.1999
		Difference 1	-9.286	**0.0000**	-9.355.	**0.0000**
	Fixed and Trended	Level	-2.626	0.2709	-2.554	0.3019
		Difference 1	-9.211	**0.0000**	-9.279	**0.0000**

According to the stationary test results of the CDS in Table 4, it was seen that all Fragile Five countries were not stationary in their level values in both the fixed model and the fixed trend model in the ADF and PP tests. However, they were found to be stationary in their first difference.

Determination of the appropriate Lag Length

In order to determine the appropriate lag lengths, the VAR analysis was performed for each country separately using the stock market index values and the CDS data of all countries included in the study.

The abbreviations in the tables define as;

AIC = Akaike Information Criterion,

SC = Schwarz Information Criteria

HQ = Hannan-Quinn Information Criteria.

The star symbol in the tables represents the best value of the information criterion it contains. In the study, Akaike Information Criterion (AIC) selected the appropriate information criterion since the information criteria should be closest to 0. The obtained results are given separately in the tables below.

Table 5
Brazil's Lag Length Table

VAR Lag Length Selection Criteria
Internal Variables: Brazil Index Brazil Cds
External Variables: C

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-6.461.740	NA	4.07e+11	32.40870	32.49314	32.43923
1	-5.732.546	134.9010*	1.30e+10*	28.96273*	29.21606*	29.05432*
2	-5.727.228	0.930560	1.55e+10	29.13614	29.55836	29.28880
3	-5.680.127	7.771.702	1.50e+10	29.10063	29.69174	29.31436
4	-5.636.687	6.733.216	1.49e+10	29.08343	29.84343	29.35822
5	-5.585.302	7.450.814	1.42e+10	29.02651	29.95539	29.36236
6	-5.564.729	2.777.283	1.60e+10	29.12365	30.22142	29.52057
7	-5.540.585	3.018.069	1.78e+10	29.20292	30.46958	29.66091
8	-5.488.190	6.025.448	1.74e+10	29.14095	30.57650	29.66000

When Table 5 is examined, it was seen that the most suitable lag length was 1 for Brazil according to Akaike Information Criteria.

Table 6
Indonesia's Lag Length Table

VAR Lag Length Selection Criteria
Internal Variables: Indonesia Index Indonesia Cds
External Variables: C

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-4.733.250	NA	71880747	23.76625	23.85070	23.79678
1	-4.159.386	106.1649*	4983990.*	21.09693*	21.35026*	21.18853*
2	-4.142.061	3.031.897	5593860.	21.21031	21.63253	21.36297
3	-4.133.773	1.367.520	6585569.	21.36887	21.95997	21.58259

Lag	LogL	LR	FPE	AIC	SC	HQ
4	-4.123.600	1.576.794	7709108.	21.51800	22.27800	21.79279
5	-4.106.457	2.485.706	8759002.	21.63229	22.56117	21.96814
6	-4.051.337	7.441.259	8284036.	21.55668	22.65446	21.95360
7	-4.008.184	5.394.074	8386069.	21.54092	22.80758	21.99891
8	-3.964.893	4.978.558	8570381.	21.52446	22.96001	22.04351

When Table 6 is examined, according to Akaike Information Criteria, the most suitable lag length is concluded to be 1 for Indonesia.

Table 7
South Africa's Lag Length Table

VAR Lag Length Selection Criteria
Internal Variables: South Africa Index South Africa Cds
External Variables: C

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5.804.707	NA	1.52e+10	29.12354	29.20798	29.15407
1	-5.315.654	90.47477*	1.62e+09*	26.87827*	27.13160*	26.96987*
2	-5.285.353	5.302.757	1.70e+09	26.92676	27.34898	27.07943
3	-5.255.386	4.944.507	1.80e+09	26.97693	27.56804	27.19066
4	-5.221.263	5.289.053	1.86e+09	27.00632	27.76631	27.28111
5	-5.201.462	2.871.117	2.09e+09	27.10731	28.03620	27.44317
6	-5.155.823	6.161.338	2.07e+09	27.07911	28.17689	27.47603
7	-5.153.361	0.307707	2.57e+09	27.26681	28.53347	27.72479
8	-5.130.573	2.620.596	2.91e+09	27.35287	28.78841	27.87192

When Table 7 is examined, according to Akaike Information Criteria, the most suitable lag length is concluded to be 1 for South Africa.

Table 8
India's Lag Length Table

VAR Lag Length Selection Criteria
Internal Variables: INDIA Index INDIA Cds
External Variables: C

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5.448.152	NA	2.56e+09	27.34076	27.42521	27.37129
1	-4.735.556	131.8303*	88861774*	23.97778*	24.23111*	24.06938*
2	-4.725.114	1.827.364	1.03e+08	24.12557	24.54779	24.27823
3	-4.719.301	0.959257	1.23e+08	24.29650	24.88761	24.51023
4	-4.674.782	6.900.454	1.21e+08	24.27391	25.03390	24.54870
5	-4.651.865	3.322.964	1.34e+08	24.35932	25.28821	24.69518
6	-4.625.632	3.541.382	1.46e+08	24.42816	25.52593	24.82508
7	-4.610.142	1.936.282	1.70e+08	24.55071	25.81737	25.00869
8	-4.606.874	0.375768	2.12e+08	24.73437	26.16992	25.25342

When Table 8 is examined, according to Akaike Information Criteria, the most suitable lag length is concluded to be 1 for India.

Table 9
Turkey's Lag Length Table

VAR Lag Length Selection Criteria
Internal Variables: TURKEY Index TURKEY Cds
External Variables: C

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-6.288.805	NA	1.72e+11	31.54403	31.62847	31.57456
1	-5.651.458	1.179.093	8.66e+09	28.55729	28.81062*	28.64888
2	-5.593.770	1.009.542	7.94e+09	28.46885	28.89107	28.62151*
3	-5.547.274	7.671.759	7.73e+09	28.43637	29.02748	28.65010
4	-5.523.593	3.670.518	8.45e+09	28.51797	29.27796	28.79276
5	-5.443.400	11.62801*	7.01e+09*	28.31700	29.24588	28.65286
6	-5.422.791	2.782.218	7.88e+09	28.41396	29.51173	28.81087
7	-5.372.097	6.336.784	7.68e+09	28.36048	29.62714	28.81847
8	-5.320.452	5.939.204	7.53e+09	28.30226*	29.73781	28.82131

When Table 9 is examined, according to Akaike Information Criteria, the most suitable lag length is concluded to be 8 for Turkey.

Using the appropriate lag lengths determined, the VAR models for the Fragile Five countries were calculated as follows.

Table 10
Vector Autoregression Estimates (VAR 1)

VAR(1) Model	Brasil	Brasil CDS	Indonesia	Indonesia CDS	South Africa	South Africa CDS	India	India CDS
Brazil (-1)	.6539	.0003	.0067	-.0004	.0056	.0010	.0778	.0003
	[4.731]	[0.289]	[1.042]	[-0.752]	[0.089]	[1.157]	[1.716]	[1.073]
Brazil CDS(-1)	-1.462	0.7439	-0.7093	0.0232	-3.096	0.2535	-9.619	-0.0164
	[-0.679]	[3.787]	[-0.703]	[0.228]	[-0.312]	[1.839]	[-1.360]	[-0.304]
Indonesia (-1)	1.178	-0.0770	0.6149	-0.0158	0.6094	-0.0570	-1.213	-0.010
	[2.567]	[-1.839]	[2.859]	[-0.730]	[0.288]	[-1.943]	[-0.804]	[-0.873]
Indonesia CDS(-1)	6.544	0.3085	-3.490	0.8121	1.642	-0.4404	7.012	0.0483
	[1.177]	[0.609]	[-1.341]	[3.099]	[0.643]	[-1.238]	[0.384]	[0.347]
South Africa (-1)	-0.0723	-0.0001	0.0053	-0.000	0.7008	-0.0013	0.0981	0.0005
	[-0.224]	[-0.057]	[0.355]	[-0.463]	[4.732]	[-0.648]	[0.927]	[0.718]
South Africa CDS(-1)	4.329	-0.500	3.678	-0.190	-5.610	0.487	7.631	0.039
	[1.628]	[-2.064]	[2.955]	[-1.522]	[-0.459]	[2.865]	[0.874]	[0.595]
India (-1)	-0.0204	0.0055	-0.0048	0.0041	-0.2598	0.0024	0.6194	-0.001
	[-0.045]	[1.440]	[-0.238]	[2.000]	[-1.291]	[0.887]	[4.312]	[-1.206]
India CDS(-1)	-5.120	0.2650	-2.947	0.3240	-4.285	0.1506	-2.591	0.752
	[-1.141]	[0.649]	[-1.403]	[1.533]	[-2.078]	[0.524]	[-1.759]	[6.702]

Table 11
Vector Autoregression Estimates Turkey (VAR 8)

VAR(8) Model	Turkey	Turkey _CDS
Turkey (-1)	1.027	-0.0024
	[5.336]	[-1.290]
Turkey (-2)	0.360	-0.0045
	[1.304]	[-1.686]
Turkey (-3)	-0.055	0.0030
	[-0.197]	[1.104]
Turkey (-4)	-0.332	-0.0021
	[-1.222]	[-0.791]
Turkey (-5)	0.493	0.0020
	[1.808]	[0.754]
Turkey (-6)	0.1659	-0.0024
	[0.545]	[-0.814]
Turkey (-7)	-0.1232	0.0063
	[-0.399]	[2.107]
Turkey (-8)	-0.9032	0.0022
	[-2.580]	[0.669]

Table 12
Vector Autoregression Estimates Turkey_CDS (VAR 8)

VAR(8) Model	Turkey	Turkey _CDS
Turkey _CDS (-1)	6.961	-0.031
	[3.139]	[-0.143]
Turkey _CDS (-2)	-1.134	-0.099
	[-0.490]	[-0.438]
Turkey _CDS (-3)	2.005	0.380
	[0.854]	[1.656]
Turkey _CDS (-4)	-3.742	-0.1760
	[-1.578]	[-0.759]
Turkey _CDS (-5)	6.808	-0.008
	[2.964]	[-0.035]
Turkey _CDS (-6)	1.227	-0.297
	[0.485]	[-1.201]
Turkey _CDS (-7)	-2.560	0.707
	[-0.992]	[2.805]
Turkey _CDS (-8)	-1.279	0.294
	[-2.122]	[0.499]

Granger Causality Analysis

In order to determine the short-term relationship between the CDS and the index variables belonging to the Fragile Five countries and the direction of this relationship, a separate Granger causality test was conducted for each country. The hypotheses to be tested are as follows;

H_0: There is no Granger causality between the variables. ($p > 0.10$)

H_1: There is Granger causality between the variables. ($p < 0.10$)

The analysis results obtained are shown below in Table 8.

Table 13
Fragile Five Countries, Granger Causality Test Results

Granger Causality Test for the Fragile Five Countries			
Sample: 1 48			
Lag: 1	**F-Statistic**	**Probability**	**Causality**
Brazil Index does not granger cause Brazil CDS	0.4957	0.4851	No
Brazil CDS does not granger cause Brazil Index	0.0662	0.7980	No
Indonesia Index does not granger cause Indonesia CDS	219.28	0.1458	No
Indonesia CDS does not granger cause Indonesia Index	0.0059	0.9387	No
S. Africa Index does not granger cause S. Africa CDS	167.34	0.2026	No
S. Africa CDS does not granger cause S. Africa Index	111.49	0.2968	No
India Index does not granger cause India CDS	661.88	**0.0135**	**Yes**
India CDS does not granger cause India Index	492.22	**0.0317**	**Yes**
Turkey Index does not granger cause Turkey CDS	172.01	0.1471	No
Turkey CDS does not granger cause Turkey Index	298.33	**0.0190**	**Yes**

When Table 13 was examined, there was a short-term relationship between India's CDS premium variable and the index values, and these two variables were mutual Granger reasons for each other. In addition, there was a Granger causality between Turkey's CDS premium and the index variable. One-sided causality relationship was observed from the CDS premiums to the index values. No Granger causality relationship was seen between the CDS premiums and the index values for Brazil, Indonesia, and South Africa.

Johansen Cointegration Analysis

After looking at the short-term relationship between variables with the Granger Causality Analysis, the Johansen Cointegration Analysis was conducted to determine whether there was a long-term relationship between variables. The hypotheses to be tested are as follows;

H_0: There is no cointegration relationship between variables. ($p < 0.10$)

H_1: There is cointegration relationship between variables. ($p > 0.10$)

Each country analyzed in the study was separately taken into consideration. The results of the Johansen Cointegration Analysis are shown in the tables below.

When Table 14 was examined, since the probability value of p was higher than 0.10, the H_0 hypothesis was not rejected indicating that Brazil's CDS premiums and the index values were not co-integrated, and that there was no long-term relationship between these two variables.

Table 14
Brazil Johansen Cointegration Analysis Results

Series: BRAZIL CDS - BRAZIL INDEX				
Observations Included: 46 (after adjustment)				
Trend assumption: No Deterministic Trend				
Sample (adjusted): 3 48				
Lag Range (at first differences): 1 - 1				
Hypothesis		**Max-Eigenvalue**	**0.1**	
CE(s)	**Eigenvalue**	**Statistics**	**Critical Value**	**Probability**
No	0.122860	6.030.059	9.474804	0.3463
No more than 1	0.028290	1.320103	2.976163	0.2929

Table 15
Indonesia Johansen Cointegration Analysis Results

Series: INDONESIA CDS - INDONESIA INDEX				
Observations Included: 46 (after adjustment)				
Trend assumption: No Deterministic Trend				
Sample (adjusted): 3 48				
Lag Range (at first differences): 1 - 1				
Hypothesis		**Max-Eigenvalue**	**0.1**	
CE(s)	**Eigenvalue**	**Statistics**	**Critical Value**	**Probability**
No	0.293475	15.98024	17.23410	0.1461
No more than 1	0.083045	3.988056	10.66637	0.7438

When Table 15 was examined, the H_0 hypothesis was not rejected as the probability value of p is higher than 0.10. Thus, it was concluded that Indonesia's CDS premiums and index values were not co-integrated, and that there was no long-term relationship between these two variables.

Table 16
South Africa Johansen Cointegration Analysis Results

Series: SOUTH AFRICA CDS - SOUTH AFRICA INDEX				
Observations Included: 46 (after adjustment)				
Trend assumption: No Deterministic Trend				
Sample (adjusted): 3 48				
Lag Range (at first differences): 1 - 1				
Hypothesis		**Max-Eigenvalue**	**0.1**	
CE(s)	**Eigenvalue**	**Statistics**	**Critical Value**	**Probability**
No	0.075317	3.602014	9.474804	0.6922
No more than 1	9.82E-05	0.004519	2.976163	0.9557

The examination of Table 16 revealed that the H_0 hypothesis was not rejected due to the fact that the p-value was higher than 0.10. Therefore, it could be stated that South Africa's CDS premiums and the index values were not cointegrated, and there was no long-term relationship between these two variables.

Table 17
India Johansen Cointegration Analysis Results

Series: INDIA CDS – INDIA INDEX				
Observations Included: 46 (after adjustment)				
Trend assumption: No Deterministic Trend				
Sample (adjusted): 3 48				
Lag Range (at first differences): 1 - 1				
Hypothesis		**Max-Eigenvalue**	**0.1**	
CE(s)	**Eigenvalue**	**Statistics**	**Critical Value**	**Probability**
No	0.198531	10.18024	12.29652	0.2004
No more than 1	0.020931	0.973024	2.705545	0.3239

When Table 17 was examined, since the probability value of p was higher than 0.10, the H_0 hypothesis was not rejected. That is, India's CDS premiums and index values were not co-integrated, and there was no long-term relationship between these two variables.

Table 18
Turkey Johansen Cointegration Analysis Results

Series: TURKEY CDS – TURKEY INDEX				
Observations Included: 39 (after adjustment)				
Trend assumption: Quadratic Deterministic Trend				
Sample (adjusted): 10 48				
Lag Range (at first differences): 1 - 8				
Hypothesis		**Max-Eigenvalue**	**0.1**	
CE(s)	**Eigenvalue**	**Statistics**	**Critical Value**	**Probability**
No*	0.415111	20.91698	15.00128	0.0135
No more than 1*	0.090122	3.683.361	2.705545	0.0550

The results presented in Table 18 revealed that since the probability value of p was less than 0.10, the H_0 hypothesis was rejected in favor of the H_1 hypothesis, indicating that Turkey's CDS premiums and index values were co-integrated, and there was a long-term relationship between these two variables. Therefore, it was assessed that there was a cointegration relationship as well as a long term relationship between the CDS premium and the index values of Turkey.

Vector Error Correction Model (VECM)

In cases where there was at least one cointegration relationship between the variables, the Vector Error Correction Model (VECM) was used. For the vector error correction model to be statistically significant, the p-value must be less than 0.10, and the error term coefficient must be between -1 and 0.

The results of the VECM analysis of the countries with a cointegration relationship between the CDS premiums and the stock market indices are shown in the tables below.

Table 19
Turkey Vector Error Correction Model Results

Variable	Coefficient	Std. Error	t-Statistics	P-Value
D(TURKEY CDS)	-0.005449	0.001186	-4.594.185	0.0000
Error Term (-1)	**-0.561342**	0.137174	-4.092.200	0.0002
C	-6.028.129	6.405.113	-0.941143	0.3518
R-square	0.464889	The dependent variable		-4.165.957
Adjusted R-square	0.440566	Connected		5.864.277
Residual sum of squares	84650.71	Akaike information criterion		1.046.168
F- Statistics	1.911.296	Schwarz information criterion		1.057.977
P value (F-statistic)	0.000001	Hannan-Quinn information criterion		1.050.612
		Durbin-Watson		2.019.464

The data of Turkey were analyzed, and it was observed that the error term coefficient was between -1 and 0. In addition, the p-value was less than 0.10. Therefore, the relevant model was statistically significant at the 0.10 significance level. In other words, approximately 56 % of the deterioration in the previous period's balance will recover in the next period.

Correlation Analysis

The Pearson correlation coefficient reveals the direction and strength of the relationship between the CDS premiums and index values of the countries included in the study. In order for the correlation coefficients to express a meaningful result, the variables must conform to the normal distribution. For this purpose, first, the least squares estimation was made for each of the Fragile Five countries by using the index values and the CDS premiums. The normality test results of the error terms resulting from the estimation are given in the table below. (a=0.05)

Table 20
Jarque-Bera Test Results

Variables	Jarque-Bera Statistics	Probability	Decision
Brazil – Brazil CDS	1.7439	0.4181	Accept
Indonesia – Indonesia CDS	4.3887	0.1114	Accept
South Africa - South Africa CDS	0.6412	0.7257	Accept
India - India CDS	2.004	0.3669	Accept
Turkey -Turkey CDS	4.3273	0.1149	Accept

It was seen that the error terms conformed to a normal distribution in all regression models examined in table 20.

When the results in Table 21 were examined, the ρ values of Brazil, Indonesia, South Africa, and India were less than - 0.5. In other words, it could be said that there was an inverse and strong relationship between the CDS premiums of these countries and their index values. On the other hand, the ρ value of Turkey, was higher than -0.5 indicating there was a weak inverse correlation between the index value and Turkey's CDS premium.

Table 21
Fragile five countries Pearson Correlation Coefficients

Country	Correlation Coefficients (ρ)
Brazil	-0.8279
Indonesia	-0.9280
South Africa	-0.6133
India	-0.8985
Turkey	-0.2743

Conclusions

International capital markets have significantly developed with the technological advancements in recent years. Due to these developments, the inflow and outflow of capital to countries have accelerated, and investing in international markets has become very advantageous for investors in terms of time and cost. Accordingly, a serious capital flow has mostly started towards the "fragile" and "developing" countries, which previously did not have sufficient capital inflows but offered attractive return opportunities for the investors. Today, when capital can turn into investment within seconds, the CDS premiums offer investors to insure the risks of countries quickly and instantly. This feature has been defined as the most critical indicator of country risk in recent years.

When we look at the previous studies examining the relationship between the CDS premiums and the stock market indices, it was realized that those studies have generally either compared the developed countries and developing countries or analyzed a single country. The primary starting point of the present study is that although the Fragile Five countries are among the developing countries, they do not show similar trends with the other countries in the same group.

In this regard, the relationship between the CDS premiums and the stock indices were separately discussed for the countries, namely Brazil, Indonesia, South Africa, India and Turkey, defined as the "Fragile Five" by Morgan Stanley, that have the most fragile economies. The short-term relationship was examined with the Granger Causality analysis and the long-term relationship with the Johansen Cointegration analysis. Then, the correlation relationship between the CDS premium and stock market index values were evaluated.

The examination of the relationship between the CDS premiums, an indicator of country risk, and the stock market indices, was made for the countries belonging to the Fragile Five group. As a result of the econometric analysis made in this context, it can be stated that there was a short-term relationship between India's CDS premiums and the index values and that these two variables were the Granger cause of mutual change. However, there was no long-term relationship between these two variables. When the correlation analysis results were examined, it can be said that there was an inverse and strong relationship between the CDS

premiums and the index values.

It was observed that there was a one-sided causality relationship between Turkey's CDS premium and the stock market index values in the short run and the causality relationship was from Turkey's CDS premium to the index values. In addition, the presence of a long-term relationship between the index value and Turkey's CDS was also determined. The results of correlation analysis conducted for the data belonging to Turkey revealed a weak inverse correlation between the index value and the CDS premium. When we look at the other Fragile Five countries, there was no short- or long-term relationship between the CDS premiums of Brazil, Indonesia, and South Africa and their index values. According to correlation analysis results, there were an inverse and strong relationship between the CDS premiums and the index values for those countries.

As a result, the investors operating in international markets should take into consideration the CDS values of India and Turkey as an indicator when making short-term investment decisions in the stock markets of the Fragile Five countries. On the other hand, it could be said that, only Turkey's CDS premium can be used as an indicator in long-term investment decisions.

It was concluded that the effect of CDS premiums on the stock market indices was not the same for each country. However, in the globally developing capital markets, CDS premiums, which show the country risk instantly, are considered an indicator that investors will use much more in the coming years. After this study, in addition to the CDS premium, various macroeconomic variables can be used as an indicator of country risk. New studies on the effects of these variables on the stock markets can contribute to the literature. In terms of investors, it can be stated that among the Fragile Five countries, the CDS premiums of India, and Turkey, can be used in short-term investment decisions, while only Turkey's CDS premium in long-term.

When the findings were analyzed in terms of Turkey, it was seen that there were both long-term and short-term relationships between Turkey BIST-100 index and its CDS premiums, in addition a one-way causality relationship between variables also existed (Sahin & Ozkan, 2018), (Sovbetov & Saka, 2018), (Sadeghzadeh, 2019) and (Atmisdortoglu, 2019). The findings obtained in the present study contradict with those in the study conducted by Sit et al., 2014 in which they claim that the CDS premium had no effect on the Turkish stock market. In our study, we determined a unilateral causality and cointegration relationship between the variables in both the short- and long-term. In addition, although the findings they obtained did not directly conform to the results of the present study, their results also contradicted some other studies. For example, Norden & Weber found in their 2009 study that a change in CDS premiums had a significant impact on the stock prices. Chan et al., in their 2009 study, revealed a very high and significant negative correlation between the CDS premiums and the

stock indices. Foncesa & Gottschalk observed in their 2018 study that the CDS premiums were affected by volatility in the stock returns. Our study is compatible with these studies for these reasons.

When looking at the other studies that contradict the results of our study, it is seen that our results are incompatible with the results of (Basarır & Keten, 2016), (Degirmenci & Pabuccu, 2016) and (Sahin & Ozkan, 2018). These studies indicated that there was a double-sided causality relationship between the CDS premiums and the stock market indices or stock prices. However, in our study, a unilateral causality was determined from the CDS premiums of Turkey to the BIST-100 index.

In conclusion, the key findings of the study can be listed as follows;

• CDS premiums are a variable that has gained popularity in the last 10 years and can now be used as a financial confidence indicator for countries.

• In today's world, where mobility is very fast, international stock market indices are affected by this confidence variable. For this reason, governments are required to implement stable economic policies, especially in a way to prevent significant volatility in the stock markets.

• It is recommended that both the monetary and fiscal policies of the countries be long-term and consistent.

CDS contracts are now becoming an indicator that expresses the insurable margin of the financial assets issued by the governments. In order to ensure the stability of CDS premiums, especially the principle of transparency should be exercised. It is very important that the political and military stabilities support the economic stability.

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