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Testing the Relationship between Investor Risk Appetite and Country Risk: The Case of Turkey

Summary: Country risk is an important factor affecting the risk appetite of investors who want to create an optimal portfolio by minimizing their risks. Investor risk appetite can affect country risk as a factor contributing to the development of financial markets and the country's economy. The aim of this study is to determine the relationship between investor risk appetite and country risk. Hatemi-J cointegration and Hatemi-J asymmetric causality tests were used to determine the relationship between CDS premium, which is frequently preferred to represent country risk, and domestic and foreign investor risk appetite variables. As a result of the analysis, it has been determined that CDS premium and domestic and foreign investor risk appetite variables are cointegrated, a positive causality from increases in both local and foreign investor risk appetite to CDS premium and a negative or positive causality from decreases in CDS variables to both local and foreign investor risk appetite.

Keywords: Risk, Risk appetite, CDS premium, Hatemi-J cointegration, Hatemi-J asymmetric causality.

JEL: G32, G41.

Risk and return are the main factors affecting the investment decisions of investors who want to evaluate their investments in financial markets (Mehmet Bolak 2004). While determining the expected return from an investment is not an important problem, determining the risk of an investment requires taking into account various systematic and non-systematic factors that constitute the risk (Serpil Canbaş and Hatice Doğukanlı 2001; Mehmet B. Karan 2011).

Foreign investment, especially in developing countries, is one of the important factors vital for economic growth, economic stability, and the development of financial markets since developing countries have insufficient local savings (Abdulkadir Kaya, Bener Güngör, and Mehmet S. Ozcomak 2014). For foreign investors, the risk level of a country in which they will invest is decisive. CDS premiums, which are indicators used as country risk, are preferred by investors because their data can be accessed instantly (Ömer İskenderoglu and Asuman Balat 2018).

To ensure the expected return on an investment, the risk undertaken by investors is considered as financial risk tolerance. Investors with high-risk tolerances tend to take risks and have high expectations of returns. Financial risk tolerance is affected by

various factors such as education, culture, social environment, income level, economic conditions and varies by time (Adem Anbar and Melek Eker 2009). Although many different measures are used to determine risk tolerance, the concept of risk appetite, representing macroeconomic uncertainties and individual risk avoidance tendencies caused by systematic risk, is considered as an important indicator in international financial markets. While effects of macroeconomic factors in a country have similar effects on investment instruments, investors' risk appetites are more influential factors in determining asset prices and predicting the direction of markets (Sibel Çelik, Elmas Dönmez, and Burcu Acar 2017).

In this study, the relationship between country risks and investor risk appetites will be examined. In the next part of the study, after the literature review on the subject is presented, the data, methods and findings will be mentioned, and a general evaluation will be made in the conclusion section.

1. Literature Review

Discussed in academic studies since the 1960s, the concept of country risk is examined in terms of factors such as profit transfers, confiscation, expropriation faced by multinational companies and in terms of their effects on foreign direct investments. Examination of country risks in terms of financial markets gained more importance after the 1980s, when globalization began to become widespread together with the integration in financial markets, the increase in uncertainties, and the impact of all countries and markets on economic crises (Sevda Yapraklı and Bener Güngör 2007). In rapidly developing financial markets with globalization and developments in technology, investors have been able to invest quickly and safely in any financial markets. Today, investors can trade in local markets as well as make investments that they deem attractive in different countries' financial markets. Especially foreign investors who expect high returns prefer to benefit from credit ratings given by international credit rating companies, risk ratings prepared by international organizations or Credit Default Swaps (CDS) instead of examining many different risk factors to keep their risks at a minimum level.

After 1980s, CDSs have become a very popular indicator for securities markets, direct investments, portfolio investments, companies, countries, capital market institutions and researchers. In 1998, CDSs were standardized and facilitated by the International Swaps and Derivatives Association. Initial studies on CDS were generally on companies. One of these pioneering studies on CDS premium is the studies by John Hull and Alan White (2000). In this study, researchers presented a methodology under the assumption that the debtor has no default risk and the payment is handled with a reference institution's default. For this purpose, they analyzed the sensitivity of the CDS valuation to the recovery rate assumption. In addition, in their study, they exemplified their methodology with real data.

In another pioneering study on companies, Peter Carr and Liuren Wu (2004) proposed a model that allows stock options and CDSs to be estimated and valued together. In their study, Carr and Wu followed the Markov process and indicated that a stock moves in stochastic volatility before defaulting, and when default occurs, the stock price drops to zero. In another study conducted using country CDS premiums,

Carr and Wu (2007) examined CDS spreads and implied volatility in foreign exchange options. In that study, a methodology was proposed in which CDS premiums and the difference in foreign exchange return have a linear correlation and follow a common spread.

Examining the financial literature, it is seen that the studies are concentrated between CDS premiums and macroeconomic-financial variables. When the studies between CDS premiums and risk appetite and macroeconomic variables are examined, it is seen that different results have been obtained in the literature. Çelik, Dönmez, and Acar (2017) found out that the increase in interest rate and exchange rate had a negative effect on risk appetite, while the increase in money supply and central bank foreign exchange reserves had a positive effect. A similar result was found in the study by Ömer Özpınar, Hamir Özman, and Osman Doru (2018), a positive relationship was found between Turkey's CDS premium and the dollar exchange rate in the short and long term. Esra N. Kılcı (2017a, b) did not find a relationship between CDS premium and macroeconomic indicators in both studies using the same period (2010-2016) and different analysis techniques (Engle-Granger, Johansen and Toda Yamamoto). In their study, which aimed to measure the effect of macroeconomic variables on CDS premiums of countries, Dragon Y. Tang and Hong Yan (2009) indicated that there was a negative relationship between growth in GDP and CDS premiums.

Apart from macroeconomic variables, some studies have investigated the relationship between CDS and public debt or credibility. For example, Cristoffer Brandorf and Johan Holmberg (2010), point to a relationship between CDS premiums and public debt, unemployment and inflation rates in Italy, Greece, Ireland, Portugal and Spain. Similarly, Thomas Plank (2010) has revealed in his study that there is a high correlation between CDS premiums of Turkey, Czech Republic, Russia, Poland, Romania and Hungary and the external debt credibility of countries. Alessandro Fontana and Martin Scheicher (2016) concluded that short-selling frictions explain the continuity of positive deviations, while financing frictions explain the continuity of negative deviations observed for countries with weak public finances.

When studies on the relationship between CDS premiums and financial variables were examined, similar results were obtained. Esra Aksoylu and Şakir Görmüş (2018) determined the existence of a significant relationship between CDS premiums and financial indicators in their studies using Asymmetric Hatemi-J and Granger models during 2005-2015. Similarly, in studies covering the period of 2010-2016 conducted by Kılcı (2017a, b), long-term causality was determined between CDS premium and the variables of capital adequacy ratio, real effective exchange rate, BIST 30 index non-performing loans/total loans. As a similar result, Çağatay Başarır and Murat Keten (2016) emphasized that there is a significant relationship between CDS premium and stock prices. In their study, Francis A. Longstaff et al. (2011) concluded that CDS premiums for developing and developed countries such as Romania, Mexico, Chile, Korea, Malaysia and Japan for the period 2000-2010 were closely related to US stock market and high-yield markets and VIX index rather than to local economic indicators. Eli M. Remolona, Michale Scatigna, and Eliza Wu (2008) stated that CDS premiums and risk-tolerant indices such as VIX index and RTI had an effect on the country risk premium. In addition, Mahmoud Qadan and Yasmeen I. Bayaa (2020) indicated that

the changes in investors' risk appetite were an important determinant not only for stock prices, but also for oil, which is the most important energy source. Tuğrul Kandemir, N. Serap Vurur, and Halilibrahim Gokgoz (2020) examined the relationship between CDS variable and financial markets, as well as the relationship between CDS variable, exchange rate and bond prices with the GARCH model. They concluded that there is a negative coefficient between CDS and Stock Exchange index.

Examining the field literature, there are studies that indirectly examine the relationship between country risk and risk appetite. Qadan and Joseph I. Yagil (2015) examined industrial production, which has an effect on country risk, and stock returns, which has an effect on investor risk appetite, using data for the period 1980-2010. As a result of the analysis, they concluded that there is an asymmetric cointegration between stock market returns and industrial production in G7 countries. In their study, Liron Riter-Gavish, Qadan, and Yagil (2021) examined investors' decisions to return to the stock market or leave the market in the short term, using a large data set in the 2008 financial crisis. For this purpose, researchers tested two hypotheses. The first hypothesis is that during the financial crisis, investors who received financial advice were less willing to leave the stock market completely and were more likely to return to the market. The second hypothesis is that investors with less knowledge are more likely to leave the stock market. As a result of the analysis, both hypotheses were accepted. They also found that being divorced increases the likelihood of investors leaving the market, and single investors are less likely to leave the market.

In another study, which directly investigated the relationship between credit default swaps (CDS) and risk appetite, Sibel Fettahoğlu (2019) concluded that foreign and local investor appetite, one of the independent variables related to risk appetite, gave significant results in explaining CDS premium; that there was a negative and significant correlation between CDS and the risk appetite index according to all three investor classes. In their studies investigating the relationship between risk appetite and commodity prices, Ömer Iskenderoğlu and Saffet Akdag (2019) found out that there was a long-term Granger causality relationship from oil prices and exchange rate to risk appetite. In addition, it was observed that there was a short-term causality relationship from changes in gold prices and interest rates to investor risk appetite. Balat (2020), on the other hand, determined a cointegrated relationship according to the results of the Johansen Test in her study investigating whether there was a relationship between risk appetite and the BIST 100 index. Jun Pan and Kenneth J. Singleton (2008) stated that investor risk appetite had an impact on CDS premiums in Mexico, Turkey and Korea.

General information about the field literature is given in Table A1 in the Appendix.

2. Data, Methods and Findings

2.1 Data

This study aims to determine the relationship between investor risk appetite and country risk in Turkey. In analyses, Turkey's CDS premiums representing the country's risk and domestic investor risk appetite and foreign investor risk appetite indices will

be used to determine the effects of domestic and foreign investors' risk appetite separately. As the CDS premium, Turkey's 5-year CDS premiums were used. The Risk Appetite Index was used as the investor's risk appetite. The Risk Appetite Index is calculated by the Central Registry Agency, the official depository of Borsa Istanbul, Turkey's only stock exchange. In the calculation of this index, firstly, the deviations of the stock portfolio values held by the investors as of Fridays were calculated by deducting the weighted averages of the portfolio values of the previous 52 weeks. In the second stage, scores between the values of "0" and "100" were created over the deviation matrices for the portfolios. Finally, the index was calculated by taking the weighted averages of these scores according to the ratio of the portfolio size of the relevant week to the total market size. The Risk Appetite Index has been published weekly by Central Registry Agency (CRA) since 2008. In order not to reflect the effects of the 2008 global financial crisis on the RISE data and to determine the effects of the Turkish economy in the recent period, the last 6-year period has been examined. Therefore, Weekly data for the period 04.01.2016-01.01.2021 were used in the analyzes. Investor risk appetite data was obtained from the CRA, and CDS premiums data was obtained from the website. The variables used in the study, their abbreviations and the sources they are provided are presented in Table 1.

Table 1 Information on Variables

Abbreviations	Variables	Resources
Domestic	Domestic investor risk appetite	Central Registration Agency (CRA)
Foreign	Foreign investor risk appetite	
CDS	CDS premiums	www.worldgovernmentbonds.com

Source: Authors' compilation.

2.2 Method

To determine the relationship between investor risk appetite and CDS premiums, whether there is a long-term relationship between the variables will be analyzed by Hatemi-J Cointegration test, which takes into account two regime changes. If the variables are cointegrated, the causality test between the variables will be used from Hatemi-J asymmetric causality test, which has superiority over other tests and can evaluate positive and negative shocks separately because classical causality tests reveal the causality relationship only over positive shocks.

2.2.1 Cointegration Test

In cointegration tests frequently used in the literature, it is accepted that cointegration vectors of the data belonging to analysis period remain the same. However, when examining long-term relationships, there may be shifts in vectors, that is, relationships may change during the period due to reasons such as crises and economic factors. Pierre Perron (1989) found in his study that unit root tests have low power if there are structural breaks that are not taken into account in the data. Likewise, Allan W. Gregory and Bruce E. Hansen (1996) indicated that the presence of an unconsidered regime shift would lead to a decrease in the power of analysis in cointegration tests. Therefore,

in the study, in the analysis of cointegration between variables, the cointegration test developed by Abdulnasser Hatemi-J (2008) will be used to allow two regime changes. The following regression model (1) is considered for analysis.

$$y_t = \alpha + \beta^t x_t + u_t, \quad t = 1,2,\ldots,n\,. \tag{1}$$

In the analysis, primarily, the effects of two structural breaks on the intersection point and slopes are calculated by the formulas numbered (2) below.

$$y_t = \alpha_0 + \alpha_1 D_{1t} + \alpha_2 D_{2t} + \beta_0^t x_t + \beta_1^t D_{1t} x_t + \beta_2^t D_{2t} x_t + u_t. \tag{2}$$

Dummy (D1t and D2t) variables used in Formula (2) were treated with assumptions 3 and 4.

$$D_{1t} = \begin{cases} 0 & if\ t \leq [n\tau_1] \\ 1 & if\ t > [n\tau_1] \end{cases} \tag{3}$$

$$D_{2t} = \begin{cases} 0 & if\ t \leq [n\tau_2] \\ 1 & if\ t > [n\tau_2] \end{cases} \tag{4}$$

In the calculation of the first-order serial correlation coefficient value $\hat{\rho}^*$ with bias correction required for the determination of $Z\alpha$ and Zt test statistics, it is calculated by the Formula (5).

$$p^* = \frac{\sum_{t=1}^{n-1}(\widehat{\hat{u}_t \hat{u}_{t+1}} - \sum_{j=1}^{B} \omega\left(\frac{j}{B}\right)\hat{y}(j)}{\sum_{t-1}^{a-1} \hat{u}_t^2}. \tag{5}$$

The autocovariance function is defined as in Equation (6).

$$\hat{y}(j) = \frac{1}{n} \sum_{t=j+1}^{T} (\hat{u}_{t-j} - \widehat{\hat{\rho} u}_{t-j-1}) \left(\hat{u}_t \widehat{\hat{\rho} u}_{t-1}\right). \tag{6}$$

$Z\alpha$ and Zt test statistics, which will be used for the existence of the cointegration relationship, are calculated by Formulas (7) and (8).

$$Z_\alpha = n(\hat{p}^* - 1). \tag{7}$$

$$Z_t = \frac{(\hat{p}^* - 1)}{\left(\hat{y}\,(0) + 2\sum_j^B \omega\left(\frac{j}{B}\right)\hat{y}(j)\right) / \sum_t^{n-1} \hat{u}_t^2}. \tag{8}$$

In determining the distribution of the determined $Z\alpha$ and Zt test statistics according to 1%, 5% and 10% importance levels, it is determined by the following formulas.

$$ADF^* = \inf_{(\tau_1,\tau_2)\in T} ADF\,(\tau_1,\tau_2)$$

$$Z_t^* = \inf_{(\tau_1,\tau_2)\in T} Z_t\,(\tau_1,\tau_2)$$

$$Z_\alpha^* = \inf_{(\tau_1,\tau_2)\in T} Z_\alpha\,(\tau_1,\tau_2)$$

2.2.2 Causality Test

The causality relationship between two variables has been examined in many empirical studies. Granger Causality test, especially developed by Clive W. J. Granger (1969), is the intensely preferred method of analysis. In Granger causality test, it is examined whether there is a causality between the two variables, and it is accepted that this relationship exists in negative shocks by examining the positive shocks. The main reason why positive and negative shocks are not handled separately is that an asymmetrical structure is not taken into account. An important reason for existence of asymmetric causal effects between variables is the existence of asymmetric information. The first study on the existence of asymmetric markets was done by George A. Akerlof (1970), Michael Spence (1973) and Joseph E. Stiglitz (1974) discussed this work extensively. In traditional causality tests, the causality relationship between the variables is determined by considering only positive shocks and it is assumed that the same relationship is also valid for negative shocks. The Hatemi-J causality test detects causality between both positive and negative shocks. Also, it is of great importance to consider asymmetrical behavior in causality tests. Therefore, asymmetric causality analysis developed by Hatemi-J (2012), which takes into account causality relationship between variables, asymmetric behavior and delayed augmented preload simulations and can be applied to the efficient market hypothesis, will be used in the study. In the procedure to be followed to test the causality relationship between CDS and investor risk appetite (Domestic and Foreign) for the Turkish economy, y_{1t} represents CDS variable and y_{2t} represents risk appetite. The random walking process of variables is determined by the equations in numbers (9) and (10).

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{10} + \sum_{i=1}^{t} \varepsilon_{1i}; \quad (9)$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{20} + \sum_{i=1}^{t} \varepsilon_{2i}. \quad (10)$$

Constant values in equations, $y_{1.0}$ and $y_{2.0}$, represent the initial values. Positive and negative shocks are calculated respectively as $\varepsilon_{1i}^{+} = max\,(\varepsilon_{1i}, 0), \varepsilon_{2i}^{+} = max\,(\varepsilon_{2i}, 0), \varepsilon_{1i}^{-} = min\,(\varepsilon_{1i}, 0)$ and $\varepsilon_{2i}^{-} = min\,(\varepsilon_{2i}, 0)$. Therefore, calculation of y_{1t} and y_{2t} will be transformed into the state in Equations (11) and (12).

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{1,0} + \sum_{i=1}^{t} \varepsilon_{1i} + \sum_{i=1}^{t} \varepsilon_{1i}; \quad (11)$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{2,0} + \sum_{i=1}^{t} \varepsilon_{2i} + \sum_{i=1}^{t} \varepsilon_{2i}. \quad (12)$$

Cumulative of positive and negative shocks for each variable will be determined with $y_{1t}^{+} = \sum_{i=1}^{t} \varepsilon_{1i}^{+}, y_{1t}^{-} = \sum_{i=1}^{t} \varepsilon_{1i}^{-}, y_{2t}^{+} = \sum_{i=1}^{t} \varepsilon_{2i}^{+}$ and $y_{2t}^{-} = \sum_{i=1}^{t} \varepsilon_{2i}^{-}$. In testing the causality relationship between variables, the autoregressive model of the degree p will be obtained by VAR(p) model (13) model using the following vector.

$$y_t^{+} = v + A_1 y_{t-1}^{+} + \cdots + A_p y_{t-1}^{+} + u_t^{+}. \quad (13)$$

Determining the appropriate length of delay in causality tests is an important criterion. In the Hatemi-J causality test, VARp+d model and Hatemi-J critical information values are used to determine the appropriate delay lengths. VAR(p) model

numbered (14) is constructed and hypothesis "H0: Granger is not a cause" is tested by following method (15).

$$Y = DZ + \delta. \tag{14}$$

$$Wald = (C\beta)^1[C((Z'Z)^{-1} \otimes S_U)C']^{-1}(C\beta). \tag{15}$$

2.3 Findings

To investigate the relationship between CDS premiums used to represent country risk and domestic and foreign investors' risk appetites; cointegration and causality relationship between variables were analyzed. Since the data to be used in the analysis are time series, the variables must be stationary. If the series are not stationary, there will be a false regression problem in the analysis (Damodar N. Gujarati 1999). For this reason, the variables were tested for stability before proceeding to analyses. Classical unit root tests are performed under the assumption that the effects of the shocks occurring in the series are temporary and that this effect will be ineffective in the long term. The characteristics of the series such as whether they are stationary and linear or not, seasonal effects should also be taken into consideration (Nimet M. Esenyel 2017). Since cointegration and asymmetric causality analyses that take into account regime changes will be used in the analyses, ADF-type unit root test called Narayan-Popp unit root test developed by Paresh Narayan and Stephan Popp (2010), which allows two breaks in the stationarity test of variables, is used. Narayan-Popp unit root test results of CDS, Domestic and Foreign variables in the level value, whose graphs are presented in the Appendix (Figures A1, A2 and A3), are presented in Table 3. Before proceeding to the analyses, descriptive statistics data of the variables were created and presented in Table 2.

Table 2 Descriptive Statistics of Variables

	CDS	Foreign	Domestic
Mean	319.9949	47.52613	52.78610
Median	289.2400	46.80038	52.71671
Maximum	643.3300	70.20350	73.54160
Minimum	155.2000	20.01516	31.84451
Std. dev.	118.0065	11.65567	10.93953
Skewness	0.728793	-0.117315	-0.056664
Kurtosis	2.668594	2.202955	1.850692
Jarque-Bera	24.39204	7.536132	14.56014
Probability	0.000005	0.023097	0.000689
Sum	83838.67	12451.85	13829.96
Sum sq. dev.	3634564.	35458.08	31234.76
Observations	262	262	262

Source: Authors' compilation.

Table 3 Narayan-Popp Unit Root Test Results

Variables	Level values	
	Constant	Constant and trendy
CDS	-3,272 (3)	-3,134 (3)
Domestic	-3,726 (1)	-3,877 (1)
Foreign	-3,304 (0)	-4,635 (0)
Critical values		
a = 1%	-4,731	-5,318
b = 5%	-4,136	-4,741
c = 10%	-3,825	-4,430

Notes: * Significance at the significance level of 1%, with figures in parentheses indicating appropriate delay lengths.

Source: Authors' compilation.

When the data in Table 3 are examined, it has been determined that all three of the variables are not statistically stationary at the 10% level in the level value. Since stationarity is important in time series analysis, the stationarity test was performed again by taking the first-order differences of the variables.

Graphs of first difference values of CDS, Domestic and Foreign variables are presented in the Appendix (Figures A4, A5 and A6). In addition, the results of the Narayan-Popp Unit Root Test performed with the first difference values of the variables are shown in Table 4.

Table 4 Narayan-Popp Unit Root Test Results

Variables	I. Level values	
	Constant	Constant and trendy
CDS	-5,616 (8)*	-5,617 (8)*
Domestic	-20,58 (0)*	-6,318 (8)
Foreign	-18,83 (0)*	-18,72 (0)*
Critical values		
a = 1%	-4,731	-5,318
b = 5%	-4,136	-4,741
c = 10%	-3,825	-4,430

Notes: * significance at the significance level of 1%, with figures in parentheses indicating appropriate delay lengths.

Source: Authors' compilation.

When the stationarity test results of the first difference values of all three variables are examined, it was determined the CDS, Domestic and Foreign variable was statistically stable at the first level value at the 1% significance level. With Narayan-Popp Unit root test, it was determined that there were breaks in CDS variable data on 7/29/2018 and 2/9/2018, in the domestic variable data on 3/31/2019 and 8/9/2019 and in the foreign variable data on 7/15/2018 and 10/7/2018. In the analyses made in the light of this information, the CDS variable will be used at the first level, and the Domestic and Foreign variables will be used with the level values.

To determine the cointegration relationship among CDS, Domestic and Foreign variables, an econometric model numbered (16) was created, and the results of Hatemi-J Cointegration test are presented in Table 5.

$$CDS = C + \beta_1 Domestic + \beta_2 Foreign + e. \quad (16)$$

Table 5 Hatemi J Cointegration Test Results

t-statistics	-19,45*
Za	-314,2
Zt	-19,45
Initial breaking point	7.04.2019
Second breaking point	30.06.2019
Critical values	% 1 -6,928 % 5 -6,458 %10 -6,224

Notes: * refers to significance at 1% level of importance.

Source: Authors' compilation.

Examining Table 5, which shows the results of Hatemi-J cointegration analysis that takes into account the fracture in the two regimes, it is determined that the CDS, Domestic and Foreign variables are cointegrated; there is a long-term relationship between the variables. In other words, the cointegration of variables shows that they are affected by similar shocks in the long term.

Cointegration of the variables suggests that there may be at least a one-way causality relationship between the variables (Gujarati 1999). Results of the Hatemi-J asymmetric causality test to test whether there is a causality relationship between CDS and Domestic and Foreign variables are shown in Table 6 and Table 7.

Table 6 CDS-Domestic Variables Hatemi J Asymmetric Causality Test Results

Variable pair	Optimal latency length	Test statistics (MVald)	Critical values	
Domestic (+) → CDS (+)	3	0,423	%1 %5 %10	9,832 6,354 4,854
Domestic (+) → CDS (-)	3	33,669*	%1 %5 %10	14,545 8,834 6,445
Domestic (-) → CDS (-)	3	2,517	%1 %5 %10	11,075 6,936 4,639
Domestic (-) → CDS (+)	4	3,782	%1 %5 %10	11,851 8,572 6,692
CDS (+) → Domestic (+)	3	3,811	%1 %5 %10	10,012 6,657 5,047
CDS (+) → Domestic (-)	4	1,657	%1 %5 %10	12,149 7,955 6,105
CDS (-) → Domestic (-)	2	16,073*	%1 %5 %10	9,479 5,921 4,533
CDS (-) → Domestic (+)	4	26,631*	%1 %5 %10	12,291 8,511 6,759

Notes: * and to 1% significance, respectively.

Source: Authors' compilation.

Examining Table 6, showing the causality relationship between CDS and Domestic variables, it is seen that increases in the Domestic variable are a reason for the decreases of CDS variable, and decreases of CDS variable are a reason for the decreases of the Domestic variable, and causality relationships are statistically significant at the 1% significance level.

The two main factors affecting investor risk appetite are the level of uncertainty caused by macroeconomic conditions and investors' risk aversion preferences. The risk premium, expressed as the additional return demanded in exchange for purchasing a risky investment instrument, depends on the risk appetite of the investor as well as the risk of the security.

The increase in the risk appetite of domestic investors will lead to an increase in the volume in the financial markets and an increase in the market indices. This positive development in the financial markets will provide the opportunity to access the funds needed quickly and at affordable costs. Thus, the increase in investments and consumption will contribute to the development of the country's economy by increasing employment and production. These positive developments will be welcomed by international financial institutions and will lead to a reduction in Turkey's CDS premiums. This finding is in line with the findings of Pan and Singleton (2008) and Fettahoğlu (2019).

These findings reveal that only the decreases in premiums from the changes in CDS premium have reduced the risk appetite of domestic investors. This situation shows that the domestic investors who invest by following CDS premium and therefore the country risk are risk-sensitive or risk-loving investors, that is, yield-oriented investors. Therefore, the decrease in the country CDS premium will also cause nominal return of the investor to decrease as it will mean that the country risk is also reduced. As a result, the investment appetite of domestic investors whose nominal returns are decreasing will also decrease.

When Table 7 is examined, it is concluded that increases in the foreign variable are a reason for the decrease in the CDS variable statistically at 1% significance level, and that the decrease in CDS variable is a reason for both the increase and decrease in the foreign variable statistically at 1% significance level.

The increase in foreign investor risk appetite will lead to an increase in foreign investment in Istanbul Stock Exchange in Turkey. Due to this positive economic development, CDS premiums will also decrease.

The fact that the decreases in CDS premiums have both positive and negative causality on foreign investor risk appetite can be considered as an indicator that foreign investors do not avoid risk and invest in a nominal return-oriented manner, as expressed for domestic investors. For this reason, since the increases in CDS premiums will lead to an increase in risk premium and nominal return, the risk appetite of foreign investors will increase, and the decrease in CDS premiums will have the opposite effect.

Table 7 CDS-Foreign Variables Hatemi J Asymmetric Causality Test Results

Variable pair	Optimal latency length	Test statistics (MVald)	Critical values	
Foreign(+) → CDS(+)	3	0,200	%1 %5 %10	10,083 6,486 4,965
Foreign(+) → CDS(-)	4	41,762*	%1 %5 %10	15,237 8,779 6,316
Foreign(-) → CDS(-)	3	1,442	%1 %5 %10	11,209 6,468 4,581
Foreign(-) → CDS(+)	4	3,978	%1 %5 %10	13,335 8,294 6,532
CDS(+) → Foreign(+)	3	4,027	%1 %5 %10	10,493 6,378 4,913
CDS(+) → Foreign(-)	4	3,394	%1 %5 %10	11,319 7,771 6,367
CDS(-) → Foreign(-)	3	16,600*	%1 %5 %10	9,848 6,126 4,506
CDS(-) → Foreign(+)	4	25,765*	%1 %5 %10	11,877 8,219 6,603

Notes: * refers to 1% significance, respectively.

Source: Authors' compilation.

These findings are in line with the findings by Pan and Singleton (2008) reporting that investor risk appetite has an effect on CDS premiums, and findings by Fettahoğlu (2019) that investor risk appetite is significant in explaining CDS premiums. In addition, the effect of increases and decreases in CDS premiums on investor risk appetite was also determined in this study.

3. Conclusion

This study aims to determine the relationship, and its direction, between other individual's investor risk appetite and country risk in Turkey. In the analyses, 5-year CDS premiums of Turkey were used to represent the country risk. In addition, the domestic investor risk appetite index and the foreign investor risk appetite index were included in the analysis to determine the effects of the risk appetites of domestic and foreign investors separately. Weekly data for the period 1/4/2016-8/10/2020 were used to carry of analysis study. In determining the relationship between the variables, the existence of a long-term relationship was performed by Hatemi-J cointegration test, and causality examination was performed by Hatemi-J asymmetric causality analysis. Since the data used in the analyses are time series, the stability of the variables was tested first. Narayan-Popp unit root test, which is a two-fracture unit root test, was used as a stagnation test. According to the results of the unit root test, it was determined that CDS variable was stationary in the first difference value, and the Domestic and Foreign

variables were stationary in the level values, and the variables were included in the analyzes with their stationary values.

As a result of Hatemi-J cointegration test conducted to measure long-term relationship between the variables, it was determined that the variables were cointegrated, in other words, that there was a long-term relationship between CDS and domestic-foreign variables. Since the existence of a long-term relationship between the variables may be an indicator of the causality relationship, Hatemi-J asymmetric causality analysis was performed to determine the causal relationship between the variables. As a result of the analysis, it was determined that there is a causal relationship from positive increases of the Domestic variable to negative increases of the CDS variable, from negative increases of the CDS variable to negative increases of the Domestic variable. In addition, it was determined that there is a causal relationship from positive increases of the foreign variable to negative increases of the CDS variable, from positive increases of the CDS variable to positive increases of the foreign variable, and from negative increases of the CDS variable to negative increases of the foreign variable.

When the findings are evaluated in general, it can be stated that CDS premiums and domestic-foreign investor risk appetite act together in the long term; in other words, they are affected by similar shocks in the long term, and increases in risk appetite are evaluated positively in terms of country risk and CDS premiums calculated by international organizations are positively affected by this situation. In light of these findings, it can be concluded that investor risk appetite triggers the CDS premium.

When causality relations of CDS premiums on risk appetites are examined, a positive causality can be found between CDS premium and risk appetites. This situation reveals that investors who invest in Turkey affected by the CDS premium are insensitive to risk and have a return-oriented tendency. Therefore, while the risk appetite of the relevant investors will increase due to the increase in risk premiums and the increase in nominal returns, there will be a decrease in risk appetite with the decrease in risk premium.

To reduce the country's risk and CDS premiums as well as the development of financial markets, environments should be created and arrangements should be made to increase the risk appetites of capital markets institutions and legislators, domestic and foreign investors, in other words, the investment tendencies in Istanbul Stock Exchange.

Investors who invest in securities markets will be able to make healthier investment decisions by following the CDS premiums and predicting the general investor risk appetite trends according to the increase or decrease in premiums.

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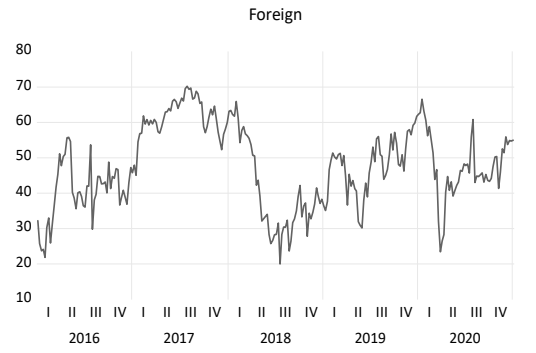
Appendix

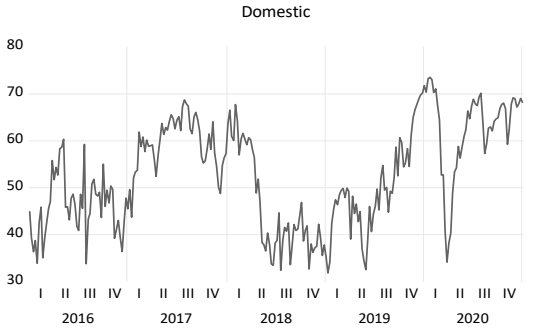
Source: Authors' compilation.

Figure A1 Level Value Graph of CDS Variable



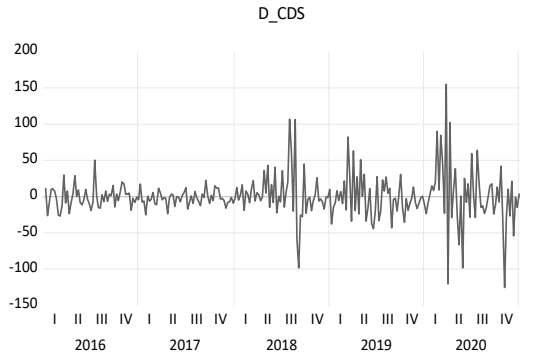
Source: Authors' compilation.

Figure A2 Level Value Graph of Foreign Variable



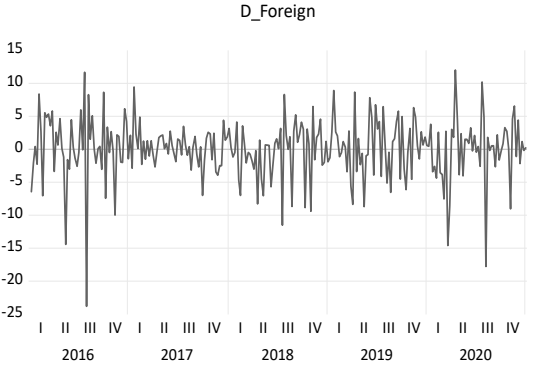
Source: Authors' compilation.

Figure A3 Level Value Graph of Domestic Variable



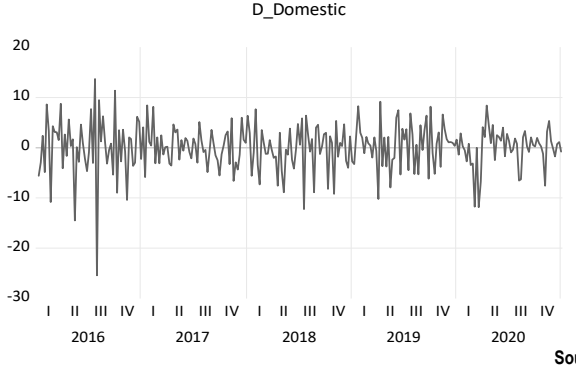
Source: Authors' compilation.

Figure A4 First Level Value Graph of CDS Variable



Source: Authors' compilation.

Figure A5 First Level Value Graph of Foreign Variable



Source: Authors' compilation.

Figure A6 First Level Value Graph of Domestic Variable

Table A1 Literature Table

Researchers	Model	Results
Qadan and Bayaa (2020)	GARCH threshold, structural vector automatic regression and causality models	The analysis shows that the changes in the risk appetite of investors are an important determinant not only for stock prices, but also for oil, the most important energy source.
Balat (2020)	Johansen Cointegration test	Empirical findings prove that there is a cointegrated relationship between the variables. In addition, according to the results of Granger Causality analysis, it has been determined that there is a significant causality relationship from BIST 100 index to both domestic and foreign investor risk appetite index.
Akkuş (2020)	Hacker and Hatemi-J Causality tests	A bidirectional causality relationship was found between public external borrowing and CDS premiums. No causal relationship was found between private sector external debt and CDS premiums.
Mili (2019)	Mean Return Hypothesis	The results of the analysis show that in the pre-crisis period, the dominant CDS spillover changes are more consistent with the average reversal hypothesis for most European countries. There is also strong evidence that the intertemporal trade-off between volatility and yield partially explains the average return in European CDS markets.
İskenderoğlu and Akdağ (2019)	Granger, Jörg Breitung and Bertrand Candelon (2006) Causality Analyzes	The obtained results indicate the existence of a long-term causality running from oil prices to risk appetite. In addition, it has been determined that there is a short, medium and long-term causality relationship from exchange rate to risk appetite. Changes in gold prices and interest rates have a short-term causality in investors' risk appetite.
Fettahoğlu (2019)	Regression	In the study, it was found that the risk appetite of foreign and local investors gave significant results in explaining the CDS premium; It has been observed that there is a negative and significant correlation between CDS and risk appetite index for all three investor classes.
Özpınar, Özman, and Doru (2018)	Causality	It has been determined that there is a positive relationship between the US Dollar exchange rate and the CDS premium in both the long and short run in Türkiye; therefore, both variables move together in the long run. It has been concluded that the direction of the relationship is only one-way causality from US Dollar exchange rate to CDS.
Aksoylu and Görmüş (2018)	Granger, Hatemi-J Causality tests	In the study, it was determined that there is an asymmetric causality relationship between CDS premiums and selected financial variables. In addition, it was observed that the Hatemi-J asymmetric causality test was more effective than the Granger test in explaining the causality relationship between CDS premiums and selected financial variables.
Çelik, Dönmez, and Acar (2017)	Regression	As a result of the analysis, it has been determined that interest rates, exchange rates, money supply and central bank foreign exchange reserves affect the risk appetite of investors in Turkey. In addition, it was concluded that the increase in interest rates and exchange rates had a negative effect on risk appetite, while the increase in money supply and foreign exchange reserves had a positive effect.
Kılcı (2017a)	Engle-Granger, Johansen Co-integration tests	It has been determined that the relationship between Turkey's 5-year CDS premiums and macroeconomic indicators such as growth, inflation, unemployment, current account deficit is weak, and the explanatory power of these variables is not clear. In addition, according to the Engle-Granger Co-integration Test results, long-term relationships were determined between the real effective exchange rate and financial indicators such as banking sector capital adequacy, non-performing loans/total loans, BIST 30 values, and CDS premiums.
Kılcı (2017b)	Toda-Yamamoto test	In the study, it was concluded that there is a long-term causality relationship between the real effective exchange rate, capital adequacy ratio and BIST 30 variables and 5-year CDS premiums.
Başarır and Keten (2016)	Granger, Johansen Cointegration tests	As a result of the analysis, a two-way causality relationship was found between CDS premiums and stocks at a significance level of 95% in the countries covered. No short- and long-term causality relationship was found with exchange rates.
Fontana and Scheicher (2016)	Causality	The analysis found that short selling friction explains the persistence of positive biases.

Longstaff et al. (2011)	Causality	The analysis revealed that country credit risk can be predominantly associated with global factors. It shows that CDS premiums are closely related to the US stock market and VIX index rather than local economic indicators.
Plank (2010)	Regression	The model results reveal that there is a high correlation between CDS premiums and external debt credibility of countries.
Brandorf and Holmberg (2010)	Regression	The results indicate the existence of a relationship between CDS premiums and public debt, unemployment and inflation rates.
Tang and Yan (2009)	Regression	The results indicate the existence of a negative relationship between GDP growth and CDS premiums. On the other hand, it reveals that CDS premiums decrease in periods when investor risk appetite is high and systematic risk is low.
Pan and Singleton (2008)	Regression	Empirical findings reveal that investors' risk appetite, as well as country-specific and regional economic risks, have an impact on CDS premiums.
Remolona, Scatigna, and Wu (2008)	Regression	In the study, it was concluded that indices showing risk tolerance such as inflation rate, VIX index and RTI have an effect on country risk and risk premium.

Source: Authors' compilation.