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Dynamic Interactions Between CDS Premiums, Exchange Rates, and the BIST Banking Index: Evidence from Turkey (2013–2023)



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Abstract: This study investigates the dynamic interrelationships among credit default swap (CDS) premiums, exchange rates, and the Borsa Istanbul (BIST) Banking Index in the context of the Turkish financial market over the period 2013–2023. Monthly data have been employed, and the analysis has been conducted using the timevarying parameter vector autoregressive (TVP-VAR) model, a framework well-suited for capturing evolving interactions and volatility spillovers over time. Empirical results indicate that fluctuations in exchange rates have exerted a significant influence on the volatility of both CDS premiums and the BIST Banking Index. Furthermore, substantial volatility transmission has been observed from CDS premiums to the BIST Banking Index, highlighting the sensitivity of banking sector equity performance to sovereign credit risk perceptions. It has also been identified that CDS premiums exhibited pronounced volatility prior to 2018, remained highly volatile between 2018 and 2022, and experienced renewed volatility post-2022. Similarly, the BIST Banking Index demonstrated persistent volatility from 2014 through the end of 2022, suggesting an extended period of market instability within Turkey's banking sector. These findings contribute to the broader understanding of systemic risk and financial interconnectivity in emerging markets. They may provide valuable insights for policymakers, institutional investors, risk management professionals, and financial analysts concerned with market stability and investment strategy. Understanding these interdependencies is essential for the formulation of effective hedging strategies, the pricing of financial instruments, and the assessment of macro-financial vulnerabilities in economies subject to external shocks and credit risk fluctuations.

Keywords: Credit default swap (CDS) premiums; Borsa Istanbul (BIST) Banking Index; Exchange Rates; Timevarying parameter vector autoregressive (TVP-VAR) model; Volatility transmission; Financial market dynamics; Turkey

1. Introduction

Investors in emerging markets are seen to use various indicators to assess country risks and market volatility. Among these indicators, CDS stands out, reflecting investors' perceptions of a country's debt risk and revealing the risk premium. In developing countries such as Turkey, a relationship is observed between CDS premiums, exchange rates and banking sector performance. While exchange rates are an indicator of economic uncertainties and financial vulnerabilities, the BIST Bank Index reflects the health of the banking sector and investor confidence in the country. In this study, the relationship between CDS premiums, exchange rates and the BIST Bank Index in Turkey is examined, and the sectoral and macroeconomic reflections of financial risks are evaluated.

In today's complex and ever-changing financial markets, it is important for investors and analysts to understand and evaluate the relationships between various indicators. Among these indicators, important metrics such as CDS premium, exchange rate and BIST data provide important clues about the general health of the market, economic stability and investor confidence.

With the integration of global financial markets, understanding the relationships between economic indicators is of vital importance for investors, policy makers and economists. In developing countries like Turkey,

interactions between credit risk perceptions, financial market fluctuations and exchange rates are critical to economic stability and growth. In this context, CDS premiums are an important and dynamic indicator widely used to measure a country's credit risk. While CDS premiums reflect market players' perceptions of a country's ability to repay its debts, the BIST Bank Index and exchange rates provide important information about the country's economy and market dynamics.

CDS was first expressed and used by JP Morgan in 1994 (Augustin et al., 2016; Sovbetov & Saka, 2018).

CDS can also be called a kind of insurance because CDS fulfills the same function as insurance coverage for the risk of non-payment of a loan (Fabozzi & Choudhry, 2004).

Credit default swaps are simply transactions between the creditor and the debtor in the relationship, in response to the possibility of the debtor not being able to pay the debt or the risk of the other party not being able to collect the receivables. CDS is a contract that protects the creditor against the risk of any possible problem that may occur in terms of the return of a loan, and the amount paid to the buyer based on this contract is expressed as a certain percentage of the loan, which is called the Credit Default Premium (Han & Zhou, 2015).

According to another definition, CDS is a type of insurance contract that assumes a debtor's commitment to pay a certain loan. The CDS premium represents the cost of obtaining insurance on a certain loan or debt. In other words, investors pay CDS premiums to protect themselves against the risk of the debtor going bankrupt. A high CDS premium indicates that the market sees a certain debtor as high risk.

In this context, country CDS data is actively used today in measuring credit risk. While CDS below 100 indicates that risk perception is low, CDS above 300 indicates that risk perception is high, which means that risk is perceived high by investors in the market (Eğilmez, 2020). In this context, the CDS value is also a value that shows the risk perception of foreign investors.

Turkey's CDS premium is an important indicator of how the market perceives the country's economic and political risks. When Turkey 's CDS premium increases, it indicates that investors believe that Turkey's risk of defaulting on its debts is increasing and therefore demand higher insurance costs.

The exchange rate, on the other hand, expresses the value of a country's currency against another country's currency. Changes in exchange rates generally occur depending on factors such as a country's economic strength, political stability and foreign trade balance. On the other hand, the BIST Bank Index is an important indicator used to track the performance of stocks of leading companies in the banking sector. The bank index usually provides information about a country's economic health and the state of its financial sector.

Although the relationships between CDS premium, exchange rate, and the BIST Bank Index depend on various factors, a few basic points are mentioned below in order to understand the general trends.

Risk Perception and Exchange Rate Relationship: When investors lose confidence in a country's economic and political stability, they may lose confidence in that country's currency. In this case, the price of the national currency in terms of foreign currency may fall, which may cause the country's CDS premium to increase.

Banking Sector and Stock Market Index: The banking sector is one of the cornerstones of a country's economy. The Banking Index tracks the performance of the banking sector while also providing clues about overall economic health. During times of economic optimism, the Banking Index usually rises, while during times of economic uncertainty or crisis, it may fall.

Risk Perception and Bank Index: When investors lose confidence in the health of a country's banking sector, the bank index may fall, leading to an increase in the country's CDS premium.

In general, during periods of declining economic confidence, the CDS premium is expected to increase, while the stock market index is expected to fall and exchange rates are expected to rise. In periods of optimism, the CDS premium is expected to decrease, while the stock market index is expected to rise and exchange rates are expected to fall or remain stable. Therefore, it is important for investors to follow and analyze these indicators in financial markets. Because these indicators can help evaluate economic and financial risks.

The financial sector and the banking sector are directly affected by global developments in the world and specifically by positive and negative developments in the economy. In this direction, it is noteworthy that current studies mainly examine the relationship between the country risk premium and the crises experienced in the field of finance and banking (Badurlar, 2021).

The most important players in financial markets are banks. BIST Bank Index is an index of all banking companies traded on Borsa Istanbul. BIST Bank Index is an index that measures the performance of bank shares traded on Borsa Istanbul. The banks included in this index may change over time, but generally there are large banks and some medium-sized banks in Turkey.

One of the means through which foreign direct investments enter countries is the stock exchanges of those countries. It is observed that investors generally prefer bank stocks that they find safer when making their investments through the stock exchange. One of the most important criteria affecting foreign direct investments is the CDS premium of that country. In this context, it is thought that the CDS premium indirectly affects the BIST Bank index.

The objective of this research is to investigate the association between CDS premiums, which are important indicators that quickly reflect market dynamics, and the BIST Bank Index and exchange rates in the case of Turkey.

The findings provide information that market players can use in their decisions. Turkey has faced various challenges in recent years, such as economic fluctuations, political debates and external debt obligations. This has led to an increase in CDS premiums and fluctuations in financial markets. The banking sector, in particular, is of great importance in terms of economic stability and sustainability of growth. While the BIST Bank Index reflects the performance of banks in Turkey, exchange rates have a direct influence on the country's foreign trade balance and the risk appetite of foreign investors.

This study is considered to contribute to the literature by addressing the relationship between CDS premiums and BIST Bank Index and exchange rates in the context of Turkey, a developing country example. In economies open to financial fragility such as Turkey, studies examining the impact of country risk premiums on banking sector performance and exchange rate dynamics and the simultaneous interaction of these variables are limited. The study also provides not only theoretical but also methodological contributions in terms of presenting current findings on risk transmission mechanisms by revealing the causal relationships between CDS premiums and financial market indicators with the empirical method used.

2. Literature

The first study on CDS in the literature was conducted by Duffie (1999). This study mostly included the meaning of the credit default premium and detailed information about its content.

Fung et al. (2008) analyzed the interaction among the stock markets of the relevant countries and CDS in their study on the USA and the nations of Asia (China, Malaysia, Korea, Thailand and the Philippines). Data for the subject variables were used from 2001 to 2007. The research findings suggest that the stock market was both investable and leading to high-yield CDS markets.

Chan et al. (2009) investigated the correlation between CDS premium and stock markets in South Korea, China, Indonesia, Japan, Malaysia, Thailand and Philippines. The study, covering the data between 2001 and 2007, concluded that there is a strong negative correlation between stock indices and CDS premiums.

The two studies mentioned above have examined the relationship between CDS premium and stock market from a general perspective, and our subject study has focused on a specific index under the stock market. The bank index is considered to have a special importance, especially as it is the vehicle through which foreign investors first enter the country.

Zhang et al. (2010) examined the causality relationship between various exchange rates for the US dollar and CDS in their study. In the study conducted using daily data from North American and European countries between 2004 and 2008, a causal link was established between the US dollar and the CDS premium, while a causal connection was found between the EUR and the Credit Default Swap premium only through the Australian dollar.

Longstaff et al. (2011) tried to determine the interaction between Credit Default Swap and exchange rate by performing regression analysis and used 10-year monthly data covering the years 2000-2010. According to the findings, there is a positive relationship between these two variables.

Diebold & Yilmaz (2012) examined how volatility and shocks in financial markets spread, and in this context, they developed the "Spillover Index" method, and analyzed the interaction between financial indicators such as CDS premiums, exchange rates and stock indices. In their analysis, two-way but asymmetric relationships were observed between CDS markets and stock and foreign exchange markets.

Coronado et al. (2012) evaluated the interconnection between CDS premiums and stock prices. In their study, they used data covering the years 2007-2010 for 8 European countries. The findings demonstrated a negative linkage between these variables.

Liu & Morley (2012) determined bidirectional causality between two variables for France and unidirectional causality from exchange rate to CDS premium for the USA as a result of their analysis using monthly data for the USA and France between 2005 and 2019.

Ratner & Chiu (2013) conducted a study on the interaction between the American stock market and CDSs. In this study where the variables were used for the years 2004-2011, it was concluded that CDSs created a safe area in the stock market.

Asandului et al. (2015) tested the correlation between Credit Default Swap spreads and stock indices across countries in different locations by performing Johansen cointegration analysis. In the study using 2004-2014 data, the study found that Credit Default Swap affected stock prices, especially after the financial crises.

Başarır & Keten (2016) analyzed the causal linkage between CDS premium and stocks and exchange rates in developing countries in their study covering the period between 2010 and 2016. The findings indicate that there is a mutual causality between CDS premium and stocks, but there is no causality relationship between CDS and exchange rates.

Roberts et al. (2016) investigated the relationship between CDS premium and USD/EUR exchange rate by applying the Granger causality test in their study. In the analysis made with 2005-2012 data, it was determined that there was a two-way and one-way relationship between the two variables.

Acaravcı & Karaömer (2017) conducted a study on whether there is a long-term relationship between BIST 100

indices and CDS premium. In the study on Turkey, a vector autoregressive model was used with weekly data covering the years 2012-2017. No long-run relationship was found between the two variables in the analysis. In the same study, Granger causality analysis was also conducted with variance decomposition and impulse/response, and it was concluded that there was no causal relationship between the BIST 100 index and CDS premium.

Bektur & Malcioğlu (2017) analyzed the interaction between CDS and the BIST 100 index by using Turkey data between 2000 and 2017 and applying the Hacker Hatemi J causality test. As a result of this study, it was revealed that there is a one-way relationship from CDS premium to the BIST 100 index.

Çonkar & Vergili (2017) studied the bond between CDS and USD/TL and EURO/TL for Turkey with Granger causality. In the study using daily data between 2010 and 2015, it was concluded that there is a one-way causality relationship from USD/TL to CDS premium and EURO/TL at a significance level of 5%.

Yunus et al. (2018) investigated the relationship between exchange rates and CDS premiums in their study. Panel data analysis was conducted and cointegration tests were applied in the study on Indonesia, Turkey, Brazil, India, and South Africa, which are called the "Fragile Five". Based on the analysis, it was found that CDS premiums have a one-to-one effect on the nominal exchange rate in these countries and that the CDS premium is one of the most important data affecting the exchange rate.

Özman et al. (2018) measured the correlation between CDS premium and exchange rates in Turkey with Johansen cointegration and Granger causality tests. As a result of the study covering the years 2005-2017, it was revealed that there is a long-term positive relationship between CDS premium and exchange rate.

Sovbetov & Saka (2018) examined the relationship between BIST 100 and CDS premiums using Granger causality analysis using Turkey data. The study covering the years 2008-2015 revealed that there is short-term and long-term bidirectional causality between the two variables.

Kahyaoğlu (2019) analyzed the correlation between CDS and exchange rates using time series analysis. The analysis revealed a strong relationship between the two variables.

Tanyıldızı (2019) studied the relationship between CDS premium and Bloomberg Commodity Index, VIX index, bond benchmark interest rates and BIST 100 index. In the relevant study, Turkey's data covering the years 2008-2018 were used. The results indicated a direct relationship between the variables, which was not statistically significant in the long term. It was revealed that there was a statistically significant inverse relationship between the BIST 100 index and CDS premiums in both the short and long term.

Altuntaş & Ersoy (2022) examined the relationship between CDS premium, BIST 30 Index and BIST Banking Index in the example of Turkey. In the relevant study, weekly data between the period 2009-2020 were used. The Granger Causality Test results in this study showed that there is a bidirectional causal interaction between Turkey's Credit Default Swap premium and BIST Banking Indices.

Evci (2020) analyzed the relationship between CDS premium and the BIST100 index and found that there was a reverse causality relationship between the two variables.

Sarıgül & Şengelen (2020) investigated the relationship between CDS premiums and the BIST Bank index by applying cointegration and Granger causality tests. Based on the findings, where data for the years 2014-2019 were used, it was concluded that a long-run association existed between the subject variables.

Topaloğlu & Ege (2020) examined the relationship between CDS premiums and BIST 100 index returns in their study. From the empirical evidence gathered, using the data of the relevant variables for the years 2010-2019, it was concluded that there was a negative connection between the BIST 100 index and CDS premiums.

Gürsoy & Kılıç (2021) analyzed the relationship between political uncertainty and the BIST Banking Index and CDS premiums. In the study conducted on the example of Turkey, monthly data for the periods of 2010-2020 were used. In the study, results were obtained that there was a strong two-way relationship between CDS premium and the BIST Banking Index.

Karshoğlu & Sevim (2022) examined the correlation between CDS premiums and BIST100 with the example of Turkey using the Granger causality test. As a result of the study using 10-year data between 2010 and 2020, there appeared to be a bidirectional connection between the two variables in question.

The relationship between CDS premiums and exchange rates has become an important area of research, especially in emerging economies, in the context of openness to external shocks. For example, Longstaff et al. (2011) argued that CDS premiums reflect global risk perception and this perception can increase volatility in exchange rates. In studies conducted specifically for Turkey, Özman et al. (2018) revealed a long-term positive relationship between CDS premiums and exchange rates in Turkey. Kahyaoğlu (2019) concluded that there is a strong relationship between CDS and exchange rates. However, most of these studies address the relationship from a one-way and short-term perspective; they do not focus sufficiently on long-term effect channels or binary variable interactions.

On the other hand, some studies focusing on developed economies (Longstaff et al., 2011) analyzed the relationship between CDS and exchange rates and concluded that there is a positive relationship, but also pointed out that the level of effect is weak, emphasizing the importance of the country context.

In this context, the existing literature has not reached a clear consensus on the CDS-foreign exchange relationship; the impact of contextual factors has been ignored, especially in developing country examples.

However, in the case of Turkey, the number of studies that include holistic and dynamic models that address the simultaneous interaction of CDS premiums with both exchange rate and financial sector indicators is quite limited.

The literature on the impact of CDS premiums in the banking sector is more limited. Although there are studies indicating that CDS premiums have a negative impact on Banking Index returns, these studies only address the banking sector in terms of financial returns. Studies addressing the simultaneous interaction of CDS premiums with exchange rate and bank stocks are quite limited. Therefore, it is thought that empirical analyses that address the dynamic relationship between these indicators in a holistic manner in the case of Turkey will make significant contributions to the literature.

3. Dataset and Method

This study examines the dynamic connection between CDS premiums and the BIST bank index and exchange rates. The study uses monthly data from Turkey for the years 2013-2023. Exchange rate information is obtained from the TCMB EVDS (2024) database. CDS values are obtained from the Bloomberg database, and BIST Bank index data is obtained from the "historical-data" data of the website investing.com (2024).

In the construction of the econometric model, fundamental macroeconomic variables such as interest rates were excluded. This decision is based on the fact that CDS premiums already encapsulate market expectations related to key indicators like interest rates, inflation, and overall country risk. As CDS functions as a comprehensive measure of sovereign risk, the inclusion of interest rates as a separate explanatory variable could lead to redundancy and potential multicollinearity. To ensure model parsimony and avoid overlapping effects, such variables were intentionally omitted (Gilmez, 2024).

The dynamic relationships between the variables in question were examined using the TVP-VAR model. The analysis was performed using David Gaber software. VAR is a dynamic model that includes fixed coefficients and variance for the period studied. On the other hand, deviations may occur in the results obtained in the standard VAR model due to some structural changes in the time period of interest. In order to prevent this deviation, Cogley & Sargent (2001) and Cogley & Sargent (2005) were the first to consider the time-varying parameter VAR model. In the following process, Primiceri (2005) used this model and highlighted the advantages of the model in his study. The fact that the variance-covariance matrix in the TVP-VAR model has a time-varying structure is important in terms of measuring the effect of sudden changes in the economy on the variables during the study period (Balli et al., 2021).

Unlike classical VAR models, the TVP-VAR model is not limited to the assumption of fixed parameters; thus, it can analyze changes in the system without requiring external structural break dates or nonlinear transformations. This feature increases the flexibility and validity of the method by reducing the dependency on fixed parameter definitions. Since the Bayesian structure of the TVP-VAR model naturally takes into account uncertainty in parameter estimation, traditional robustness checks have limited meaning in such Bayesian frameworks.

The formulation of the TVP-VAR model is as follows Eq. (1):

$$y_t = c_t + B_{1t}y_{t-1} + \dots + B_{st}y_{t-s} + \varepsilon_t, \quad \varepsilon_t \sim N(0, \Omega_t)$$

$$t = s + 1, \dots, n$$

$$y_t = [u, i, m_2]$$
(1)

 y_t : Vector of internal variables.

 B_{1t} : ..., Bst (nxn) dimensional time-varying coefficients matrix.

 c_t : Vector of constant terms.

 ε_t : Unobservable shocks that vary over time.

 Ω_t : It represents the covariance matrix.

Time-varying coefficients and error covariances are used to estimate the connectivity procedure. The total connectivity index is expressed as follows Eq. (2):

$$C_t^g(J) = \frac{\sum_{i,j=1,i\neq j}^N \phi_{ij,t}^g(J)}{\sum_{i,j=1}^N \phi_{ij,t}^g(J)} * 100$$
(2)

The situation where variable i transmits its shock to all other variables j, called "total connectedness to others", is as follows Eq. (3):

$$C_{i \to j,t}^{g}(J) = \frac{\sum_{i,J=1, i \neq j}^{N} \phi_{ij,t}^{g}(J)}{\sum_{j=1}^{N} \phi_{ij,t}^{g}(J)} * 100$$
(3)

The situation that variable i receives from other variables j, called "total directional connectedness from others", is as follows Eq. (4):

$$C_{i\leftarrow j,t}^{g}(J) = \frac{\sum_{i,j=1,i\neq j}^{N} \phi_{ij,t}^{g}(J)}{\sum_{j=1}^{N} \phi_{ij,t}^{g}(J)} * 100$$
(4)

The "net total directional connectivity", reflecting the "power" of variable i or its influence on the entire network, is derived by subtracting the total directional connectivity from the others from the total directional connectivity to the others as follows Eq. (5):

$$C_{i,t}^{g} = C_{i \to j,t}^{g}(J) - C_{i \leftarrow j,t}^{g}(J)$$
(5)

4. Findings

In the study, the interconnectedness relationships between CDS premiums, EUR/USD and BIST bank variables were conducted through the TVP-VAR model. Figure 1 shows the time path graphs for the values of the variables.



Figure 1. Price series graphs of the variables subject to analysis



Figure 2. Volatility series graphs of the variables subject to analysis

The relevant data are original price series and are shown in the graph as they are without any processing on the data of the variables. It is seen that the prices of all variables, especially CDS and exchange rates, are variable. The upward movement of the BIST Bank index in 2022 is remarkable; more movements are observed in the EUR/USD parity and CDS prices on a yearly basis.

In Figure 2, volatility information of the return series of the variables is shared.

As can be seen, all three variables exhibit volatility, with CDS and EURO/USD variables being higher.

According to the analysis results, the exchange rate stands out as a significant volatility transmitter on both the BIST Bank Index and CDS premiums. This finding is consistent with contagion theories indicating that investors tend to withdraw capital from emerging markets, especially during periods of fluctuation in global risk appetite (Calvo & Mendoza, 2000). This result can also be explained by investors turning to safe-haven assets in the face of large-scale shocks within the framework of a portfolio rebalancing approach. In this context, exchange rate volatility has a direct impact on the financial indicators of developing countries such as Turkey; this effect is a reflection of the increasing integration among financial markets and sensitivity to external shocks.

4.1 Descriptive Statistics

Descriptive statistics used in the study are given in Table 1.

	cds	euro_usd	bist_bank
Average	11,268	1.69	8,666
Variance	128,798	1,661	47,326
Distortion	2,586***	0.985***	2,281***
	(0.000)	(0.000)	(0.000)
Kurtosis	8,856***	1,110**	10,481***
	(0.000)	(0.028)	(0.000)
J.B.	574,016***	27,895***	713,173***
	(0.000)	(0.000)	(0.000)
ERS	-3.319***	-1,586	-1.984**
	(0.001)	(0.115)	(0.050)
Q (10)	4,690	3.131	12,322**
	(0.554)	(0.801)	(0.023)
Q2 (10)	3,524	3,662	5,957
	(0.741)	(0.719)	(0.371)
*** 0	100/ 1	1 ***** 0 *	

Table 1. Descriptive statistics

** Significant at 10% level; ***Significant at 5% level

The table also includes values for ESR and autocorrelation. According to the ERS test developed by Elliott et al. (1992), all variables are stationary in their returns. In addition, variables are stationary according to skewness and kurtosis values. The concepts of "skewness" and "kurtosis" provide information about whether the distribution is normally distributed or not. Fisher & Gallagher (2012) Ljung Box Q and Q2 test statistics show that the series contains autocorrelation at various levels. The fact that the series contain autocorrelation indicates that it is appropriate to use a TVP-VAR model with time-varying variances. The JB (Jarque-Bera) test was used to check whether there was a normal distribution. The Jarque Bera test is a statistical hypothesis testing technique widely used to determine whether the data are normally distributed or not. The ESR (Eretoch Sedimentation Rate) unit root test also concluded that there was no unit root problem, that is, the variables were stationary. The Q and Q2 data in the table are the results showing whether there is an autocorrelation problem tested at Levels 1 and 2, and these data indicate that there is no autocorrelation problem at both levels.

4.2 Total Connectivity

The density of volatility spread for the period related to the variables is shown in Figure 1. Connectedness, that is, volatility spread, refers to the tendency of the variables under analysis to move together by being affected by each other.

In Figure 3, it is seen that three variables act together between 2020 and 2022. It can be said that the relevant period is the Covid process.

If the price of a variable increases or decreases according to the increase or decrease of another variable, that variable *is volatile*. If the price increases or decreases of one variable increase or decrease the price of another variable, that variable is also *volatile*.

Figure 4 shows the net directional connectivity graphs of the variables. Based on the net directional connectivity graph, the shaded regions below the zero line represent the inflow of volatility intake in the corresponding date or period, and the shaded areas above the zero point show the volatility spread during the respective date or time period. When the net directional connectivity graph of the variables in Figure 4 is examined, BIST Banking is the variable that receives volatility in almost all periods. When examined specifically in terms of CDS, it is seen that the relevant variable received volatility until the end of 2018 and spread volatility from 2018 to 2022. The CDS variable started to receive volatility at the end of 2022. The EUR/USD variable spread volatility to other variables in almost all periods.



Figure 3. Dynamic total connectivity graph of variables



Figure 4. Clear directional connectedness graph of variables

Average dynamic connectivity data of variables are shown in Table 2:

	cds	euro_usd	bist_bank
Average	11,268	1.69	8,666
Variance	128,798	1,661	47,326
Distortion	2,586***	0.985***	2,281***
	(0.000)	(0.000)	(0.000)
Kurtosis	8,856***	1,110**	10,481***
	(0.000)	(0.028)	(0.000)
J.B.	574,016***	27,895***	713,173***
	(0.000)	(0.000)	(0.000)
ERS	-3.319***	-1,586	-1.984**
	(0.001)	(0.115)	(0.050)
Q (10)	4,690	3.131	12,322**
	(0.554)	(0.801)	(0.023)
Q2 (10)	3,524	3,662	5,957
	(0.741)	(0.719)	(0.371)

Table 2. Average dynamic connectivity table of variables

As can be seen in Table 2, 85.65% of the CDS premium's volatility fluctuations are mainly influenced by its own dynamics, while the total 14.36% is due to other variables. The EUR/USD variable makes a volatility spillover of 4.16%, and the BIST Bank variable makes a volatility spread of 10.20% to the CDS premium. The CDS premium spreads a volatility of 13.79% to the other variables. In this case, it can be said that the CDS premium variable is a variable with a volatility of 0.56%.

According to Table 2, it is seen that 96.24% of the volatility change of the EUR/USD variable is again due to

itself, and 3.76% is due to other variables. 3.11% is due to the CDS premium, and 0.65% is due to the BIST Bank variable spreading volatility to the EUR/USD variable. The EUR/USD variable spreads 5.89% of volatility to other variables. It is seen that the EUR/USD variable is the variable spreading 2.13% of volatility on net.

Table 2 shows that 87.59% of the volatility change of the BIST Bank variable is due to itself and 12.41% is due to other variables. 10.68% of the change is due to the CDS premium variable and 1.73% is due to the EUR/USD variable. The BIST Bank variable has a volatility spread of 10.85%. In this case, it can be stated that the variable in question has a net volatility of 1.57%.

The blue dots in Figure 5 show the volatility spreaders, while the yellow dots show the variables with volatility spread, that is, the volatility area. In addition, the size of the dot shows the size of the spread effect. Apart from the points in the graph, the arrows show the direction of the volatility spread and the thickness of the lines with the arrows shows the strength of the volatility spread.



Figure 5. Representation of volatility spread of variables in network graph form

When the direction of the arrows is examined according to the information given, it is seen that it is from the EUR/USD variable to both BIST Bank and CDS premium. In this case, it can be said that the EUR/USD variable spreads volatility to the BIST Bank and CDS premium variables. When the thickness of the arrows is examined, it is seen that the EUR/USD variable spreads more severe volatility to the BIST Bank variable compared to the CDS premium. When the size and color of the points are evaluated, it can be said that the EUR/USD variable is the variable that spreads more volatility. BIST Bank and CDS premium variables are variables that receive volatility, and the BIST Bank variable is the variable that receives more volatility compared to the CDS premium. In the sub-division of this final result, it is seen that these variables spread and receive volatility to each other at different rates, and the detailed results are given below:

• The CDS premium spreads 13.79% volatility to the EUR/USD and BIST Bank variables, and the majority of these variables, BIST Bank, receives 14.35% volatility. In this case, the CDS premium variable is the one that receives 0.56% volatility.

• The EUR/USD variable spreads 5.89% volatility to the CDS premium and BIST Bank variables. It receives 3.76% volatility from these variables. The exchange rate variable is the one that spreads 2.13% volatility on the net.

• The BIST Bank variable has a volatility spread of 10.85% to EUR/USD and CDS premium variables.

• It has a volatility of 12.41% in total, 10.68% of which is CDS premium. It can be said that the variable in question is a variable with a net volatility of 1.57%.

• The EUR/USD variable spreads volatility to the BIST Bank and CDS premium variable.

• According to the CDS premium, the EUR/USD variable spreads more severe volatility to the BIST Bank variable.

• The EUR/USD variant exhibits greater volatility.

• Although BIST Bank and CDS premium variables are volatile variables, the BIST Bank variable is the variable that has more volatility than CDS premium.

5. Conclusion and Evaluation

In this study, the relationship between CDS premiums and the BIST Bank index and exchange rates was analyzed. Monthly data of Turkey for the years 2013-2023 were used in the study. Dynamic relationships between variables were assessed with a time-varying parameter vector autoregressive (TVP-VAR) model. The analysis revealed that, it was concluded that the Eur/Usd variable is a "net volatility emitter", and the CDS and BIST Bank variables are "net volatility receiver" variables.

In general, the results obtained as a result of the study support the studies of Altuntaş & Ersoy (2022), Gürsoy & Kılıç (2021), Karshoğlu & Sevim (2022), Sarıgül & Şengelen (2020), Sovbetov & Saka (2018), and Yunus et al. (2018) in the literature, and different results were reached with the study of Başarır & Keten (2016).

The results of this study may be important for investors trading in financial markets, risk managers, banking sector representatives and economists. Investors can benefit from this and similar studies to understand the relationships between financial assets and data such as exchange rates, CDS premiums and the BIST Bank index. This information may provide useful insights for investors to consider when creating investment strategies or diversifying their portfolios.

In developing countries in general, capital inflows are a factor that positively affects economic activity. Understanding the connection between CDS premiums and exchange rates and BIST indices is important in terms of the decision-making mechanism of foreign investors who will invest in developing countries such as Turkey. These relationships, which are also important in terms of domestic investor decisions, become even more important in the BIST bank index when considered in terms of bank stocks, which are considered to be the first entry point for foreign investors.

The different degrees of volatility spread between the variables detailed above, which were determined as a result of the analysis, play a decisive role in the decision-making process of domestic investors as well as foreign investors, especially in terms of the position they will take in the stock market. The exchange rate policies to be implemented to establish sustainable stability in capital markets should be designed in a way that minimizes market risk perception. Although the Central Bank does not have a theoretical exchange rate policy, it is observed that the Central Bank has indirectly affected the exchange rate, especially since the date when economic policies were revised within the scope of the recent return to orthodox policies. When evaluated from this perspective, it is extremely important to correctly read the relationship between the variables subject to the analysis. In this direction, it is thought that the insights gained from the study will be guiding.

In future studies, we plan to incorporate structural risk models—particularly the Merton model—into our analysis to examine how they explain banking sector risk through CDS premiums. This approach is expected to enhance both the theoretical and analytical depth of the study, leading to more comprehensive results.

Investors should view the increase in CDS premiums as an indicator of macroeconomic risks and make investment decisions in light of these indicators. In addition, diversified portfolios can protect investors from potential losses during economic crises. By monitoring the increase in CDS premiums, policymakers can establish early warning systems and intervene to ensure market stability when necessary. Such a proactive approach can reduce the severity of economic fluctuations and ensure that markets become more stable.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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