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Research Article

How the macroeconomic conditions and the global risk factors affect sovereign CDS spreads? New Evidence from Turkey

Makrekonomik koşullar ve küresel risk faktörü ülke risk primlerini nasıl etkiler? Türkiye'den yeni kanıtlar

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Abstract

This paper aims to investigate the effects of a set of major country-specific macroeconomic variables and global risk factor on determining Turkey's sovereign CDS spreads. The industrial production index, consumer price index, nominal exchange rates, policy interest rate, stock market index, and the volatility index as a proxy for global risk appetite are used by employing SVAR methodology with block exogeneity for 2011M01-2020M09 periods. The results reveal that the country's nominal exchange rate is the main driver of sovereign CDS spread. Especially in 2018, the most significant source of the high increase in sovereign CDS spreads is the exchange rates. According to the impulse response functions, to reduce the sovereign CDS spread, economic growth is more effective than the stock market return. Moreover, it is seen that the global risk factor does not play an essential role in the increases in domestic country's sovereign CDS spread.

Keywords: Sovereign CDS Spreads, Macroeconomic Factors, Structural VAR

Jel Codes: M52, M31, E24

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Öz

Çalışmanın amacı, Türkiye'nin ülke risk primini (CDS) belirlemede, ülkeye özgü makroekonomik değişkenlerin ve küresel risk faktörünün araştırmaktır. Bu amaçla, sanayi üretim endeksi, tüketici fiyatları endeksi, nominal döviz kuru, politika faiz oranı ve global risk iştahının bir ölçümü olarak VIX oynaklık indeksinin ülke CDS primi üzerndeki etkileri SVAR metodolojisi kullanılarak 2011:01 ve 2020:09 dönemleri için araştırılmıştır. Elde edilen sonuçlar, nominal döviz kurunun CDS primini belirleyen başlıca değişken olduğunu ortaya koymaktadır. Özellikle 2018 döneminde CDS primlerindeki yüksek artışın en büyük kaynağını döviz kurundaki artışlar oluşturmaktadır. Nominal kur artışları, ülkenin CDS primini enflasyon oranındaki artışlardan daha fazla artırmaktadır. Etki tepki fonksiyonlarına göre; ülkenin CDS primini düşürmekte, ekonomik büyümenin, hisse senedi piyasasındaki getirilerden daha etkili olduğu bulunmuştur. Ayrıca, küresel risk faktörünün ülkenin CDS primindeki artışlarda önemli bir rol oynamadığı görülmektedir.

Anahtar Kelimeler: Ülke kredi risk primi, Makroekonomik Faktörler, Yapısal VAR

Jel Kodları: M52, M31, E24

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Introduction

Financial engineering has become a central point in the new global economy to promote financial development. The growing body of new sophisticated financial instruments has increased the importance of the financial system's health and the wealth of the overall economy. In this context, financial derivatives become an essential source of excessive risk-taking. Credit Default Swap (hereafter, CDS) is a crucial aspect of excessive risk-taking, an over-the-counter credit derivative contract that provides payments to bondholders against default. Thus, CDS has become an essential type of derivative instrument over the past decade[1]. Under the contract, the protection buyer makes periodic payments called CDS premium or spread and receives a compensation payment from the protection seller if a default occurs. The increasing level of default risk leads to an increase in CDS spread (Chan-Lau, 2006: 4). According to Liu and Morley (2012: 2), there are two types of CDSs: (i) corporate CDS (a single name CDS) and (ii) Sovereign CDS. Corporate CDS spreads written on corporate debts and reflects the ability of the corporations' financial strength. In contrast, sovereign CDS spreads reflect the country's credit risk and ability to repay its debt. Overall, CDS spreads are indicators that reflect the financial sector's health and the macroeconomic stability of the creditor country for the investors (Hui and Fong, 2015: 174). Therefore, determining the appropriate macroeconomic indicators which heavily affect CDS spreads, such as economic growth, inflation rates, exchange rates, interest rates, and stock market dynamics, is of great importance among policymakers and investors.

The relationship between major macroeconomic variables and sovereign CDS spreads has been the subject of interest in economics and finance literature, especially after the Global Financial Crisis in 2007-2009. According to Doshi, Jacobs, and Zurita (2017: 44), the sovereign risk was limited to emerging economies in Latin America and Asia. However, in the aftermaths of the Global Financial Crisis and Eurozone Debt Crisis, the studies about sovereign CDSs have attracted more and more attention. Sun, Wang, Yao, Li, and Li (2020:1) categorize the studies related to CDSs into three groups. The first strand of the studies focuses on CDS market dynamics to model CDSs' default risk and pricing strategy. The structural models by following Merton's (1974) novel work (e.g., Cao, Yu, and Zong, 2010; Cremers, Driessen, Maenhout, and Weinbaum 2008) or reduced-form models by following Jarrow and Turnbull (1995) (e.g., Pan and Singleton, 2008; Longstaff, Pan, Pedersen, and Singleton, 2011) were employed. The second strand of CDSs literature focuses on the determinants of CDS spreads (e.g., Alexander and Kaeck, 2008; Dieckmann and Plank, 2012; Aizenman, Jinjarak, and Park, 2013). Atil, Bradford, Elmarzougui, and Lahinai (2016: 43) state that country-specific factors are the major determinants of sovereign CDS spreads. They also show that global factors play an essential role to understand the movements in sovereign CDS spreads, especially when a global risk event occurs. The last strand of literature deals with the spillovers between CDS market and asset markets such as commodities market, stock market, equity market, and exchange rate (Wang, Yang and Yang, 2013; Hui and Fong, 2015; Bouri, Boyrie, and Pavlova, 2017; Gadanecz, Miyajima, and Met, 2018; Augustin, 2018; Bostanci and Yilmaz, 2020).

Although extensive research has been carried out on CDS spreads, there is no consensus on whether global factors or country-specific factors are the main drivers of CDS spreads. This paper examines the effects of country-specific macroeconomic shocks on sovereign CDS spreads by controlling global risk factor for Turkey. Turkey's sovereign credit default risk is relatively high to the other selected emerging and developed countries over the last decade (Figure 1). Turkey's sovereign CDS spread has significantly above the selected countries' sovereign CDS spreads between the 2016 -2020 periods. It is also observed that sovereign CDS spread reached its maximum in 2018 August (546.23 basis points). The second peak occurred in April 2020 during the COVID19 pandemic (571.02). It is noteworthy that Eurozone sovereign countries' CDS spreads had increased to extreme points between 2011 and 2012, especially for Italy and Spain. CDS spreads of an advanced country, namely the U.S economy, are yielded between 13-50 base points, but for emerging countries like Mexico and Russia, CDS spreads are yielded over 150 base points.

[1] The CDS first appeared in the early 1990s but gained importance after the 2007-2009 global financial crisis. The notional outstanding amount is approximately 9 billion US dollars.

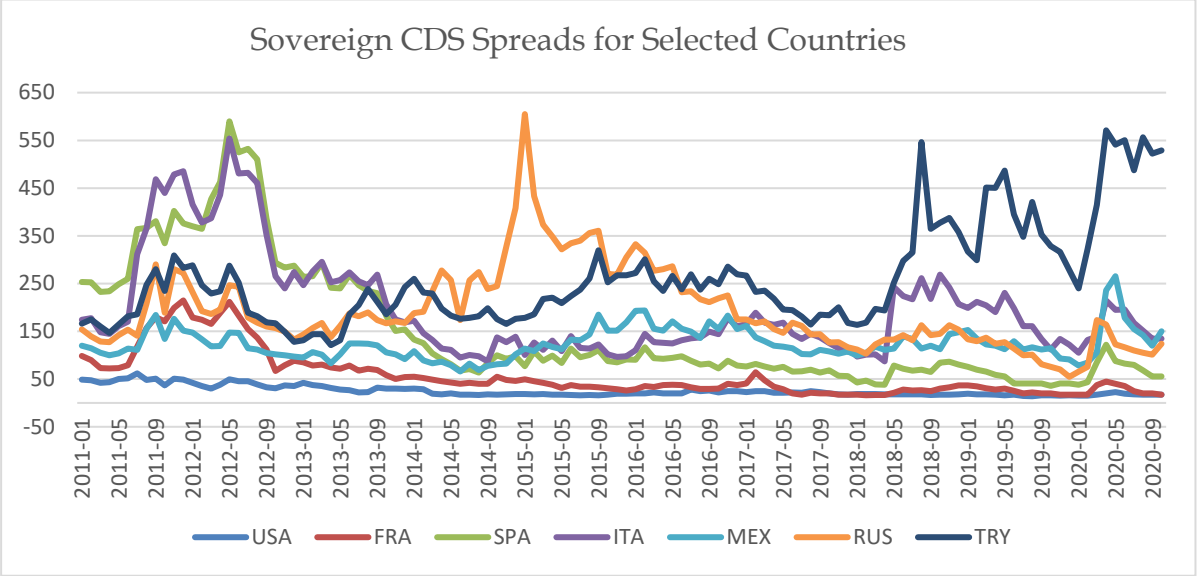

Figure 1: Sovereign CDS Spreads for Selected Countries

Source: Bloomberg Terminal Databases

The primary objective of this study is to investigate the impact of country-specific macroeconomic factors, and global risk factor on the sovereign CDS spreads in Turkey, especially after the adoption of "financial stability" goal of the Central Bank of the Republic of Turkey (CBRT). To achieve this objective, this paper seeks answers to the following questions. First, what is the role of the country-specific macroeconomic factors in driving the sovereign CDS spreads in Turkey? Second, does the volatility risk index play a role in driving the sovereign CDS spreads in Turkey? Third, what is the root cause of extremely high sovereign CDS spreads, particularly in 2018 for Turkey? In view of these questions, Structural VAR methodology with a block exogeneity approach adopted to identify various shocks affecting sovereign CDS spreads. The SVAR methodology allows for computing the responses of sovereign CDS spreads to shocks in the selected variables. Furthermore, historical decomposition employed to investigate the 2018 period.

The remaining part of the study proceeds as follows: The following section reviews the relevant empirical literature. Section 3 describes the data used in this study and gives a short overview of the methodology. Section 4 discusses the empirical findings. Finally, the conclusion gives a critique of the findings.

Literature Review

In the past two decades, a growing number of researchers have sought to identify the main factors which determine a country's sovereign CDS spreads (e.g. Norden and Weber, 2004; Alexander and Kaeck, 2008; Baldacci, Gupta and Mati, 2011; Galil and Soffer, 2011; Galil, Shapir, Amiram, and Ben-Zion, 2014; Kajurova, 2015; Kocsis and Monostori, 2016). It has been argued that the significant amount of sovereign CDS spreads are linked to the country-specific factors such as output growth, exchange rates, budget deficit, interest rates, inflation rates, and stock market (Hui and Fong, 2015; Carr and Wu,2007; Remolona, Scatigna, and Wu, 2008; Hui and Chung, 2011). However, some researchers are much more concerned with the global economic conditions for explaining the source of CDS spreads (Ciarlone, Piselli, and Trebeschi, 2009; Fontana and Scheicher, 2010).

Preliminary work related with determinants of CDS spreads was undertaken by Edwards (1984). Edwards (1984: 726) investigated the international financial community's behaviour when granting loans to less developed countries. He analyzed the determinants of spreads by emphasizing country risk rather than financial risk using 19 less developed countries data over the period 1976 and 1980. The obtained results show that the debt/GNP ratio and international reserves are highly related to spreads. Ramos-Francia and Rangel (2012) have also examined the relationship between country-specific macroeconomic factors and sovereign risk for 26 countries, including developed and emerging countries, for the 2002-2009 period. They have revealed that inflation, real growth rates, exchange rates, and twin deficits are the main indicators for explaining the sovereign CDS spreads.

In their analysis of sovereign CDS spreads, Aizenman et al. (2013) found that inflation, external debt, and commodity terms of trade volatility are positively associated with sovereign CDS spreads for

emerging countries during the 2004-2012 periods whilst trade openness and fiscal balance/GDP ratio is negatively related. The results also imply that country-specific factors gained importance during and after the crisis. In another study by Aizenman, Hutchison, and Jinjarak (2013), fiscal and macroeconomic determinants such as fiscal balance/tax base, public debt/tax base, trade to GDP, inflation, external debt are found to be important determinants of sovereign risk. Similarly, Doshi et al. (2017) studied sovereign CDS contracts for a sample of 25 countries and found that spreads increase when the stock market and exchange rate volatility increase and decrease with a decrease in interest rate.

In a recent study by Ho (2016), the long and short-run determinants of sovereign CDS spreads are investigated for eight emerging countries between 2008 and 2013 periods. He employed a pooled mean group cointegration approach using three country-specific macroeconomic determinants; current account, external debt, and international reserves. The results revealed that all these three variables are statistically significant to explain the long-run sovereign spreads, and international reserves are very important for reducing the sovereign CDS spreads. There is also evidence that the stock market return is significantly related to CDS spread changes (Ngene, Hassan, and Alam, 2014; Tabak, Miranda, and Medeiros, 2016). By employing the Panel VAR methodology, Shear and Butt (2017) investigated the CDS market for 36 countries. They found that a significant portion of the CDS spread changes are explained by stock market return.

Many studies also focus on global economic factors rather than the country-specific factors to explain the sovereign CDS spreads (Ciarlone et al., 2009; Fontana and Scheicher, 2010; Longstaff et al., 2011; Dieckmann and Plank, 2012). According to Longstaff et al. (2011:76), a substantial part of the variation in CDS spread can be explained by global factors such as volatility, U.S equity, global risk premium than local factors. In the same vein, Dieckmann and Plank (2012) reported that the state of the world financial system plays a significant role in influencing CDS spread. Augustin and Tedongap (2016) also show that U.S growth and consumption volatility are related to CDS spread for 38 countries. Hibbert and Pavlova (2017) investigate regional differences in CDS spread indicators and local versus global factors. They have employed a quantile panel regression approach for 34 countries. Their study shows that changes in CDS spreads are more sensitive to global stock market conditions. From the causality perspective, Srivastava, Lin, Premachandra, and Roberts (2016) find strong evidence of Granger causality from VIX to sovereign CDS spreads.

Turkey is in a high sovereign CDS spread position because of the macroeconomic instability during the past few years. Several attempts have been made to highlight the drivers of sovereign CDS spreads for Turkey (Kilci, 2017; Gebeşoğlu and Varlık, 2018; Şahin, 2018; Polat, 2017). In a recent study, Cihangir (2020) investigates the global and domestic variables that affect Turkey's sovereign CDS spreads between the 2009 and 2018 periods. In her study, the Granger causality test and GARCH volatility spillover models are conducted. Her findings show that both national and global shocks have impact on sovereing CDS spreads but national variables tend to have greater impact. Akyüz and Bekar (2021) examine the effects of macroeconomic indicators on the sovereign CDS during the 2009-2019 periods with Autoregressive Distributed Lag (ARDL) model and causality analysis. The study indicates that inflation rate, interest rate, net foreign debt rate, and foreign trade deficit rate have a positive effect on CDS while economic growth has a negative effect. In another study conducted by Münyas (2020), the relationship between sovereign CDS spreads and exchange rates are examined with the causality and cointegration approach for 2005-2019. The study shows a bidirectional causality between the variables.

These studies provide important insights into the understanding of the macroeconomic, global, and financial dynamics related with sovereign CDS spreads. In view of all that has been mentioned so far, one may suppose that sovereign CDS spreads are highly correlated with country-specific and global macroeconomic conditions.

Data and methodology

Data

In this study, monthly data, which covers the period between 2011M1 and 2020M9, is used. The period coincides with the CBRT's announcement of the "financial stability "goal among the price stability goal. The linkages between financial markets and sovereign CDS spreads are the subject of a growing body of research on sovereign CDS literature (Hui and Fong, 2011; Ngene et al., 2014) hencefore the beginning of the financial stabilization goal period is choosen. The sovereign CDS spreads with a maturity of five years are used. In order to identify the effect of macroeconomic shocks on Turkey's sovereign CDS spreads, in line with the related literature emphasized in Section 2, a set of macroeconomic and financial variables are selected. As a proxy for the gross domestic product (GDP), the industrial production index (ipi) is used. As the GDP series are published with a lag and quarterly, the ipi series has an advantage

over GDP for the econometric analysis. Ipi series are announced monthly and shows the recent course of economic activity. Moreover, the industrial production index highly correlated with GDP (0.89) for the analysed period. Further, the Consumer price index (cpi), policy interest rate (int), nominal exchange rates (NEER), and stock market indicator (Bist100) are used. In addition, as a proxy for the global risk appetite in the S&P stock market, the Volatility Index (VIX) is included. VIX is constructed based on the price inputs of the S&P 500 index options and measures the market expectations of stock return volatility. Stock market indicator and the nominal exchange rate (base currency U.S Dollar) variables are selected to capture the local financial markets. To represent the country's macroeconomic conditions, industrial production index and inflation rates are used, and for monetary policy shock, the policy interest rate is selected. All the variables are in logarithmic form except the policy interest rate. Sovereign CDS spreads, BIST100 index and VIX data are obtained from the Bloomberg database. The industrial production index, inflation rates, nominal exchange rate, and policy interest rate data are obtained from the Central Bank of the Republic of Turkey.

Methodology

The macroeconomic drivers of the sovereign CDS spreads for Turkey are analyzed by employing SVAR methodology. The SVAR approach functions well by introducing desired restrictions to analyze the effect of shocks. A general form of the Structural VAR system is written as:

$$AX_t = A_0 + A_1(L)X_{t-1} + A_2 * D_t + B\varepsilon_t \quad (3.1)$$

A is the matrix of contemporaneous interactions between variables, X_t is the n-vector of endogenous variables. $A_1(L)$ represents polynomial matrices with a lag operator, ε_t which is the vector of structural innovations which are serially uncorrelated and have zero mean. D_t contains deterministic terms, i.e., trend and monthly seasonal dummies. Matrix A is used to define the impulse responses of endogenous variables to structural shocks. Matrix B contains the structural form parameter of the model. Equation (3.1) cannot be estimated directly because of the identification problem. To estimate the SVAR model, equation (3.1) will be multiplied by an inverse matrix A^{-1} then the reduced form of the model will be determined (Yildirim and Yildirim, 2017:80).

$$Xt = C(L)Xt + \varepsilon_t \quad (3.2)$$

$C(L) = A^{-1}A_1(L)yt$, $\varepsilon_t = A^{-1}B\varepsilon_t$ in Equation (3.2). This equation is also known as the short run AB model. Investigating the short and medium-term dynamics is the main aim of this paper; thus, contemporaneous restrictions are employed, and the short run AB model is structured.

Equation (3.3) represents the vector of endogenous variables. The vector of endogenous variables includes volatility index (VIX), industrial production index (IPI), inflation rate (CPI), nominal exchange rate (NEER), the stock market index (BIST100), interest rate (INT), and CDS spreads.

$$Xt' = [VIX, IPI, CPI, NEER, BIST100, INT, CDS] \quad (3.3)$$

To impose the necessary number of restrictions and identify the structural form of the model, the VAR model determined as below (3.4). SVAR methodology with block exogeneity is used. Block exogeneity enables to include exogenous variables which affect domestic variables in the system (Can, Bocuoğlu, and Can, 2020: 377), but these exogenous variables do not be affected from endogenous variables. Following Cushman and Zha (1997: 437), the first and second rows represent the block exogeneity implying that the second block does not enter into the first block either contemporaneously or with lagged values.

$$\begin{bmatrix} uvix \\ uipi \\ uinf \\ uneer \\ ubist100 \\ uint \\ ucds \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & NA & 0 \\ 0 & NA & 0 & 0 & 1 & NA & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ NA & NA & NA & NA & NA & NA & 1 \end{bmatrix} = \begin{bmatrix} \beta_{11} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \beta_{22} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \beta_{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \beta_{44} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \beta_{55} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \beta_{66} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \beta_{77} \end{bmatrix} \begin{bmatrix} \varepsilon vix \\ \varepsilon ipi \\ \varepsilon inf \\ \varepsilon neer \\ \varepsilon bist \\ \varepsilon int \\ \varepsilon cds \end{bmatrix} \quad (3.4)$$

The volatility index (VIX) is the most exogenous variable in the system and represents the risk appetite of the global financial environment. Because Turkey is a small open economy, the VIX shocks can be quickly transmitted to the CDS spreads, but the shocks in the CDS spreads do not have an effect on the VIX. The second and third rows show the equilibrium conditions in the goods market based on aggregate demand and aggregate supply framework. It implies the sluggish reaction of output and prices to the shocks in the other variables. The fourth row shows that the exchange rate variable is affected only from interest rate shocks contemporaneously, indicating the Augmented Taylor rule and uncovered interest parity theory. The stock market influenced by ipi shocks and interest rate shocks, simultaneously referring the Arbitrage Pricing Theory (APT). APT is developed by Ross (1976) and extended by Humerman (1982) and Connor (1984), where macroeconomic factors mainly determine the stock prices. The sixth equation shows the interest rate reaction to the variables contemporaneously. Because the output and price level data are unobservable within the same months, the interest rate is affected from only exchange rate shocks simultaneously. It starts to react only a few periods later after an output or inflation shock. Finally, CDS spreads react contemporaneously to all other shocks.[2]

Empirical results

Before estimating the SVAR model, a battery of unit root tests are employed. Augmented Dickey-Fuller test (Dickey and Fuller, 1979), Phillips Perron test (1988) and Zivot and Andrews (1992) structural break unit root tests (ADF, PP and Zivot Andrews) are performed to check the stationarity of the series. The unit root test results are presented in Table 1 in the appendix. Required transformations are done by checking the stationarity, and monthly seasonal dummies are included in the model. The optimal lag length is determined based on the Akaike information criterion (AIC), Hannan-Quinn information criteria (HQ) and Schwarz information criteria (SC) (max 12 lengths) and the appropriate VAR model is estimated with three lags. The next step for deciding the appropriate VAR model is to test the stability conditions. The inverse roots of the characteristic AR polynomial have modulus, and they lie inside the unit circle. The Lagrange Multiplier (LM) test for residuals autocorrelation confirms the stationarity of the underlying VAR model. To control the over-identifying restriction on the contemporaneous matrix, the likelihood ratio test employed and confirms the validity of identifying restrictions.[3]

Impulse responses

In order to understand the responses of sovereign CDS spreads to one unit structural shocks on volatility index, industrial production index, consumer price index, nominal exchange rates, stock returns, and policy interest rates, impulse responses are performed and presented in Figure 2. Since the main interest is to analyse the effect of the macroeconomic shocks on sovereign CDS spreads, only the responses of the sovereign CDS spreads to other shocks are presented. The red dotted lines show +- 2 standard error confidence intervals. The vertical line represents the deviations from the baseline level of the sovereign CDS spreads in response to shocks.

As seen in Figure 2, the volatility index shock has not a statistically significant impact on sovereign CDS spreads. The industrial production index shock has a negative impact on sovereign CDS spreads for two months; after that, it became statistically insignificant. An inverse relationship is expected between the industrial production index, and sovereign CDS spreads since the increase in output leads to an increase in economic well-being and thus reduces the country's sovereign CDS spreads. The effect of the ipi shock dies out, and sovereign CDS spreads converge to their equilibrium level after eleven months. Sovereign CDS spreads respond significantly to unexpected changes in inflation only for one month, but this result is not consistent with the economic expectations. As mentioned before, nominal exchange rate increases indicate a depreciation in the local currency. A depreciated currency means that country's currency loses its value, and the current account balance widens. Regarding this implication, the country's default risk increases. Henceforth, a rise in NEER will increase sovereign CDS spreads. The response of sovereign CDS spreads to an increase in NEER is positive for the first two months. Polat (2017: 132) also found similar results in his study which he investigates the regime-switching behaviour of sovereign CDS spreads for Turkey. Sovereign CDS spread declines immediately after a stock market return shock, and the equilibrium is restored eleven months later. This finding is consistent with economic expectations and also with the study of Sovbetov and Saka (2018) for Turkey. Lastly, in

[2] According to the alternative ordering of variables, alternative SVAR models and a VAR model with Cholesky identification are employed for robustness check. The impulse response and FEVD analysis results do not exhibit a high amount of change. The results are available upon request.
[3] See appendix 2 and 3.

contrast to the early findings for Turkey (Kargı, 2014; Başarır and Keten, 2016), the response of sovereign CDS spreads on interest rate shocks is statistically insignificant. [4]

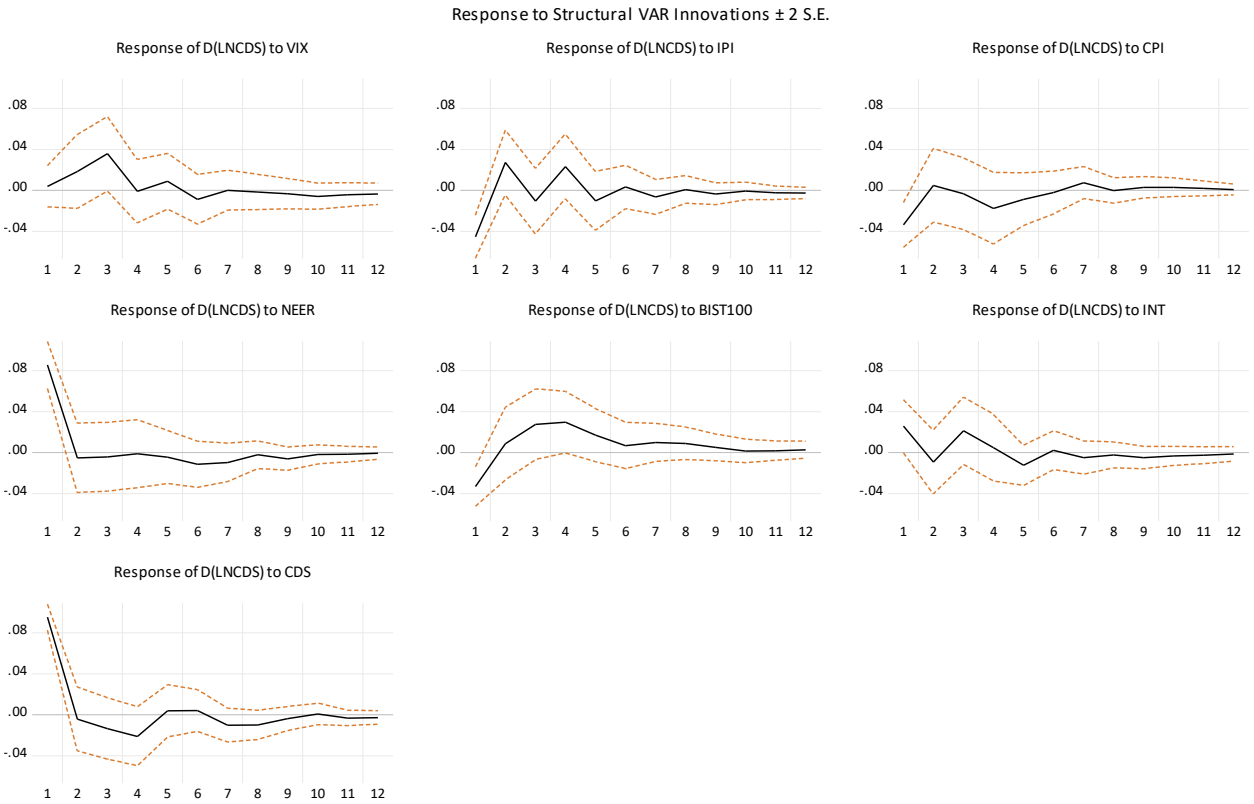

Figure 2: Responses of Sovereign CDS spreads to Macroeconomic Shocks

Variance decomposition

In this section, forecast error variance decompositions (FEVD) is estimated to determine how the fluctuations in endogenous variables influence sovereign CDS spreads changes. FEVD provides information about the relative impact of each structural shock in affecting the FEV of endogenous variables. In this analysis, by looking at FEVD, the model answers the contributions of VIX, ipi, cpi, NEER, BIST100, and policy interest rate shocks in driving sovereign CDS spreads forecast errors. Table 1 shows the FEVD of sovereign CDS spreads for Turkey computed at forecast horizons up to 36 months. According to Table 1, variations in sovereign CDS spreads are mainly explained by the nominal exchange rates (34.34 %). This result is consistent with the other studies in the literature (Hassan, Kayhan, and Bayat, 2017; Polat, 2017). The second most significant contribution to the fluctuations in sovereign CDS spreads is the industrial production index (9.55%). Inflation and stock market return account for approximately only %5 in the first month.

Regarding the other determinants, VIX, which represents the effect of the global factors in the variation of sovereign CDS spreads, explains only 0.07% in the first month. However, after 12 months, the effect of VIX on sovereign CDS spreads has reached 6.45%. Furthermore, the contribution of interest rate shock is weak initially, and only 3.11 % of the sovereign CDS spread variations can be explained by interest rate shocks. Finally, the exchange rate, industrial production index and, stock market returns are the major sources of sovereign CDS spreads. Therefore, the central part of the forecast error variance of sovereign CDS spreads can be explained by its shocks for the entire period.

[4] Because the aim of this paper is to analyze the drivers of sovereign CDS spreads, the other variables' responses to the shocks are not presented.

Table 1: Forecast Error Variance Decomposition of Sovereign CDS Spreads Changes

Period	VIX	IPI	CPI	NEER	BIST100	INT	CDS
1	0.07	9.55	5.29	34.34	5.10	3.11	42.52
2	1.58	12.26	5.09	32.47	5.14	3.29	40.13
3	6.43	11.32	4.57	28.95	7.57	4.70	36.41
4	5.92	12.39	5.31	26.65	10.16	4.41	35.11
5	6.05	12.43	5.44	26.03	10.91	4.84	34.26
6	6.26	12.35	5.40	26.22	10.97	4.81	33.97
7	6.17	12.31	5.51	26.16	11.15	4.82	33.84
8	6.14	12.23	5.48	26.01	11.35	4.81	33.95
9	6.15	12.22	5.48	26.01	11.39	4.87	33.85
10	6.25	12.19	5.50	25.99	11.37	4.90	33.78
11	6.29	12.19	5.51	25.94	11.36	4.91	33.76
12	6.32	12.20	5.50	25.91	11.37	4.91	33.75
16	6.42	12.18	5.50	25.87	11.35	4.93	33.70
24	6.45	12.18	5.50	25.86	11.35	4.93	33.70
36	6.45	12.18	5.50	25.86	11.35	4.93	33.70

Historical decomposition

Historical decomposition provides information on each structural shock in driving deviations of the SVAR's endogenous variables in a specific period. By interpreting historical decomposition, the role of the shocks in driving the increase in sovereign CDS spreads in 2018 is examined. With the beginning of May 2018, the sovereign CDS spreads for Turkey have skyrocketed (215 base to 522 bases). Therefore analyzing the 2018 period provides important explanations about the dynamics behind the sovereign CDS spread for Turkey.

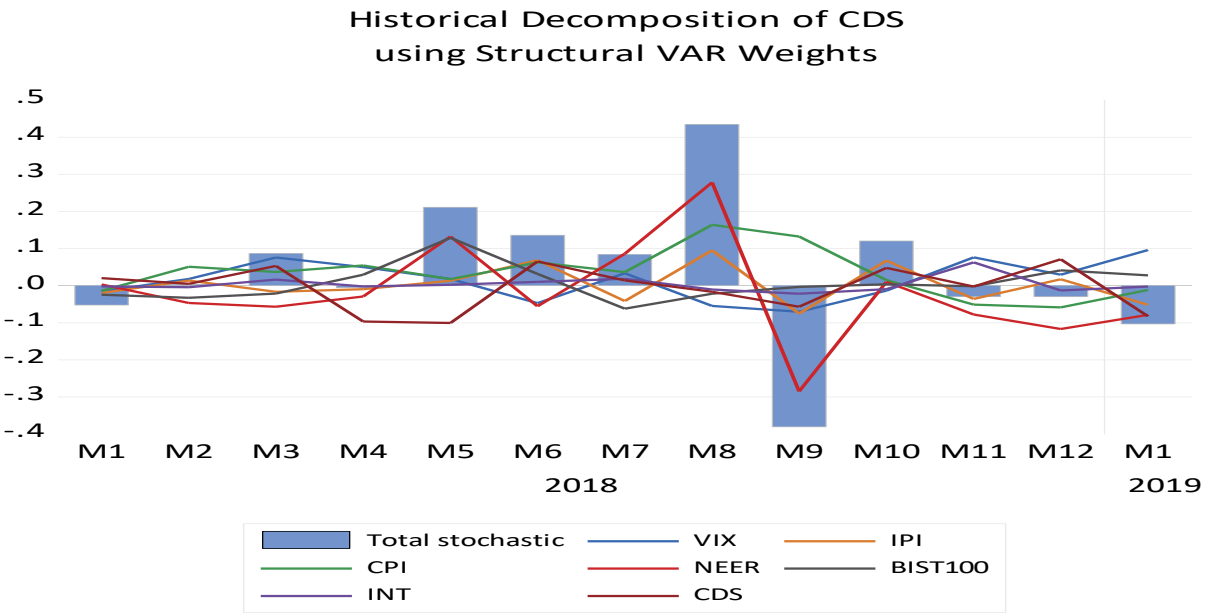

Figure 3. Historical decomposition of sovereign CDS spreads

As seen from Figure 3, the most attributable pay goes to cpi and NEER. The considerable increase in sovereign CDS spreads is caused by the deterioration in nominal exchange rates and inflation rate. During the 2018 period, the nominal exchange rates have increased significantly. Also, ipi has significant explaining power on sovereign CDS spreads changes. It can be concluded that a stable nominal exchange rates and inflation rates are crucial for a low level of sovereign CDS spreads.

Conclusion

The drivers of the sovereign CDS spreads have been widely studied in the economics literature. The present study is also designed to determine the effect of country-specific macroeconomic shocks on

Turkey's sovereign CDS spreads as a small open economy. For this purpose, Structural VAR methodology with a block exogeneity approach employed in this study. In addition, the volatility index is included as an indicator of the global financial risk factor. The results indicate that country-specific macroeconomic shocks are the main drivers of sovereign CDS spreads when compared to the global condition shock. Furthermore, nominal exchange rate has the highest influence on sovereign CDS spreads. A depreciated currency means that country's currency loses its value, and the current account balance widens. In addition, depreciated currency increases the country's default risk, increasing the sovereign CDS spreads. Besides these, the country's inflation rate has an important role on the sovereign CDS spreads. However, the policy interest rate was found to be insignificant.

These findings have important implications for a developing small open economy. The vulnerability of the economic conditions and the volatility of exchange rates directly affect the country's macroeconomic conditions. Exchange rate fluctuations immediately pass through to the real market indicators such as inflation and output. The depreciated currency will increase the inflation rates, thus lowers the output. Furthermore, the balance of payments deteriorated, and the debt burden of the country rises. As a result, sovereign CDS will increase as the economic conditions worsen.

In future research, the effect of the shocks on sovereign CDS spreads can be identified for different regimes. For example, in an expansion regime of the GDP, the economy is more stable, so the effects of the macroeconomic determinants on CDS spreads will differ from the contradiction regime. The current findings add to a growing body of literature on the drivers of sovereign CDS spreads, but further research regarding the role of the regimes needs to be undertaken to understand the drivers of the sovereign CDS spreads clearly.

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Appendix

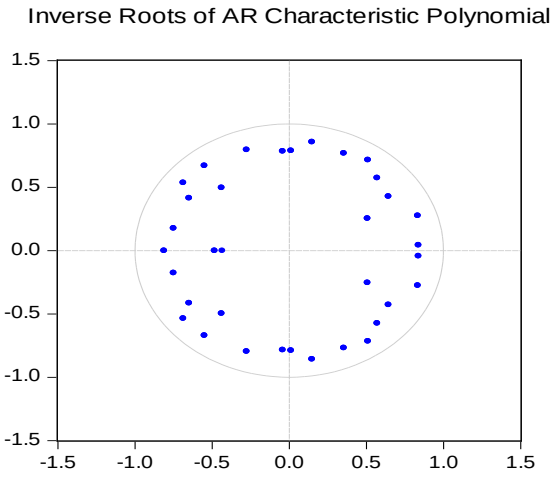
Appendix 1

Table 1: Unit Root Test Results

Variables	ADF	PP	Zivot Andrews	Break Date
LNIPI	-0.403 (ct)	-8.214 (ct)*	-9.503 (Model C)	2007 M10
ΔIPI	-6.553 (ct)*	-	-	
CPI	-0.871 (ct)	-1.000 (ct)	-4.069 (Model C)**	2016 M02
ΔCPI	-4.744 (ct)*	-8.432 (ct)*	-	
NEER	-2.219 (ct)	-2.323 (ct)	-3.868 (Model C)**	2018 M05
ΔNEER	-8.269 (ct)*	-7.109 (ct)*	-	
BIST100	-4.188 (ct)*	-3.735 (ct)*	-4.616 (Model C)*	2017 M05
ΔBIST100	-	-	-	
INT	-2.273 (c)	-1.792 (c)	-5.319 (Model A)	2016 M01
ΔINT	-3.550 (c)*	-8.819 (c)*	-	
CDS	-2.810 (ct)	-2.823 (ct)	3.943 (Model C)**	2018 M05
Δ CDS	-11.295 (ct)*	-11.331 (ct) *	-	
VIX	-4.118 (ct)*	-4.053 (ct)*	-5.536 (Model C)*	2017 M02
ΔVIX	-	-	-	

Notes: ct denotes for constanst and trend. *, **, *** denotes for the sinificance at %1, %5, and %10 levels. Model C represents the model with constant and trend.

Appendix 2: Stability Conditions



Appendix 3: Autocorrelation LM Test Results

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	59.80443	49	0.1386	1.240900	(49, 339.5)	0.1406
2	52.73704	49	0.3317	1.083383	(49, 339.5)	0.3345
3	47.44158	49	0.5365	0.967353	(49, 339.5)	0.5393
4	54.09870	49	0.2860	1.113494	(49, 339.5)	0.2887
5	63.69604	49	0.0773	1.328953	(49, 339.5)	0.2786
6	42.90100	49	0.7175	0.869202	(49, 339.5)	0.7198
7	55.78314	49	0.2350	1.150898	(49, 339.5)	0.2375
8	41.90774	49	0.7536	0.847894	(49, 339.5)	0.7557
9	39.36705	49	0.8357	0.793656	(49, 339.5)	0.8372
10	45.92996	49	0.5984	0.934541	(49, 339.5)	0.6010
11	36.97117	49	0.8967	0.742855	(49, 339.5)	0.8977
12	62.11739	49	0.0988	1.293120	(49, 339.5)	0.1004

Likelihood ratio (LR) test for over-identification

LR test		
Chi-sq	Prob	.
75.9188	0.3623	