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Drivers of Sovereign Risk Premium during Financial Crisis: Dynamic Panel Approaches for Brics Economies and Turkey

Finansal Kriz Döneminde Ülke Risk Priminin Belirleyicileri: Brics Ekonomileri ve Türkiye için Dinamik Panel Yaklaşımları

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Abstract: Sovereign risk plays a significant role in shaping financial investment behaviors towards the country. In this respect, sovereign risk premiums are closely monitored by policymakers, politicians, academicians as well as financial investors. As the country risk increases, those who want to buy the country's debt instruments demand more interest payments. Concordantly, rising sovereign risk has negative consequences in many ways such as borrowing capacity, borrowing cost, and financing the current account deficit. However, the behavior of sovereign risk premiums differs in the crisis period from normal periods. Therefore, it is necessary to clarify what are the main determinants of sovereign risk so that crisis periods can be managed successfully by policymakers. In this study, short and long term relationships between sovereign risk premium and current account balance, inflation rate, government bond interest rate, and nominal exchange rates were analyzed for 2008:q1 to 2014:q2 period by dynamic panel data method for Brics economies and Turkey. According to the findings of the empirical analyses, current account deficit, inflation, and interest rates affect positively sovereign CDS spreads both in the short and long term and there exists a direct relationship between them. On the other hand, the exchange rate has a very weak short-run effect and no significant long-run effect on the sovereign CDS spreads. Besides, both short and long-run effects of interest rates on sovereign CDS spreads are more pronounced than of others. That is to say, sovereign CDS spreads are influenced mainly by changes in the interest rates.

Structured Abstract: The extraordinary development of the financial markets and the vulnerabilities accumulated within the financial system, resulting in crisis periodically, have made risk management compulsory for financial investors. In this process, credit derivatives have become the most effective tool for controlling credit risk. Credit derivatives are financial contracts that transfer credit risk from one side to another for a price, without touching the ownership of the principal asset if the principal or interest of the debt is not paid on time for various reasons. As the most frequently used credit derivative instrument in the credit derivatives market, credit default swaps (CDS) is the contract of transferring the credit risk of a reference asset (of a firm/country) to a particular institution/company for a price. It is important to note that the CDS contract covers all cases where the conditions previously agreed on the repayment of the loan are not fully or partially fulfilled for various reasons (bankruptcy, payment failure, denial of liability). A financial investor who buys protection with a CDS contract transfers all these risks to the party selling the CDS contract for a certain price,

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and if the risks occur, the losses are covered by the party selling CDS contract. The price of the credit default swap is called "spread". CDS spreads are calculated on a daily basis and they adapt to all kinds of developments at an extraordinary speed. Especially, they react excessively to macroeconomic phenomenons under extraordinary conditions like a crisis period. For this reason, sovereign CDS spreads, which are considered as the most accurate indicator of country risk, are closely observed by politicians, government, academicians as well as financial investors, who intend to purchase the debt instruments of a country.

This study aims to determine macroeconomic variables that affect the credit risk spreads for the Brics economies and Turkey in the global crisis period. For this purpose, short and long-term dynamic interaction between sovereign risk premiums and current account / GDP ratio, inflation, interest rate, and the exchange rate were analyzed by panel ARDL and dynamic and static fixed-effect methods. The data spans from 2008 q1 to 2014q2 with quarterly frequencies. The dependent variable representing sovereign risk premium is 5 year sovereign CDS spreads (hereafter CDS spreads) obtained Bloomberg Terminal. Explanatory Country- specific macroeconomic variables used in the empirical analysis are current account balance used as a percent of GDP, consumer price inflation as a % change in the same period of the previous year, 2 years the government bond interest rate comprising default risk component and the nominal exchange rate series created as a national currency per 1 U.S. Dollar (end of period).

As a result of the cointegration tests carried out in this study, it is concluded that explanatory variables and CDS spreads are co-integrated. The values of error correction terms obtained from PMG and MG estimators are -0.74 and -0.83 respectively. According to the results obtained from all methods, it is understood that current account deficit, inflation, and interest rates have positive significant effect CDS spreads of countries under consideration both in the short and long term. 1% increase in the ratio of current account deficit/GDP, inflation, and interest rates causes increases in CDS spreads by 4.8%, 5.2%, and finally 13.4% respectively. However, the exchange rate has a very weak short-run effect and no significant long-run effect on the CDS spreads. Also, both short and long-run effects of interest rates on CDS spreads are more pronounced than of others. That is to say, CDS spreads are influenced mainly by changes in the interest rates.

Although CDS spreads reach their highest levels in a global panic environment where risk appetite is reduced, the increase in CDS spreads reach its peak in some countries, while remaining limited in some countries. This implies that the rise is partly due to the global turmoil, but to a large extent to the economy itself. In this sense, as the risks related to the national economy increase, CDS spreads increase, and as CDS spreads increase, those who want to invest in that country demand high interest and/or decrease the amount of financial investment directed to the country. The findings of the study show that the change in CDS spreads for the sample countries during the crisis period is explained by more than 80% of the changes in national macroeconomic variables under consideration. In this respect, it is believed that the results of this study would contribute to policies aimed at preventing the source of risk factors that put upward pressure on CDS spreads.

Keywords: Sovereign Risk, Credit risk, Financial Risk, CDS Spreads, Dynamic Panel Approaches.

Jel Codes: F30, F37, F40.

Öz: Ülke risk primi, ülkeye yönelik finansal yatırım davranışlarında önemli bir belirleyici konumunda olduğundan finansal yatırımcıların yanında, politika yapıcılar, siyasiler, akademisyenler tarafından da yakından takip edilmektedir. Ülke riski arttıkça, o ülkenin borçlanma araçlarına ait faiz oranları, artan risk primi sebebiyle yükselişe geçmekte, buna paralel olarak ulusal ekonomik sistem, borçlanma kapasitesi, borçlanma maliyeti ve cari açığın finansmanı gibi birçok açıdan olumsuz etkilenmektedir. Dahası bu etki, kriz dönemlerinde daha belirgin olmaktadır. Bu nedenle, kriz dönemlerinin politika yapıcılar tarafından başarılı bir şekilde yönetilebilmesi için ülke riskinin temel belirleyicilerinin bilinmesi önem taşımaktadır. Bu çalışmada, ülke risk primleri ile cari işlemler dengesi, enflasyon oranı, devlet tahvili faiz oranı ve nominal döviz kuru arasındaki kısa ve uzun vadeli ilişkiler dinamik panel veri analizi yöntemleri ile 2008:q1 to 2014:q2 dönemi verileri kullanılarak Brics ekonomileri ve Türkiye için analiz edilmiştir. Ampirik analizlerin bulgularına göre, ele alınan ülke grubu ve dönem aralığı için, ülke risk primi üzerinde kısa vadede çok zayıf bir etki meydana getirse de, uzun vadede anlamlı bir etkiye sahip olmadığı tespit edilmiştir. Ayrıca, ele alınan değişkenler arasında faiz oranlarının ülke risk primi üzerindeki kısa ve uzun vadele anlamlı bir etkiye sahip olmadığı tespit edilmiştir. Ayrıca, ele alınan değişkenler arasında faiz oranlarının ülke risk primi üzerindeki kısa ve uzun vadele tahvi belireki kısa ve uzun vadele anlamlı bir etkiye sahip olmadığı tespit edilmiştir. Ayrıca, ele alınan değişkenler arasında faiz oranlarının ülke risk primi üzerindeki kısa ve uzun vadeli etkileri daha belirgindir.

Anahtar Kelimeler: Ülke Riski, Kredi Riski, Finansal Risk, CDS spreadleri, Dinamik Panel Yaklaşımları Jel Kodları: F30, F37, F40.

1. Introduction

Credit derivatives are financial contracts that are derived from a financial asset, allowing the risk and return to be transferred from one side to the other, without touching the asset itself and changing ownership, in case the expected return of that financial asset falls below a certain level. Credit risk transfer through credit derivatives may arise due to the reasons such as the failure to pay the debt on time and changes in exchange rates and interest rates (Erdil, 2008: 37). In this respect, credit derivatives are one of the most effective tools for controlling credit risk.

Financial innovation led to the emergence of a new credit derivative contract called credit default swaps (CDS) that revolutionizes credit risk trading, written on direct credit risk. Recently, CDS is the most widely used credit derivative instrument. The size of credit default swap markets used by investors who want to avoid risk has expanded exceptionally over the past decade (O'Kane and Turnbull, 2003: 1).

As a credit derivative, CDS is the contract of transferring the credit risk of a reference asset (of a firm/country) to a particular institution/company for a price. It is important to note that credit risk encompasses all situations where the borrower would not be able to fully repay the loan under the initially agreed conditions (Haugh, Ollivaud and Turner, 2009:6). Simply, CDS contracts transfer the risk of non-repayment of the loan from one side to another. In a standard CDS contract, the creditor purchases credit protection to cover the loss of the face value of an asset in case of a credit event. The *credit event* is a legally defined event that usually includes bankruptcy, non-payment, and restructuring. Protection is purchased for a certain term, and the party purchasing the protection makes regular payments to the party providing the protection, called the *premium leg*. This size of these premium payments is calculated from a quoted default swap spread which is paid on the face value of the protection. These payments last until a credit event occurs or until maturity, whichever occurs first (O'Kane and Turnbull, 2003: 1). Factors such as the maturity of credit, the credit rating of the borrower party, and the status of the hedged asset are also taken into account. As the borrower's risk increases, CDS spreads also increase (Özatay 2015: 17; Pan ve Singleton, 2008).

With CDS contracts, the creditor is protected against losses that may occur in cases such as bankruptcy, payment failure, denial of liability, and lowering the credit rating. In cases where the credit is not repaid and the default occurs, the losses of the protected party are covered by the party selling the CDS contract. The amount to be paid to the protected party is equal to the difference between the value written in the contract and the market value of the reference asset after default (Atasever, 2017: 217; Kunt and Taş, 2008: 80).

CDS spreads are considered to be the most accurate indicator of sovereign risk and therefore are carefully monitored by policymakers and academicians as well as financial investors. As the sovereign risk increases, the movements in CDS spreads accelerate, and this situation is reflected as an increase in bond interest rates. Therefore, the high CDS spreads of a country leads to an increase in the financing cost of both the country's treasury and other institutions in the country. The price of the credit default swap is called "spread" and is expressed in terms of base point (bp) or one percent of the percentage point. Every 100 base points of the CDS corresponds to a 1 percent cost of interest. Therefore, countries and institutions with high CDS premiums have to issue bonds with higher interest rates and bear higher debt costs to meet their borrowing needs. Therefore, the CDS premium has the feature of being an important indicator for countries. The CDS spreads are determined daily according to the economic and political risk levels of the countries and reflect the market supply and demand dynamics well. Because every new situation is reflected in CDS spreads very quickly, CDS spreads are considered as the most important indicator of real economic stability as well as financial stability (Atasever, 2017: 218). Therefore, it is considered more reliable than credit rating agencies and is closely monitored by financial investors as the increase in CDS premiums means an increase in country risk.

The determination of the underlying dynamics in CDS spreads due to the magnitude of the damage that the country credit risk will cause to the financial system has great importance for economic and financial stability. This paper aims to reveal macroeconomic determinants that influence on sovereign credit default swap spreads. For this purpose, the short and long-run effects of current account balance, inflation rate, interest rates on government bonds, and nominal exchange rates on CDS spreads during the 2008 financial crisis, were analyzed by dynamic panel data methods for Brics and Turkey economies. The remainder of the paper is organized as follows. In Section 2, the empirical literature on the determinants of sovereign risk spreads briefly reviewed. Section 3 describes the data set and sample countries. In Section 4, the econometric model is introduced and analysis findings are presented. The paper concludes with Section 5.

2. Literature Review

Especially after the 2008 crisis, CDS spreads, which are considered as the most reliable indicator of sovereign risk in developing countries has gained importance, and the number of studies investigating that CDS spreads are sensitive to which variable, has increased. The results of some of these studies are summarized in Table 1.

Author (Date)	Countries	Method (Term)	Findings
Cossin and Hricko (2001)	29 Country (Europe- Asia-USA)	Regression January 1998 to February 2000	At low credit risk levels, the expected negative relationship between CDS premiums and interest rates is valid, while at high credit risk levels this relationship is not. USA interest rate levels are among the important determinants of credit risk worldwide. While the past development of stock prices is important in the country risk, the liquidity level does not play a big role.
Norden and Weber (2004)	90 firms from Europe, the United States, and Asia.	VAR 2000-2002	Variations in stock returns lead to changes in CDS and bond spreads. There is a granger causality relationship from CDS spreads toward bond spreads for a higher number of firms than vice versa. The CDS market is very sensitive to changes in the stock markets than the bond market.
Aizenman, Hutchison, and Jinjarak (2011)	Greece, Ireland, Italy, Portugal, and Spain	Fixed-effects and GMM 2005-2011 monthly	Fiscal space i.e. debt/tax and deficits/tax are significant determinants of market-based sovereign risk. However, the explanatory power of fiscal space measures diminishes during the crisis, and the determining role of the TED spread, trade openness, external debt, and inflation increases.

Table 1: Brief Literature of Empirical Studies on The Determinants of CDS Spreads

Heinz and Sun (2014)	European countries	Panel GLS error correction (January 2007 to December 2012)	Sovereign CDS spreads are primarily driven by global investor sentiment, macroeconomic fundamentals, and liquidity conditions in the CDS market. Under weak economic fundamentals during the 2008 crisis, a decrease in liquidity and an upsurge in risk avoidance are the main reasons underlying high CDS spreads in Europe.
Della Corte, Sarno, Schmeling, and Wagner (2014)	20 countries	Regression January 2003 to November 2013	There is a strong inverse relation between contemporaneous changes in sovereign CDS spreads and exchange rate changes at the daily, weekly, and monthly frequency.
Kargı (2014) Turkey		Johansen-Juselius Cointegration and Granger Causality Tests 2005:01 – 2013: 03	Market interest rate, policy interest rate, GDP, and CDS spreads are cointegrated. The most effective variable on CDS premiums is the interest rate. As the market interest rates increases, CDS spreads also increase.
Ho (2014)	8 Emerging Countries	Pooled Mean Group cointegration 2008.Q4-2013.Q2	CDS spreads are cointegrated with the current account, the external debt, and the international reserves. The current account, the external debt, and the international reserves are long-run determinants of CDS spreads. However, in the short run, the current account is insignificant on CDS.
Doshi, Jacobs and Latin Zurita, (2015) American, Eurozone, Asian Countries		Linear Regression January 2, 2001, to June 29, 2	CDS spreads are in a functional relationship that increases with stock market index and exchange rate volatility and decreases with interest rates and stock returns. The risk premium calculated in the study is at its highest level for all countries during the 2008 crisis.
Blommestein, Greece, Eijffinger and Qian (2016) Italy, Portugal and Spain		OLS and Regime Switching Model September 15, 2008, to December 19, 2011, weekly)	The contagion effect originating from the global financial market is an important factor in the pricing of sovereign credit risk for sample Euro countries. Sovereign risk during the crisis period was mainly oriented by global or EMU-wide factors rather than domestic economic and financial development except for Italy.
Galariotis, European Makrichoriti, and countries Spyrou (2016).		PVAR (2008 to 2014)	Determinants of CDS variance are changing between different periods and countries. Investor sentiment was an essential CDS spread determinant during the subprime crisis.
Can and Paskaleva (2017)	and Paskaleva Bulgaria, Panel OLS Romania, March 2003 un Portugal, June 2016. Italy, Ireland, Greece and Spain		Inflation, debt/GDP, current account/ GDP, local capital markets' indexes have significant effects on CDS spreads. While Country's debt and inflation lead to an increase in CDS spreads, current account/ GDP, local capital markets' indexes cause CDS to decrease. Becoming Eurozone member annihilates the increasing effects of the debt level and local capital markets on CDS spreads.
Shahzad et al. (2017)	ABD	NARDL (December 14, 2007 to September 25, 2015 weekly)	Equity prices, VIX index, the 5-year Treasury bond rate, and, to a lesser extent, the crude oil price are significant asymmetric determinants of U.S. industry CDS spreads.

Atasever (2017)	Turkey	VAR analysis and	CDS spreads are affected by the election
	y	Johansen cointegration test (2010:6- 2016:12)	periods. Dollar exchange rate and bond interest rates are among the weak determinants of CDS spreads.
Akyol and Baltacı (2018)	Turkey	ARDL (2006:01 ve 2015:09)	In the short and long term, CDS spreads have a significant negative effect on stock prices.
Tanyıldızı (2020)	Turkey	ARDL (01.02.2008- 01.10.2018)	While there is a negative relationship between CDS premiums and BIST 100 index, there is a positive and significant relationship with commodity index, VIX index, and indicator interest rates.

3. Data and Sample

The data set covers Brics economies, Turkey, and Indonesia. The reason why these countries are specially chosen is that they are characterized by high credit risk and high CDS spreads during the crisis period as well as similar financial and economic conditions. The Data spans from 2008 q1 to 2014q2 with quarterly frequencies. Quarterly data was used for the analysis of the effects of fundamental variables on CDS spreads because the data of some sample countries are not available on a monthly or daily frequency.

The dependent variable of empirical analysis is sovereign CDS spreads of 5-year maturity obtained Bloomberg Terminal. Explanatory Country- specific macroeconomic variables used in empirical analysis as follows:

The current account balance reflects important information about the economic situation of the country. Accordingly, assessment of the current account deficit or surplus of a country gives signals about foreign trade balance, foreign debt payment capacity, and degree of dependence on foreign financing or short-term capital flows. Therefore, it may be used as a significant risk premium determinant¹. The variable was obtained from the OECD database as a percent of GDP. The expected sign is negative, because of the higher current account surplus, the lower credit spread values.

One of the most important indicators of macroeconomic stability is price stability. In this respect, high inflation can be considered as an indicator of monetary, fiscal, and financial instability. The monetarization of chronic fiscal deficits causes high inflation. High inflation increases the interest rates due to the rising risk premium and increases the cost of using capital. Therefore, the high inflation rates cause the sovereign risk to increase because it contains signals that macroeconomic stability is impaired as a whole. Thus, the inflation rate can be used in determining the default risk of a country. The variable representing the inflation rate in this study is CPI taken from the OECD database as a % change in the same period of the previous year. The expected sign of inflation on CDS spread is positive because the higher inflation is, the higher default probability

A significant reason lying behind the differences among long-term interest rates across countries is the risk premium that investors demand holding any countries' assets that may include liquidity and credit risk components. The credit risk component is the extra yield required to offset the probability of a higher loss than zero or less gain than full repayment (Haugh, Ollivaud, and Turner 2009:6). Because they reflect a risk component, it is thought that interest rate affects sovereign risk premium. In this study, the government bond interest rate is used representing market rate because it comprises a risk-free as well as a default risk component. This variable was obtained from the International Financial Statistics database for Brazil, from the OECD database for China, South Africa, and Indonesia and from Investing.com for Turkey.

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¹ Baldacci et al. (2008) have found that the current account balance surplus decreases credit risk in emerging economies.

The information embedded in sovereign CDS spreads matters for the distribution of currency returns, even for countries with floating exchange rates that are far from the default (Della Corte, Sarno, Schmeling, and Wagner 2014:1). Several studies found a strong contemporaneous relation between sovereign CDS spreads and exchange rates. Findings indicate that an increase in the sovereign risk of a country is associated with a depreciation of its currency, an increase in exchange rate volatility, reflecting increased costs of crash insurance. In this study, the nominal exchange rate series created as a national currency per 1 U.S. Dollar (end of period) is taken from the IMF's International Financial Statistics database. The empirical analysis of this study was carried out by Gauss 20.

4. Empirical Methods and Findings

The panel autoregressive distributed lag model (panel ARDL) which is a cointegration approach developed by Pesaran et al. (1999) was used in this study to understand the dynamic short and long term relations between sovereign CDS spreads and selected macroeconomic variables. Panel ARDL is a cointegration test that does not require all the series to be stationary in the same order. In a panel ARDL model, both dependent and independent variables p. and q. order lags are on the right side of equality (Pesaran et al., 1999: 623-624).

Pesaran et al. (1999), developed two estimators for the panel ARDL model, one of them is "Average Group Estimator (MG)) and the other is "Pooled Mean Group Estimator (PMG)". The MG estimator puts no constraints on the parameters of the ARDL specification and derives the long-term parameters from the average of the long-term parameters derived from individual ARDL estimates. The PMG estimator restricts the long-term parameters to be the same among the countries that make up the panel but allows the constant, error variances, and short-term parameters to differ between countries. One of the modeling problems here is the choice between these two alternative estimators. Pesaran et al. (1999) suggested that the homogeneity test of long term parameters should be done with the Hausman (1978) test. Although PMG and MG are consistent estimators under the assumption of long-term homogeneity, only PMG is an effective estimator (Erdem et al., 2010: 375-76; Mamun et al., 2013: 570).

The ARDL model used in this study is expressed as follows:

$$CDS = \mu_{i} + \sum_{j=1}^{p_{i}} \lambda_{ij} CDS_{i,t-j} + \sum_{j=0}^{z_{i}} \beta_{ij} CA_{i,t-j} + \sum_{j=0}^{q_{i}} \delta_{ij} \pi_{i,t-j} + \sum_{j=0}^{m_{i}} \vartheta_{ij} ex_{i,t-j} + \varepsilon_{it}$$
(1)

i=5, t=2008:q1,.....2014:q2, μ_i represents fixed effects, λ_{ij} is lag coefficients of the dependent variable, j=number of lag, $CA_{it} \pi_{it}$, \dot{I}_{it} , ex_{it} , are explanatory variables, β_{ij} , δ_{ij} , α_{ij} , ϑ_{ij} are coefficients of explanatory variables. ε_{it} is the error term distributed independently between i and t.

$$\Delta CDS_{it} = \mu_{i} + \phi_{i}CDS_{i,t-1} + \beta^{*}{}_{i}CA_{i,t} + \delta^{*}{}_{i}\pi_{i,t} + \alpha^{*}{}_{i}i_{i,t} + \vartheta^{*}{}_{i}ex_{i,t} + \sum_{j=1}^{p-1}\lambda_{ij}^{*}\Delta CDS_{i,t-j} + \sum_{j=0}^{zi}\beta^{**}{}_{ij}\Delta CA_{i,t-j} + \sum_{j=0}^{qi}\delta_{ij}^{**}\Delta\pi_{i,t-j} + \sum_{j=0}^{ki}\alpha^{**}{}_{ij}\Delta i_{i,t-j} + \sum_{j=0}^{mi}\vartheta^{**}{}_{ij}\Delta ex_{i,t-j} + \varepsilon_{it}$$
(2)

Here,

 $\phi_i = -(\beta_i/\phi_i)$ defines the long-term or equilibrium relationship between CDS_{it} and explanatory variables. λ_{ij}^* are the short-term coefficients of the dependent variable's lags. β^{**}_{ij} , $\delta_{ij}^{**} = \alpha^{**}$, ϑ_{ij}^{**} are short-term coefficients of explanatory variables.

Error correction coefficient ϕ_i , is the speed of convergence of CDS_{it} to longterm equilibrium after the explanatory variables change. To prove the cointegration relationship between CDS_{it} and explanatory variables, the conditions of both $\phi_i < 0$ and statistical significance must be met.

Table 2 shows the short and long-run relationships obtained from PMG and MG estimators using equation (1) and (2). Firstly, the error correction coefficients (ϕ) obtained from both estimators are negative and statistically significant at the level of 1%, as expected. Accordingly, there is a cointegration relationship between CDS spreads and explanatory variables and the error correction mechanism is working. The values of error correction terms obtained from PMG and MG estimators are -0.74 and -0.83 respectively. This implies that the adjustment speed to the long-term equilibrium is quite high after a shock and also about 74 % or 83 % of imbalances transferor from the previous term's shock converge back to the long-run equilibrium in the current year.

In Table 2, It is seen that the short-term coefficients belonging to the current account (CA), inflation (π) and exchange rate (ex) variables are statistically significant for both PMG and MG estimators, however, the interest rate coefficient (i) is significant only for the MG estimator. Accordingly, it is understood that explanatory variables have significant effects on CDS spreads in the short term.

	PMG	MG	Hausman Test	
Long Term Coefficients				
CA	4.8**	-13.6	1.02 (0.31)	
π	5.2***	0.122	0.51 (0.47)	
i	13.4*	4.8	1.1 (0.31)	
EX	-0.02	4.4	1.10 (0.30)	
Error Correction Term				
ϕ	-0.741 *	-0.833*		
Short Term Coefficients				
ΔCDS	0.039	-0.025		
CA	3.606*	-11.8 *		
ΔCA	4.283	7.690		
$\Delta CA(-1)$	5.201	2.677		
π	3.858*	-3.741*		
$\Delta \pi$	-13.6***	-3.865 **		
$\Delta \pi$ (-1)	0.000	0.0		
i	9.939*	6.178		
Δi	6.455	-0.771		
Δi (-1)	1.530	-12.520		
ex	-0.017*	0.015*		
Δex	08.96	0.458		
$\Delta ex(-1)$	03.10	0.158		
Constant	6.4	7.8		

Table 2: Results from PMG and MG Estimators

Not: Akaike information criterion was used to determine the optimal lag length. PMG estimates were calculated with the back-substitution algorithm. * 1% ** 5% *** 10% indicates significance levels. Values in parentheses are probability values for the Hausman Test.

As a result of the Hausman Test, since the H0 hypothesis that assumes long-term homogeneity for each variable cannot be rejected, the PGM estimator, which is an effective and consistent estimator under long-term homogeneity, is considered to be the appropriate estimator. Also, the PMG estimator is considered to be more suitable than the MG estimator because the sample countries have similar economic structures.

The long-term coefficients except for the exchange rate variable, obtained from the PMG estimator are significant at usual significance levels. Hence, it is understood that meaningful effects in the short term almost continue to a large extent in the long term. Current account deficit, inflation, and interest rate coefficients have positive signs, indicating there is a long-term positive relationship between CDS spreads, and these variables effects CDS spreads in the same direction in the long run. Namely, increases in current account deficit, inflation, and interest rate cause CDS spreads also an increase and vice versa. Nevertheless, it is understood that the variable that affects CDS spreads most, is the interest rates. Inflation and current account deficit follow it respectively. Accordingly, a 1% increase in the ratio of current account deficit/GDP, inflation, and interest rates causes increases in CDS spreads by 4.8%, 5.2%, and finally 13.4% respectively.

The diagnostic test results given in Table 3 show that there is no autocorrelation and variance problem in individual equations. Besides, models appear to explain more than 85% of the change in CDS spreads except for China.

Table 3: Diagnostic Test Results								
	PMG			MG				
	χ^2 sc	$\chi^2_{\rm HE}$	$\overline{\mathbf{R}}^2$	LL	χ^2 sc	$\chi^2_{\rm HE}$	$\overline{\mathbf{R}}^2$	LL
Turkev	2.18	8.70	0.88	-99.37	0.78	8.84	0.81	-104.87
China	1.36	3.73	0.53	-110.43	2.56	6.12	0.16	-117.34
Brazil	0.03	0.16	0.84	-101.36	4.57	1.60	0.30	-119.24
South Africa	4.85	2.82	0.88	-100.47	0.39	2.09	0.81	-106.01
Endonesia	5.23	9.05	0.86	-114.67	16.57	5.67	0.26	-134.19

Note: χ^2_{SC} , χ^2_{HE} , \overline{R}^2 , LL denote Breusch -Godfrey serial correlation test statistic, White heteroscedasticity test statistic, Adjusted R squared, log Likelihood, respectively.

4.1. Robustness Analysis

To test the consistency of the results obtained from the PMG and MG estimators, the relationships between CDS spreads and current account, inflation, interest, and exchange rates were re-questioned using models of dynamic fixed effects (DFE) and static fixed effects (SFE). The results are summarized in Table 4.

Table 4: Dynamic Fixed Effects and Static Fixed Effects Estimation Results				
	Dynamic Fixed Effects	Static Fixed Effects		
Long Term Coefficients				
CA	5.9924	7.7352**		
π	11.6971***	10.0790**		
İ	15.7284 **	12.5290*		
EX	-0.0214	0.0379*		
Error Correction Term				
ϕ	-0.5273*			
Short Term Coefficients				
ΔCDS	0.1790***			
CA	3.1599			
ΔCA	1.8121			
$\Delta CA(-1)$	0.5326			
π	6.1682***			
$\Delta \pi$	-10.8962**			
$\Delta \pi$ (-1)	4.3029			
i	8.2939**			
Δi	5.6354			
Δi(-1)	2.2833			
ex	-0.0113			
Δex	0.0896**			
$\Delta \exp(-1)$	-0.0145			

Not: Akaike information criterion was used to determine the optimal lag length. PMG estimates were calculated with the back-substitution algorithm. * 1% ** 5% *** 10% indicates significance levels. Values in parentheses are probability values for the Hausman Test.

It is seen in Table 4 that the results obtained from DFE and SFE models support the results obtained from the ARDL model. Firstly, the error correction coefficient ($\phi = -0.52$) estimated in the DSE model is found to be negative and 1% statistically significant, confirming the cointegration relationship between CDS spreads and explanatory macroeconomic variables. On the other hand, the fact that the short-term coefficients of the DSE model for inflation, interest, and exchange rates are statistically significant shows that these macroeconomic variables are effective on CDS spreads even in the short term. However, the current account deficit does not have a significant effect on CDS premiums in the short term.

Looking at the long-term coefficients obtained from DFE, it is understood that the short-term effects of the variables on CDS spreads continue in the long-term. Accordingly, the current account deficit does not have a significant effect on CDS spreads in the long term. On the other hand, it is understood that inflation and interest variables strongly affect CDS spreads in the long run, similar to the results of the ARDL model. The variable that affects CDS spreads most is the interest rate concordantly with the results of the PMG estimator.

The results from the SSE model, where all of the coefficients are statistically significant, overlap with PMG and DFS estimation results. Again, in this model, the variable that affects CDS spreads the most is the interest rate. Then come inflation and current account deficit, respectively.

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5. Conclusion

This paper examines the short and long-run dynamic effects and the relative importance rankings of the fundamental macroeconomic variables on sovereign risk premium for Brics economies and Turkey between 2008 q1-2014 q2 by using dynamic panel methods. For this purpose, short- and long-term nature of the dynamic interaction between current account/GDP ratio, inflation, interest rate, and the exchange rate which are thought to represent economic risk situation best and CDS spreads which is representing sovereign risk premium was analyzed by panel ARDL and dynamic and static fixed-effect methods. The main reason for employing these methods for analysis is in some respect the similar macroeconomic structure of the sample countries.

First of all, the variables used in the study are statistically significant and economically important determinants of CDS spreads in sample countries. As a result of the cointegration tests carried out in this study, it is concluded that explanatory variables and CDS spreads are co-integrated. According to the results obtained from all methods, it is understood that current account deficit, inflation, and interest rates affect CDS spreads both in the short and long term, and the exchange rate only weakly affects the CDS spreads in the short term.

The fact remains that it is confirmed by the results of all estimates that the variable that CDS spreads are most sensitive to is the interest rate as with Kargı (2014). While the second most effective variable on CDS spreads is the inflation rate, the current account deficit is third in terms of rank.

However, according to the findings, increases in current account/GDP ratio, inflation, and interest rate cause CDS spreads to increase. The expected result for the interest rate is an inverse relationship between the interest rate and CDS spreads. Cossin and Hricko (2001: 22) argue that at the high-risk levels, there is no opposite relationship between interest rates and CDS spreads. The date range of this study covers a period in which risk premiums are realized at the highest levels. It is thought that a positive relationship between interest rates and CDS spreads confirms this finding.

It is a known fact that CDS spreads peaked during the 2008 crisis. Undoubtedly, the high CDS spreads that occurred during the crisis were partly due to the global panic, decreased risk appetite, rating discounts of rating agencies, and other concerns about the loss of the capital. However, the fact that the CDS spreads of each country increased at different levels during the crisis periods, indicates that the increase in CDS spreads is largely related to the national economy.

As the CDS spreads increase, the borrowing cost of the country increases, and as it decreases, the borrowing cost decreases. Accordingly, CDS spreads should be decreased to reduce the borrowing cost of the country. It is important to identify the risk factors that cause the CDS spreads to rise to implement the necessary policies on time. In this respect, it is believed that the findings obtained in this study, which analyzed the national macroeconomic variables that were effective on CDS spreads during the crisis, are guiding for financial investors and policymakers. First of all, it draws a picture that CDS spreads have reached their highest level since the period discussed is the crisis period. However, the findings of the study show that the change in CDS spreads for the sample countries during the crisis period is explained by more than 80% of the changes in national macroeconomic variables.

In this context, the consolidation of the national economic structure is a priority to prevent uncontrolled and rapid increases in CDS spreads during the crisis periods. In this context, economic policies that decrease the current account deficit and inflation rates should be followed. Financial balances should be improved to eliminate the need for excessive borrowing, thereby eliminating the need to include an additional risk premium for interest rates on borrowing instruments. Thus, vulnerabilities could be reduced inside, and thus, it enables economies to have a more resistant structure in times of crisis.

References

- Aizenman, J., Hutchison, M. M., & Jinjarak, Y. (2011). What is the Risk of European Sovereign Debt Defaults? Fiscal Space, CDS Spreads and Market Pricing of Risk (No. 17407). National Bureau of Economic Research, Inc.
- Akyol, H. ve Baltacı, N. (2018). Ülke kredi risk düzeyi, petrol fiyatları ve temel makroekonomik göstergelerin hisse senedi getirilerine etkisi: BIST 100 örneği. Kafkas Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 22, 459-476. DOI:10.9775/kausbed.2018.030.
- Atasever, G. (2017). "Türkiye'de Risk Primi (CDS), Piyasa Göstergeleri ve Seçim Dönemlerine İlişkin Ekonometrik Analiz", Vol:3, Issue:13; pp:217-226 (ISSN:2149-8598).
- Baldacci, M. E, Gupta, M. S. & Mati, A. (2008). *Is it (still) mostly fiscal? Determinants of sovereign spreads in emerging markets* (No. 8-259). International Monetary Fund.
- Blommestein, H., Eijffinger, S., & Qian, Z. (2016). Regime-dependent determinants of Euro area sovereign CDS spreads. *Journal of Financial Stability*, 22, 10-21.
- Can, H., & Paskaleva, M. (2017). Macroeconomic determinants of CDS: the case of europe. *New knowledge Journal of science*, *6*(3), 63-76.
- Cossin, D., & Hricko, T. (2001, May). Exploring for the determinants of credit risk in credit default swap transaction data. In *EFMA 2001 Lugano Meetings*.
- Della Corte, P., Sarno, L., Schmeling, M., & Wagner, C. (2014). Sovereign Risk and Currency Returns. In *The 41th European Finance Association Annual Meeting (EFA 2014)*.
- Doshi, H., Jacobs, K., & Zurita, C. (2015). Economic and Financial Determinants of Credit Risk Premiums in the Sovereign CDS Market. Conference Paper,
- Erdem, E., Guloglu, B., & Nazlioglu, S. (2010). The macroeconomy and Turkish agricultural trade balance with the EU countries: Panel ARDL analysis. *Journal of Economic & Management Perspectives*, 4(1), 371.
- Erdil, T. B. (2008). Finansal türevler ve kredi temerrüt swaplarının teori ve uygulamaları. Kadir Has Üniversitesi Sosyal Bilimler Enstitüsü Finans ve Bankacılık Doktora Ana Bilim Dalı, Yayımlanmamış Doktora Tezi.
- Galariotis, E. C., Makrichoriti, P., & Spyrou, S. (2016). Sovereign CDS spread determinants and spill-over effects during financial crisis: A panel VAR approach. *Journal of Financial Stability*, 26, 62-77.
- Haugh, D., P. Ollivaud and D. Turner (2009), "What Drives Sovereign Risk Premiums?: An Analysis of Recent Evidence from the Euro Area", OECD Economics Department Working Papers, No. 718, OECD Publishing.
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the econometric society*, 1251-1271.
- Heinz, M. F. F., & Sun, M. Y. (2014). Sovereign CDS spreads in Europe: the role of global risk aversion, economic fundamentals, liquidity, and spillovers (No. 14-17). International Monetary Fund.
- Ho, S. H. (2014). Long-Run Determinant of the Sovereign CDS spread in emerging countries. CEPN CNRS-UMR 7234, 1-10.

- Kargi, B. (2014). Credit default swap (CDS) spreads: the analysis of time series for the integration with the interest rates and the growth in Turkish economy. *Montenegrin Journal of Economics*, 10(1), 59-66.
- Kunt, A. S. ve Taş, O. (2009). Kredi temerrüt swapları ve Türkiye'nin CDS priminin tahmin edilmesine yönelik bir uygulama. *İTÜ Journal*, *5*(1), 78-89.
- Al Mamun, M., Sohog, K., & Akhter, A. (2013). A dynamic panel analysis of the financial determinants of CSR in bangladeshi banking industry. Asian Economic and Financial Review, 3(5), 560.
- Norden, L., & Weber, M. (2009). The co-movement of credit default swap, bond and stock markets: An empirical analysis. *European financial management*, 15(3), 529-562.
- O'Kane, D., & Turnbull, S. (2003). Valuation of credit default swaps. *Lehman Brothers quantitative credit research quarterly*, 2003(Q1–Q2).
- Özatay, F. (2015). Parasal İktisat Kuram ve Politika (4th Edition), *Efil Publisher*.
- Pan, J., & Singleton, K. J. (2008). Default and recovery implicit in the term structure of sovereign CDS spreads. *The Journal of Finance*, 63(5), 2345-2384.
- Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the american statistical association*, 94(446), 621-634.
- Shahzad, S. J. H., Nor, S. M., Ferrer, R., & Hammoudeh, S. (2017). Asymmetric determinants of CDS spreads: US industry-level evidence through the NARDL approach. *Economic Modelling*, 60, 211-230.
- Tanyıldızı, H. (2019). CDS Primleri ile Tahvil Gösterge Faiz Oranları ve Finansal Endeksler İlişkisi: Türkiye Örneği (Master's thesis, Erzincan Univesity, SSI).