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## RELATIONSHIP BETWEEN SOVEREIGN CREDIT DEFAULT SWAP AND STOCK MARKETS : THE CASE OF TURKEY

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### **Abstract**

*This paper aims to test the causality relationship between sovereign risk and performance of stock markets in Turkey for the period between 08.10.2008-09.06.2016. As a result of Granger Causality Test, we find that there is two-way causality relationship between sovereign risk (CDS) and stock market performance. A change in sovereign risk cause to change in stock market performance and viceversa. Sovereign credit risk affects both risk premiums and a country's ability to access global debt markets. So this findings is important for economic and political environment's credit rating clusters.*

Keywords: the causality relationship, sovereign risk, stock markets, Turkey

### **1. Introduction**

Credit risk is the risk that a borrower will not be able to make required principal interest payments or meet her contractual obligations, which in turn affects the lender's financial status. Similarly sovereign credit risk arises when a government fails to meet its debt covenants or to fulfil its obligations in the form of guarantees (Pokorna and Teply, 2011). Credit derivatives such as CDS provides protection to credit risk and losses arising from credit event. The buyer of a CDS makes periodic payments over the life of the contract in exchange for protection against default or other specified credit events, such as bankruptcy, cross default/cross acceleration, repudiation, and debt restructuring for a specified reference asset. The seller of a CDS agrees to compensate the difference between the par and market value of the reference asset if the underlying reference entity experiences a particular credit event (Fung et.al., 2008). After this point, its important for the detection of intertemporal relationship between sovereign CDS and stock market index.

In the literature, there are many studies that examine the relationship between sovereign risk and financial markets from the different perspectives. Blanco et al. (2005) found that the CDS market leads the bond market in 33 North American and European firms by using Vector Error Correction Model (VECM). Forte and Pena (2009) found the same result with Blanco et al. (2005) by using implementing VECM. Zhu (2006) found that Bond spreads and CDS spreads move together in the long run, but this relationship does not always hold in the short time by using Granger causality test and VECM.

Norden and Weber (2004) found that stock returns lead CDS and bond spread changes. CDS spread changes Granger cause bond spread. Fung et al. (2008) found that the lead-lag relationship between stock market and CDS market depends on the credit quality of the underlying reference entity. Forte and Pena (2009) concluded that stock returns lead CDS and bonds more frequently than the other way round by using VECM. Bystroem (2005) found positive link between CDS index premiums and stock index return volatilities. Coronado et al. (2011) found that the stock market had a leading role over CDS market in 8 European countries by using VAR and Panel data model. Corzo et al. (2012) contribute with Coronado et al. (2011) 's results.

Longstaff et al. (2003) found that no definitive relationship between the stock and CDS markets by using VAR model in 67 North American companies. But they implied that information flows first into the CDS and the stock markets, and then into bond market. Fontana and Scheicher (2010) found no lead-lag relationship between the markets and explain this that the parity between CDS and bond spreads in 10 euro area countries.

Relationship between the CDS and stock markets by offering new products that help investors make better investment decisions. So this paper aims to examine the relationship between sovereign risk and stock market index for Turkey. The paper proceeds as follows. Section 2 explains data and methodology, section 3 summarizes the findings and section 4 concludes the paper.

## 2. The Data and Methodology

This paper aims to test the causality relationship between sovereign risk and performance of stock markets in Turkey. The dataset includes the daily Credit Default Swap (CDS) spreads of Turkey and daily return series of Borsa Istanbul-100 (BIST-100) index for the period between 08.10.2008-09.06.2016. CDS spreads and return series of BIST-100 represent the sovereign risk and performance of stock market, respectively.

To analyse the causality relationship between sovereign risk and stock market performance, this paper use the Granger Causality Test (Granger,1969). If  $X_t$  and  $Y_t$  are stationary time series with zero means, the Granger causality model can be defined as in Equation[1].

$$X_t = \sum_{i=1}^k \alpha_i X_{t-i} + \sum_{i=1}^k \beta_i Y_{t-i} + \varepsilon_t$$

$$Y_t = \sum_{i=1}^k \delta_i X_{t-i} + \sum_{i=1}^k \gamma_i Y_{t-i} + \mathcal{G}_t \quad \text{Equation[1].}$$

In Equation[1],  $\varepsilon_t$  and  $\mathcal{G}_t$  are uncorrelated white-noise series. The null hypothesis is that Y does not Granger Cause X or vice versa. If all parameters  $\beta_i$  are equal to zero, one can not reject the hypothesis is that Y does not Granger cause X. If all parameters  $\delta_i$  are equal to zero, one can not reject the hypothesis is that X does not Granger cause Y.

### 3. Empirical Evidence

Table.1 shows the descriptive statistics for CDS spreads and BIST-100 index.

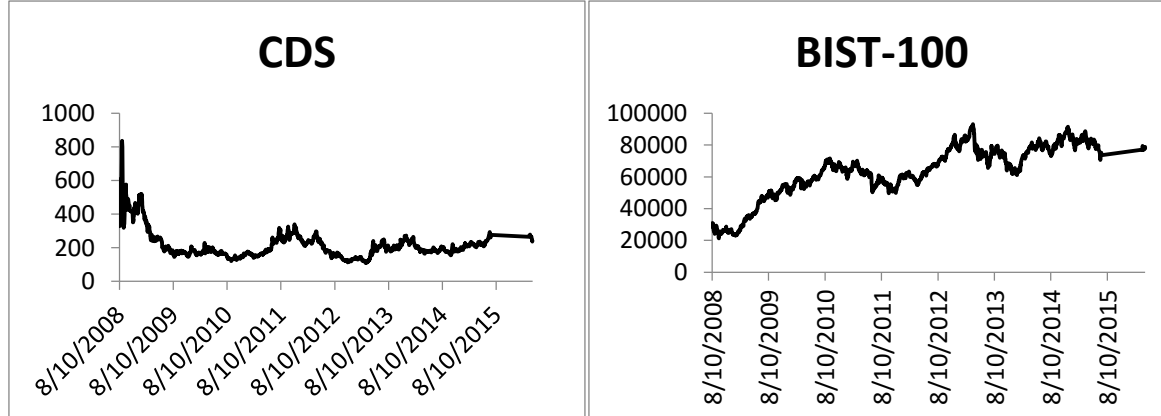
**Table.1: Descriptive Statistics.**

	<b>CDS</b>	<b>BIST-100</b>
<b>Mean</b>	213.78	63.009
<b>Median</b>	189.22	64.355
<b>Maximum</b>	835.08	93.178
<b>Minimum</b>	109.83	21.228
<b>Std.Dev.</b>	83.07	16.592
<b>Skewness</b>	2.44	-0,703
<b>Kurtosis</b>	11.7	2,9608
<b>Jarque-Bera</b>	7090***	140,72***

In Table.1, the means of CDS spreads and BIST-100 index are, 213.78 and 63.009, respectively. While the maximum and minimum values of CDS spreads are 835.08 and 109.83; those of BIST-100 index are 93.178 and 21.228, respectively. According to Jarque Bera test results, none of the two variables have normal distribution.

Before testing the causality relation, we present the graph of variables in Figure.1

**Figure.1: The graph of CDS spreads and BIST-100 index**



It is clear in Figure.1 that there is a negative relationship between CDS spreads and BIST-100 index. In other words, as Sovereign risk increase, stock market performance decrease, or vice versa. This paper aims to find the way of this relationship.

First, we test the stationary of variables by using ADF UnitRoot Test (Dickey and Fuller,1981). The results are given in Table.2.

**Table.2: UnitRoot Test Results**

		<b>LEVEL</b>	
<b>Variables</b>	<b>ADF-Test</b>		<b>ADF-Test Statistic(withinterceptandtrend)</b>
	<b>Statistic(withintercept)</b>		
<b>CDS</b>	-4.1326***		-4.2440***
<b>BIST-100</b>	-1.8473		-2.4282
		<b>FIRST DIFFERENCES</b>	
<b>CDS</b>	-		-
<b>BIST-100</b>	-40.5534***		-40.5666***

MacKinnon critical values are as follows: With intercept model: -3.43, -2.86 and -2.56 for 1%, 5%, 10% significance level, respectively. With intercept and trend model: -3.96, -3.41 and -3.12 for 1%, 5%, 10% significance level, respectively. \*\*\* shows 1% significance level.

The result in Table.2 indicates that while CDS variable is stationary at level, BIST-100 variable is not stationary at level. Therefore, we take the first differences of CDS spreads and it is clear that BIST-100 index is stationary at first differences. Therefore, we use original series of CDS spreads and first differences of BIST-100 index to test the causality relationship between sovereign risk and stock market performance.

The next step is to determine optimal lag for variables in Granger Causality Test. For this purpose, we run the VAR (Vector Auto Regression) model to identify the optimal lag, and we choose 2 lag as a optimal lag by using Schwarz Criteria. We estimate Equation[1] by using 2 lag and give the results in Table.3.

**Table.3. GrangerCausality Test Results**

<b>Nullhypothesis</b>	<b>Observation</b>	<b>Lag</b>	<b>F statistic</b>	<b>Prob</b>	<b>Conclusion</b>
<b>CDS does not GrangerCause BIST-100</b>	1704	2	7.8030	0.0004	Reject
<b>BIST-100 does not GrangerCause CDS</b>	1704	2	3.3323	0.0359	Reject

The results in Table.3 indicates that, there may be two way causality relationship between CDS spreads and BIST-100 performance. In otherwords, there is a causality relation running from CDS spreads to BIST-100 index and there is a causality relation running from BIST-100 index to CDS spreads.

#### **4. Conclusion**

The aim of this paper is to investigate causality relationship between sovereign risk and stock market performance. We use daily Credit Default Swap (CDS) spreads of Turkey and daily return series of Borsa İstanbul-100 (BIST-100) index for the period between 08.10.2008-09.06.2016 and apply Granger causality test to test the causality relation between sovereign risk and stock market performance. While CDS spreads represent the sovereign risk, BIST-100 index return represents the performance of stock market in this paper.

As a result of Granger Causality Test, we find that there is two-way causality relationship between sovereign risk and stock market performance. A change in sovereign risk cause to change in stock market performance and viceversa. This result is crucial for policymakers. Since change in sovereign risk affect the stock market performance, policymakers should seek to way

to control the sovereign risk to support the development of stock markets and to increase the role of stock market in enhancing economic growth. In the same manner, increasing stock market performance also would decrease the sovereign risk.

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