THE EFFECT OF CREDIT DEFAULT SWAPS (CDS) ON BIST100 IN TURKEY: MS-VAR APPROACH

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Abstract
2008 Global Financial Crisis has brought financial risk control to the forefront for countries. In this context, the Credit Default Swap (CDS), which shows the country's risk premiums as well as the credit ratings of the countries, has become an important indicator especially for foreign investors. Thus, investor decisions in stock markets have become more sensitive to CDS premiums. In particular, it is expected that foreign investments needed in a country such as Turkey having a volatile financial system may be affected from risk premiums such as CDS. In this study; the non-linear relationship between CDS premiums and Borsa Istanbul 100 Index (BIST100) has been analyzed by using Markov Regime Switching Vector Autoregressive (MS-VAR) model for the period of March 2005-May 2017. According to the findings; it has been seen that there is a negative relationship between CDS premiums and BIST100 index in both regimes. From this point of view; it is possible to say that investors consider CDS premiums as an important indicator while taking investment decisions.

Key words: *BIST100; Credit Default Swap (CDS); Markov Regime Switching Vector Autoregressive (MS-VAR) Model; Risk Premiums; Turkey.*

JEL Classification: *C58, E44, G10.*

I. INTRODUCTION

The trading sizes in financial markets have shown increase on a global scale every passing year since 1990s. The fact that financial markets gain functionality has brought along some risk factors. The problems of "moral hazard" and "adverse selection" are considered as the key drivers in the occurrence of these risks. This situation has positively reflected on derivative markets where credit risk is transferred to stakeholders by pricing. The best-known type of credit derivatives is Credit Default Swap (CDS) and credit risk is transferred to stakeholders by CDS (Hull, 2012: 572). The so-called contract is formed by swapping the credit risk against a certain remuneration. Thereby, credit side is protected against the risks that may be faced in case of becoming overdue because of the debit side's failure or some other reasons. The protection seller of CDS contract undertakes the credit risk caused by debt-credit relationship in consideration of the payment of premium (Kiff & Morrow: 2000; Brandon & Fernandez: 2004; Tozum: 2009; Turguttopbas: 2013). The functioning of a CDS contract is as follows:

Kaynak: Choudhry, 2006: 9.
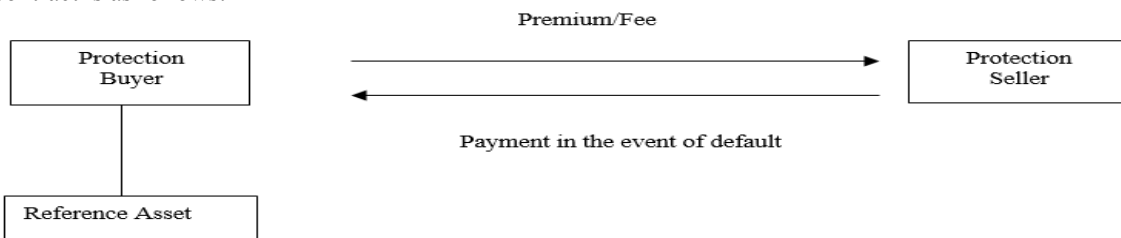
The most important feature of CDS is being a significant risk indicator for financial markets. CDS is considered as a creditworthiness indicator besides the credit ratings announced by the main international credit agencies. Because of their risk representing feature, the increase on CDS value shows that risk levels are high. The high risk levels prompt financial markets in developing countries such as Turkey to become more fragile and this situation increases the cost of borrowing in financial markets.

The aim of this study is to examine the non-linear relationship between the CDS premiums and Borsa Istanbul 100 Index returns for the period of March 2005 - May 2017 by using Markov Regime-Switching Vector Autoregressive Model (MS-VAR). In the following part of the study; the literature review has been presented and then data set, econometric methodology and empirical findings have been introduced. Lastly; the study has been completed with conclusion part and political suggestions.

II. LITERATURE REVIEW

The relationship between CDS and stock returns have been examined before by different methods as well. Being high of CDS basis points shows the declining economy and the increase on stock prices indicates the progressive economic conditions. In this context, it is expected that there is a negative relationship between CDS and stock returns. The previous studies made as to this relationship are shown in Table 1:

Table 1. Literature Review

Authors	Period	Method	Sample	Findings
Fung et al. (2008)	2001-2007 (Monthly data)	Cointegration Test and VECH Model	USA, China, Malaysia, Korea, Thailand, Philippines Stock Markets	There is a negative relationship between stock returns and risk premiums for 6 Asian countries and statistically significant relationship between stock returns and CDS premiums of China, Korea and Thailand in the long term
Norden & Weber (2004)	2000-2002 (Daily data)	Regression and Panel Regression Models	58 European Firms, 24 U.S. Firms, 8 Asian Firms	CDS market is more sensitive to stock markets in accordance with bond markets
Bali & Yilmaz (2012)	2002-2012 (Weekly data)	Correlation and Regression Analysis	Turkey	There is a non-linear relationship between BIST 100 index and CDS premiums
Basazinew &Vashkevich (2013)	2007-2011	Granger Causality and VAR analysis	Asian Countries	There is a negative relationship between CDS premiums and stock returns
Hanci (2014)	2008-2012 (Daily data)	GARCH model	Turkey	There is a non-linear relationship between CDS premiums and publicly traded firms' stock returns
Yenice & Hazar (2014)	2009-2014 (Daily data)	Regression Slope Estimated Models	Turkey, Russia, Argentina, Brazil, Indonesia, Malaysia and China	There is no statistically significant relationship between CDS premiums and index close prices for China and Indonesia and a statistically significant relationship for the other analyzed countries
Degirmenci & Pabuccu (2016)	2010-2015 (Daily data)	Vector Autoregressive Model (VAR), Granger Causality Analysis, Artificial Neural Network based Non-linear Autoregressive Models (NARX)	Turkey	There is a bidirectional causality between CDS premiums and BIST100 Index returns
Aydin, Hazar & Yukcu (2016)	2010-2015 (Daily data)	Regression Slope Estimated Models	10 Developed and Developing Countries	There is a strong relationship for Ireland and no relationship for Chili and Indonesia
Eren & Basar (2016)	2005-2014 (Monthly data)	ARDL Approach	Turkey	There is a negative relationship between CDS premiums and BIST100 Index returns in the short term and no relationship in the long term

III. DATA SET, METHOD AND FINDINGS

The data used in this study have been obtained from Borsa Istanbul and Bloomberg online data base. The monthly data including the period of March 2005-May 2017 have been used by taking the log of all variables. The descriptions and time graphics of the variables are as follows:

Table 2. The Description of Variables

Variables	Symbols
Log of Credit Default Swaps	DLCDS
Log of BIST100 Index Returns	DLBIST

Figure 1- Time Graphics of the Variables

Firstly; it has been tested whether the variables are stationary or non-stationary. According to the MS-ADF unit root tests presented in Table 3; it has been seen that the variables of DLCDS and DLBIST are stationary (no unit root). Thus, the variables ensure the stationarity condition required for using non-linear methods.

Table 3. Unit Root Test Results

Variables	t-statistics	1%	5%	10%
DLBIST	-3.2562 **	-3.45	-2.87	-2.55
DLCDS	-72838.97***	-3.45	-2.87	-2.55

In this study; BDS (Brock, Dechert, Scheinkman and LeBaron) and Likehood Ratio (LR) tests have been used in determining whether variables are linear or non-linear and the results have been shown in Table 4:

Table 4. Results of Linearity Tests: BDS and LR Tests

	Dimension	BDS Statistics	St. Error	Z-Statistics	Probability	C (m,n)	C (m,n)
DLBIST	2	0.179	0.004	39.702	0.000	7372	0.677
	3	0.303	0.007	42.085	0.000	7047	0.656
	4	0.387	0.008	45.032	0.000	6759	0.638
	5	0.442	0.008	49.321	0.000	6493	0.621
	6	0.478	0.008	55.222	0.000	6242	0.606
DLCDS	2	0.107	0.005	19.496	0.000	6534	0.600
	3	0.175	0.008	19.961	0.000	5560	0.518
	4	0.214	0.01	20.378	0.000	4781	0.451
	5	0.232	0.011	21.137	0.000	4137	0.396
	6	0.232	0.01	21.812	0.000	3568	0.346
Likehood Ratio (LR) Test for Linearity							
Test Statistics				**Probability Value**			
652.53				0.000			

Results of linearity for DLCDS and DLBIST have been presented in Table 4. According to the test results; null (H0) hypothesis proposing the linearity of the variables has been rejected for all test statistics. Thus, non-linearity of the related variables provides the required condition for using Markov Regime Switching model considering the non-linear structures of the variables.

The effect of the variations occurred in CDS premiums on BIST 100 Index returns has been forecasted by MS-VAR approach and the obtained findings have been shown in Figure2.
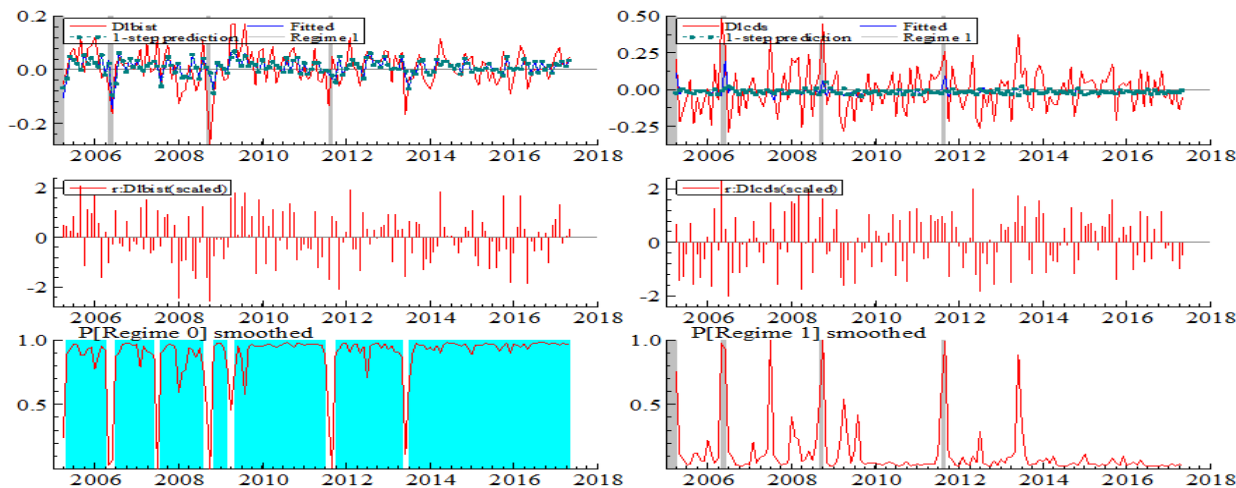
Figure 2- Smoothed Regime Probabilities

According to the Figure 2; first regime (Regime 0) presents the period of economic growth, in other words, the period when country risk is low. The second regime (Regime 1) reflects the period of economic shrinkage/pre-crisis or the period when country risk is high. When considered the transition probabilities of the variables; it has been seen that the great part of observation values are located in Regime 0 (economic expansion period) and that there are less observations in Regime 1 (economic shrinkage).

Table 5. Transition Probabilities

	Regime 0	Regime 1	The Number of Observation	Duration
Regime 0	0.90983	0.65409	93.15%	136 months
Regime 1	0.09017	0.34591	6.85%	10 months

The transition probabilities showing the switching between the regimes of economic expansion and recession have been shown in Table 5. According to Table 5; it has been seen that the probability of staying on Regime 0 is with probability 90%, respectively, the probability of staying on Regime 1 is with probability 34%. On the other hand, the results have shown that the regime switching from regime 0 to 1 is with probability %10 and from regime 1 to 0 is with probability 65%. It is possible to say from the Table 5; the mean duration of Regime 0 and Regime 1 are 136 months and 10 months respectively.

Table 6. MS-VAR Model Results

	DLBIST		DLCDS	
	Coefficients	Std. Error	Coefficients	Std. Error
Constant	0.010	0.004	-0.016	0.011
DLBİST(0)	0.035	0.096	-0.128	0.224
DLBİST (1)	-0.066	0.457	-0.285	1.192
DLCDS(0)	-0.155***	0.049	-0.174	0.133
DLCDS (1)	-0.342**	0.169	0.439	0.394

Note: DLBIST (0) shows the change in BIST100 Index returns in Regime (0); DLBIST (1) shows the variance in BIST100 Index returns in Regime 1; DLCDS (0) shows the effect of the variance in CDS premiums on BIST100 Index in Regime 0; DLCDS (1) shows the effect of the variance in CDS premiums on BIST100 Index returns in Regime 1. ***, **, * represent 1%, 5%, 10% significance levels.

As is seen in Table 6 showing the MS-VAR forecasting results; the effect of CDS premiums representing the country risk on BIST100 (DLCDS) is negative in both Regime 0 and Regime 1, but the coefficient in Regime 1 is higher than in Regime 0. Additionally; it has been seen that there is no statistically significant effect of DLBIST on DLCDS in both Regime o and 1.

Table 7. Descriptive Statistics for Model

Log Probability	324.758
Vector Normality Test	9.412 [0.052]
Portmanteau (5)	30.333 [0.065]
Vector ARCH LM (1-5) Test	1.366 [0.139]

Table 7 has presented the descriptive statistics for model. The results have shown that model provides the basic stability conditions and that there is no ARCH effect (heteroscedasticity) in the model. According to Portmanteau test statistics; there is no an autocorrelation problem between the error terms.

IV. CONCLUSION

In this study; the relationship between CDS and stock returns (BIST 100) has been analyzed by MS-VAR approach for the period of March 2005-May 2017. MS-VAR results have shown that there is a perfect negative correlation from CDS to BIST100 in Regime 1 in contrast with Regime 0 and that the correlation is not statistically significant from BIST100 to CDS. When examined the coefficient matrix; it has been seen that the probability of staying on Regime 0 is with probability 90%, respectively, the probability of staying on Regime 1 is with probability 34%. Additionally; the mean duration of Regime 0 and Regime 1 are 136 months and 10 months respectively.

CDS are closely related to global risks, financial markets volatility and investor appetite depending upon the macroeconomic policies. Thus, the negative impact of the CDS on BIST100 may be considered as the stock return decreases and economic recession. Additionally, perfect negative correlation coefficient in Regime 1 gives an important information on the decrease of investor appetite and stock returns in economic recession.

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