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## INTERACTION BETWEEN CDS PREMIUMS AND STOCK MARKETS: CASE OF TURKEY

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### Abstract

The relationship between CDS premiums and stock market is investigated in this study by using data of Turkey. Here CDS premiums, which constitute an alternative to sovereign credit ratings, are used as a measure of sovereign credit risk. At the end of examination a long term relationship is found based on traditional Johansen co integration test. C/S and C/T models of Gregory Hansen co integration test support this finding, whereas CC model does not. Toda Yamamoto causality test results indicate a unidirectional causality from BIST-100 return to CDS premiums.

**Keywords** : CDS, Stock Markets, Sovereign Credit Risk.

**Jel Codes** : G00, G10.

## CDS PRİMLERİ İLE PAY PİYASALARI ARASINDAKİ İLİŞKİ: TÜRKİYE VAKASI

### Öz

Bu çalışma kapsamında Türkiye verisi kullanılarak CDS primleri ile hisse senedi piyasası arasındaki ilişki incelenmiştir. Burada ülke riskini temsilen ülke kredi notlarına alternatif olarak kullanılan CDS primlerindeki değişim kullanılmıştır. Araştırma sonunda Johansen eşbütünleşme testi kullanılarak değişkenler arasında uzun vadeli bir ilişkinin varlığı kanıtlanmıştır. Yapısal kırılmaları dikkate alan Gregory Hansen eşbütünleşme testinin C/S ve C/T modelleri bu bulguyu desteklerken, CC modeli desteklememektedir. Toda Yamamoto nedensellik testi BIST-100 getirisinden CDS primlerine doğru tek yönlü nedensellik ilişkisini ortaya koymaktadır.

**Anahtar Kelimeler** : Kredi Temerrüt Takası, Hisse Senedi Piyasaları, Ülke Kredi Riski.

**Jel Kodları** : G00, G10.

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## **INTRODUCTION**

The interaction between CDS and stock market returns is a hot topic in recent literature. Since stock markets are directed by the transactions of domestic investors and foreign investor transactions, factors affecting those transactions have to be considered. With the financial liberalization which is experienced in the last decade, foreign investors have started to participate in other markets in order to reduce their portfolio risk through international diversification. However by investing in other markets, they are exposed to many risks including economic risks, political risks, risks associated with legal system. They are expected to prefer countries where there is no political or economic uncertainty. Legislation protecting rights of foreign investors and tax procedures are another topics to consider for foreign investors. If this is the case, investors need a proxy indicating sovereign credit risk in making investment decisions. While some authors are suspicious about using CDS premium as a measure of sovereign credit risk, many authors find it as an appropriate measure.

Despite the fact that they do not refer the same thing, country risk and sovereign credit risk is highly associated. Damodaran (2015) has counted factors affecting country risk as degree of indebtedness, pensions and social service commitments, revenues of government and their stability, political risk and implicit backing from other entities. Author has also mentioned from the significant differences between country ratings given by different agencies. Other fact that is highlighted by author is the tendency of US-based agencies to over rate U.S. According to Damodaran (2015), CDS prices supply relevant information regarding default risk despite the noise it also includes. Another study written by Baker and Filbeck (2015) state that CDS spreads are more timely and dynamic compared to sovereign credit ratings.

Crises that are experienced in 2008 and 2010 respectively has lead researchers to examine Credit Default Swap market (CDS). According to some authors CDS, which are introduced by JP Morgan in 1994, have an important role in contagion of crises. Increases in sovereign CDS premiums may reflect risk of moratorium which refers to legal delay of debt payments by an insolvent country. By this way CDSs provide insight about countries' risks. Moreover comparisons between different countries' CDS premiums may be used as a guide for international investors. An increase faced in sovereign CDS premiums of emerging markets may cause worry in global markets and may cause international investors to invest in safer countries. Furthermore mentioned increase in CDS premiums may also cause domestic investors to involve in safer markets.

Credit risk is defined as a risk of loss which will be faced if a counterpart or borrower does not fulfill their obligations. CDSs are contracts in which buyer of a CDS on a specific bond accepts to pay a period fee (premium) in order to get a payment from protection seller in the case of a credit event. CDS can be perceived as an insurance contract. Unlike insurance contracts CDS purchasers do not need to have any financial stake in the reference entity. Market price of premium quoted in percent of notional amount is defined as CDS spread. CDS spreads are highly associated with the quality of companies and countries which issue bonds. Mentioned credit event refers to bankruptcy for a corporate borrower, whereas it refers to a moratorium for sovereign borrower. Here it is also noteworthy to specify that most defaults are followed by negotiations for debt exchange or restructuring. Within perspective of this study sovereign CDSs are mentioned. Sovereign CDS spread increases as credibility of country deteriorates.

Sovereign CDS premiums are selected as best proxy for sovereign credit risk by Bystrom (2005). Consistently Akdoğan and Chadwick (2012) identify sovereign CDS premiums as a direct measure of country risk. Heinz and Sun (2014) have referenced the argument of some authors that CDS spreads mainly reflect financial markets' perception regarding country's default risk. According to Kanlı and Aydoğuş (2017), CDS premiums are rational indicators which measures country risk since they are determined on market conditions.

Sovereign credit ratings are very important for investors and policymakers who involve in the market. They has been even perceived as a proxy indicating risk perception of investors. Nonetheless, IMF (1998) has highlighted the fact that rating agencies were late in downgrading credit ratings of Asian countries before Asian crisis. Credit rating agencies have failed again in 2008 when big firms like Lehman Brothers collapsed. Lehman's bonds rating was AA on the day before it went bankrupt.

This case has reminded same question: "Is credit risk priced in a timely manner by credit ratings?" Possible explanations for failure of rating agencies are provided by Bhatia (2004). Firstly data rating agencies use generally come from governments. Since governments have a tendency to reveal only good news, ratings given by rating agencies may be upwardly biased. Secondly rating agencies success is limited with the analysts they hired. Thirdly rating agencies tend to use existing reports in order to reduce workload. Another reason is revenue bias which refers to issuers' tendency to make payments to rating agencies in an expectation to get a favorable rating.

Rodriguez et al (2019) have mentioned from the fact that rating agencies adopt a through-the-cycle approach. In other words they only take permanent changes affecting issuer's financial position into account in giving ratings. Although that approach seems prudent, it leads rating agencies to sacrifice from rating timeliness and performance in predicting defaults. Another study prepared by Kiff et al (2013) also specify that through-the-cycle-ratings fail in predicting future defaults. This case stems from the smoothed ratings caused by policy adopted by rating agencies which delays rating changes. Rodriguez et al (2019) conclude that CDS spreads, which are available and less costly to collect compared to macroeconomic data, is useful to market participants.

The relationship between credit risk of a country and stock prices is explained by Coronado et al (2011) as: Once credit quality of a country decreases, government has to raise funds from higher interest rates. At that time there will be less money to invest and spend and a tax increase will be highly probable. As a consequence consumption and investment will fall which will cause company profits to decrease and stock prices to drop. At that point credit risk problem turns into a market risk problem.

In this study the interaction between sovereign credit risk and stock market return is investigated within Turkish case for the period between 2003Q1-2018Q4. Data of CDS spread with 5-year maturity is obtained from Bloomberg data terminal. In the following section literature will be given. After then empirical study will be implemented. In the empirical part both traditional tests and tests with structural breaks are applied. At last conclusions and political implications are presented. In the literature although there are vast of studies examining the interaction between bond markets and CDS premiums, only a few study exists which analyze the relationship between CDS premiums and stock markets. Moreover existing studies generally have micro-perspective. Our study differentiates itself from existing studies by the longer data set it uses and macro perspective it has.

## **I.LITERATURE REVIEW**

Many participants in the market have spent effort in estimation of credit risk. Credit risk not only affects bonds and CDS but also stocks. Nonetheless information is reflected in the price of these assets in different time periods. According to general agreement bonds lag behind stocks and CDS, nonetheless there is not a general agreement on price discovery leadership between CDS and stocks. Older studies generally focus on bonds and CDS market, while recent studies also include stocks. Existing studies can be divided into two as the ones which use firm-level data and others which use country data.

Early essential papers, which are written by Longstaff et al (2003), Hull et al (2004) and Blanco et al (2005), demonstrate leading role of CDS markets on price formation. This is the case especially in developed markets. From these studies only Longstaff et al (2003) has included stock market in the analysis. Longstaff et al (2003) who have used data of 68 North American companies conclude that information is reflected firstly on CDS and stock markets and then into the bond market.

Some authors have exclude bonds from analysis and focus on stock market and CDS market. One of them is written by Bystrom (2005), who has investigated the relationship between itraxx cds index market and equity prices. According to that study CDS spreads are explained mostly by current and lagged stock returns. Based on that study stock prices reflect firm specific information before

CDS spreads. This indicates the leading role of stock market in reflecting firm specific information. Another study which investigate same relationship is written by Fung et al (2008). At the end of the study authors conclude that lead-lag relationship between equity market and CDS market varies according to credit quality of underlying reference entity. According to results stock market, for which S&P 500 is used as proxy, reflect information before CDS market. Moreover investment grade CDS does not estimate stock price movements. On contrary, significant mutual feedback information is detected between equity market index and high-yield CDS index.

Based on Chan et al (2008) when Merton type structural model is applied to sovereign issuers, a negative relationship is detected between sovereign CDS spreads and stock prices. Authors have found strong negative correlation between CDS spreads and stock indexes of most of the countries which are included in the empirical analyses.

Another paper which is prepared by Norden and Weber (2009) demonstrate the leading role of stock returns with respect to CDS and bond spread changes. In this study CDS market is found more sensitive to stock market compared to bond market. According to model used more contribution is made by CDS market to price discovery compared to bond market. Mentioned effect is stronger for US companies relative to European companies. Another paper prepared by Forte and Pena (2009) conclude that stocks lead CDS and bonds more frequently than the other way around. Moreover CDS is also found to be leading to bonds.

Coronado et al have investigated the relationship between stock indexes and sovereign CDS market. Author has found a negative correlation between variables. Findings demonstrate that stock return changes lead sovereign CDS spread changes during Jan2007-Dec2009; on contrary sovereign CDSs leads stock markets during Jan2010-July2010.

Flannery et al (2010) has reported CDS premiums and credit ratings of 15 American financial institutions which are heavily involved in 2008 crisis. That paper highlights the stability of credit ratings of these institutions during crisis. Unlike credit ratings, CDS premiums of these institutions have increased during crisis. At the end of the study authors conclude that CDS spreads is more responsive to events during crisis. However credit ratings did not reflect changes as quickly as CDS spreads.

Corzo et al (2012) have analyzed the interaction between sovereign CDSs, sovereign bonds and equity markets by using data of thirteen European countries. Authors state that stock market incorporates new information more rapidly during 2008-2009. Nevertheless sovereign CDS market has a leading role during 2010. Narayan et al (2014) have examined CDS market and equity market from the perspective of price discovery process. Based on findings stock market /CDS market contributes to price discovery in most/a few sectors.

There are also several studies which use Turkish data. Baklacı and Süer (2013) have attempted to explore if CDS spreads, which proxy default risk, have an impact on stock returns in global context. According to findings, CDS spreads affect stock returns globally. Same relationship is also examined by Hancı (2014) who has used Turkish data for the period Jan2008 and Dec2012. Author who has found high volatility between variables, also highlights the resistance of shocks.

Başarır and Keten (2016) has examined short run and long run relationships between CDS premium, stock indexes and exchange rates of 12 countries which take place on JP Morgan EMBI index. Authors find a bidirectional causality relationship between CDS premium and stock indices. Within CDS premiums and exchange rates a unidirectional relationship is detected. No long term relationship is detected between variables. Acaravcı and Karaömer (2017) has examined same relationship and could not be able to detect a strong relationship between BIST-100 index and CDS spread.

A recent study prepared by Rodriguez et al (2019) asked if CDS spreads are better than sovereign credit ratings in measurement of credit risk. Based on findings CDS spread changes could predict sovereign crises that will come within next seven months, nonetheless ratings do not have such a predictive ability.

## II. DATA AND METHODOLOGY

Although there are many studies which examine the relationship between CDS market and stock market in the foreign literature, only limited number of studies exist which examine Turkish case. That case could be grounded on difficulty in reaching data of CDS. Moreover most of existing studies looks from micro perspective and focus on firm-level. On contrary that paper has a macro perspective. In the empirical part, by following Bystrom (2005) CDS premiums are chosen as a proxy for sovereign credit risk. CDS premiums are used rather than credit ratings since it reflects immediate reaction of markets.

In the empirical analysis, quarterly data of CDS premiums and BIST-100 index return is used for the period between 2003Q1 and 2018Q4. In order to find changes in CDS premiums, logarithm of CDS premiums is used. Data is taken from Bloomberg data terminal. In this study both traditional ADF test and Zivot Andrews test is applied. Then presence of long term relationship is questioned. Results are given as:

**Table 1.ADF Test Results**

	Level	First Difference
Log of CDS premium	$\eta_{\mu}$ -4.790955 [-2.909206]	-
	$\eta_{\tau}$ -4.321213 [-3.483970]	-
BIST- 100 Return	$\eta_{\mu}$ -2.848803 [-2.909206]	$\eta_{\mu}$ -6.296303 [-2.909206]
	$\eta_{\tau}$ -3.015751 [-3.486509]	$\eta_{\tau}$ -6.498695 [-3.483970]

As it is obvious on Table 1, log of CDS premium is stationary at level according to ADF. Nonetheless BIST-100 return is non-stationary based on ADF test. As a further step, Zivot Andrews test is applied and results are reported on table 2. Model C which is the least restrictive model of Zivot Andrews is implemented.

**Table.2.Results of Zivot Andrews Unit Root Test**

Variable	Break Date	Zivot Andrews t-statistics
Log of CDS premium	2007Q4	-4.975983 [-5.08]
BIST-100 Return	2008Q1	-4.603767 [-5.08]

As it is obvious in table.2, both variables have unit root according to Zivot Andrews test. Structural breaks are detected in the last quarter of 2007 for CDS premium and in the first quarter of 2008 for BIST-100 return. Those times come across the period of global financial crisis. In the next step firstly Johansen cointegration test will be implemented. Then Gregory Hansen cointegration test will be also applied. In the table below results of Johansen Cointegration Test are reported.

**Table.3. Johansen Cointegration Test Results**

Hypothesized number of cointegrating equations	Trace Stat.	Critical Value (5 %)	Maximum Eigenvalue Stat.	Critical Value (5 %)
r=0	17.30882	15.49471	17.14621	14.26460
r≤1	0.162604	3.841466	0.162604	3.841466

As it is obvious in Table 3 cointegration relationship, which refers to a long term relationship, exists between variables. It is logical for CDS premium, which is perceived as a proxy of sovereign credit risk, to have a long term relationship with stock market of country. But what if structural breaks are taken into account? In order to answer that question Gregory Hansen Test will be implemented.

Based on Gregory Hansen (1996) if there are structural breaks in the data, residual-based cointegration tests give misspecified results. To overcome this deficiency Gregory Hansen (1996) has developed GH cointegration test. In this test, there are three models: Cointegration with level shift (C), cointegration with level shift and trend (C/T) and cointegration with regime shift (C/S). Table 4 gives GH Test results.

**Table.4. Gregory Hansen Test Results**

Model	Test stat.	Break date	Critical Value (%5)
CC	-4.227112	2012q1	-4.61
C/T	-8.988978	2009q3	-4.99
C/S	-8.728057	2006q1	-4.95

Based on Table 4 although there is a long term relationship between variables based on model C/T and C/S, there is not any based on CC model. Structural breaks are reported in 2009q3/2006q1 based on C/T / C/S model. Although traditional Johansen cointegration test points out a long-term relationship, it is skeptical based on CC model of Gregory Hansen cointegration test. In the next step causality will be investigated by using Toda Yamamoto noncausality test. Toda Yamamoto test is advantageous since it could be used for both cointegrated series and series that are not cointegrated. In application of this test firstly VAR (k+dmax) model is predicted, then MWALD test is applied to first k coefficients. Results of Toda Yamamoto test is given as:

**Table.5. Toda Yamamoto Granger Non-causality test results**

Null Hypothesis	Chi-square	Probability	Conclusion
CDS Premium does not cause BIST-100 return	1.611353	0.4468	Fail to Reject Ho
BIST-100 return does not cause CDS Premium	87.76710	0.0000	Reject Ho

Based on Table 5 although there is not a causality from CDS premium to BIST-100 return, a causality relationship is detected from BIST-100 return to CDS premiums. When results of all empirical tests are considered together there is an interaction between CDS premiums and stock returns. Cointegration is reported based on Johansen test. C/S model and C/T model of Gregory Hansen cointegration test supports Johansen test, but CC model does not. A unidirectional causality exists from BIST-100 return to CDS premiums. This is possible since stock markets are perceived as barometer of economy and the way economy goes affects credit risk of the country. Credit risk of country is an important factor for not only investors of government bonds but also foreign and domestic investors whose transactions determines stock market movements. Based on findings there is not a causality from CDS premiums to BIST-100 return. Although sovereign credit risk is an important factor to consider for investors, there is not a direct causal relationship from CDS premiums to BIST-100 return. Interaction between variables could be as follows: Sovereign credit risk may direct foreign and domestic investor transactions which will affect stock market return in turn. In further studies that interaction could be investigated.

## CONCLUSION

CDSs are bilateral contracts in which protection buyer agrees to pay premium in exchange for a payment by protection seller in the case of a credit event. Think about an institution which purchase Bond of Turkish Government. That institution gives credit to Turkish government in exchange for interest for a specified time period. At the maturity that institution expects to take its money back with interest. But if that institution worries about credibility of Turkey, it can pay CDS premiums to a company which take on responsibility in the case of a credit event. As the credibility of Turkey deteriorates, CDS premium increases. Such an increase in CDS premium also cause cost of borrowing to increase. Domestic and foreign investors will change investment instruments they invest and markets they involved in as sovereign CDS premium increase. Within the perspective of this article the interrelationship between CDS premium and BIST 100 index is examined. Structural breaks are detected in fourth quarter of 2007 and in first quarter of 2008 for CDS premiums and BIST-100 index respectively according to results of Zivot Andrews Test. A long-term relationship is reported based on Johansen test. C/S and C/T models of Gregory Hansen cointegration test supports findings of Johansen test. A unidirectional causality relationship is found from BIST-100 index to CDS premiums. To conclude sovereign CDS premium changes could be critical for prospect of financial markets and because of that reason they should be followed by investors. Causality relationship from BIST-100 to CDS premium could be explained by the perception according to which stock market is the barometer of economy and the way economy goes affects sovereign credit risk. In further studies same relationship could be examined for both developed and developing countries comparatively. Researchers could also question the interaction between CDS premiums and transactions of foreign investors.

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