

## Examination of the Macroeconomic Variables affecting Credit Default Swaps

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**Abstract.** Many investors, money authority and reputable institutions closely follow credit default swaps while they regard them as reliable tool of measuring country credibility, since credit default swaps (CDS) come into prominence as an important indicator for country risks in recent years. Therefore, this phenomenon creates itself an area in academics, and examination of countries' default spreads and determining the macroeconomic variables affecting them become an important academic area. For these reasons, there are lots of researches have been made in this subject in Turkey and world recently. In this research, the macroeconomic variables, which affect country default swaps of developing countries, including Turkey, are determined and examined; moreover, the effects of chosen macroeconomic variables on country default swaps are analyzed. The subject of the research is not a static case, thus Generalized Method of Moments (GMM) estimator method from dynamic panel data methods and Residual Linear Regression Model are used. According to the results of the analyses, it is found out that the selected variables which are (i) increase in current account balance, (ii) real interest rates, (iii) GDP growth rates, (iv) inflation rates and (v) annual positive changes in S&P Global Reit Index have important effects on CDS spreads.

**Keywords.** Credit Default Swaps (CDS), Country risk, Loan costs, Developing countries.

**JEL.** G24, O40, O52.

### 1. Introduction

In recent years, many countries increased their efforts to integrate with international financial system besides their willingness to enter economic community and economic collaboration with other countries (Akyol & Baltaci, 2015; Kargı, 2014b). Rapid developments in communication and information technologies as supporting fields for the related countries efforts contribute more efficient and faster financial transactions between these countries. As a result of these developments, many fund owner countries and investors transfer their funds to other countries in the worlds, especially to developing countries. Since this situation enables the integration of global financial system, any inconsistency, which might be experienced in any country in this current system, inevitably impacts global investors and countries. Negativities which might be experienced in economic, financial and social terms as intervening the country consistency called as country risk. External capital supply could become difficult when a country has

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high level of country risk which might be considered as a negative situation by fund owners. In these circumstances, countries loan costs might increase. Therefore, various tools are developed to prevent investors and current financial system as predicting the risks to be experienced by countries. One of the most important tools is credit default swaps (CDS) which act as an insurance in terms of investors. CDS's have prominent roles on observing the risks of especially developing countries, including Turkey, and their probability of falling into default.

Many investors, money authority and reputable institutions closely follow credit default swaps while they regard them as reliable tool of measuring country credibility, since credit default swaps (CDS) come into prominence as an important indicator for country risks in recent years. Therefore, this phenomenon creates itself an area in academics, and examination of countries' default spreads and determining the macroeconomic variables affecting them become an important academic area. For these reasons, there are lots of researches have been made in this subject in Turkey and world recently.

The main purpose of this research is to examine the effect of various macroeconomic variables, belong to accordingly chosen 9 developing countries and Turkey, on the related countries CDS spreads. Therefore it is aimed that which degree the chosen macroeconomic variables are effective on the countries' CDS spreads. Additionally, this research's findings are intended to make contribution to the related authorities, future studies and literature. The study is mainly composed of 4 sections. In this first section, literature research is conducted to determine which macroeconomic variables affect CDS's, and then macroeconomic variables to be used in the study are chosen. In the second section, the countries chosen for the study and possible macroeconomic variables which are effective on these countries' 5 year-CDS spreads are presented. In the third section of this study, findings obtained through the analyses are depicted. In the conclusion section, interpretation according to analysis findings is presented.

### 2. Theory and Literature

Macroeconomic variables affecting CDS spreads in the coverage of this study are, or in other words, in the analysis of the related literature to determine the indicators of CDS spreads, the prominent macroeconomic variables are found respectively as follows; growth rate of gross domestic product (GDP), credit scores given by Credit rating agencies (CTA), interest rates, unemployment rate, inflation, country/ government debts (GDP %) and budget deficit (GDP %), current accounts balance (GDP %), capital market index and factors. Some of the variables and the studies examining the effects of these variables on CDS spreads are presented as follows:

#### 2.1. *Growth rate of gross domestic product (GDP)*

In the coverage of this study, an opposite directed relationship between GDP growth rate and CDS spreads is expected. Thus, positive changes in GDP, which shows a country's net production power, might change the risk perception toward countries, in positive matter.

Brandorf & Holmberg (2010) found a negative, yet weak relationship between GDP growth rate and CDS spreads in their studies where they analyzed the effects of variations of macroeconomic variables on CDS spreads for PIIGS countries (Portugal, Italy, Ireland, Greece, Spain)

A similar finding could also be observed in a study of Anton (2011), in which he examined CDS spreads indicators which belong to developing markets (Estonia, Hungary, Czech Republic, Greece, Lithuania, Latvia, Poland, Slovakia and Slovenia and Romania) during Europe debt crisis (2008-2010). Likewise, the

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researcher, using regression analysis method, reached the conclusion of that GDP growth rate had low level of impact on CDS spreads' variations of Middle and East European Countries. Other variables used in the study, besides reel GDP growth rate, were countries' 5 year-CDS spreads (2007, October – 2010, December), rate of debt/GDP and general budget deficit/GDP.

In his study where Kargı (2014a) examined the relationship between Turkey's chosen macroeconomic data (GDP, interest rates) and CDS spreads, he obtained the finding of there was not a strong relationship between GDP and CDS spread seven in the long run. The researcher mainly focused on first quarter of 2005 and third quarter of 2013, and used ADF and PP unit root test, Engle-Granger co-integration test, Johansen-Juselius co-integration test and Granger Causality test for the analyses in his study.

### 2.2. Credit Ratings

The most reliable guidance for investors in the international markets is credit ratings which are given by credit rating agencies (CRA). Investors and companies, who aim to make investment to a country, might consider as a basic condition of trust if the country's credit rating is appropriate for investment.

In their studies where Abid & Naifar (2006) found that credit ratings were the most important determinant on CDS rates as they focused on Belgium, Germany, France, Italy, Netherlands, Poland, Sweden, Switzerland, Spain, Portugal and England. They utilized CDS fees as dependent variables in the research in which they Linear regression analysis. They used credit ratings assigned by CRAs, volatility of equity shares, tendency of yield curve, interest rates and time to maturity as explanatory variables.

In their studies, where Ismailescu & Kazemi (2010) researched the effects of credit rating changes on the chosen countries' CDS spreads and spreading effects on other developing countries' CDS primes, reached the finding of that positive events in CDS markets had a major effect on CDS markets during two day-period when such events happened. They, therefore, determined that the probability of these positive events to spread in other developing countries were higher. Alternatively, they reach the finding that negative event expectation related to CDS markets and previous prim changes of CDS could also be used for a prediction about a negative credit event. In the particular study, positive event term was used to be meant for increasing credit scores or upside revisions of countries made by S&P credit rating agencies. On the other hand negative events were considered as decrease of credit rating or downside revisions. The countries chosen for the study were 22 developing countries including Turkey, China, Argentina, Brazil, Korea and Israel. The primary data set were created from CDS spreads which were obtained through a London based distributor's credit pricing data and Daily observation of Markit Group Limited. Additionally, 161 credit rating changes, which were reported by S&P for credit ratings belonging to 22 countries for the period of January 1, 2001 and April 22, 2009 were utilized in the research. In the study where panel data analysis was used, CDS spreads and percentage change rates of spreads were used as explanatory variables.

Anton (2011) determined the investors' willingness to risk, economic foundations (debt/GDP ratio, reel GDP, budget deficit) and spreading effects in addition to low level of credit rating as a macroeconomic variable which was effective on CDS spreads' changes.

### 2.3. Interest Rates

Country interest rates are considered as an important macroeconomic indicator. Especially many studies in the related literature regard interest rate as the basic macroeconomic variable. Interest rate, which is taken as debt cost, enables us to

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examine a country's economic and financial consistency level. In this context, interest indicators are utilized in many studies, in which CDS spreads' determinants are analyzed. In their studies, Abid & Naifar (2006) reached a negative directed relationship between risk-free interest rates and CDS spreads. In his study, Kargı (2014a; 2014b) concluded that interest rates (market rate, policy rate) were the most important variable affecting CDS spreads. The most effective rate among interest rates affecting CDS spreads were found as market rate.

In their studies, where Keten *et al.* (2013) examined global factors which were effective in Turkey's CDS prim, found a long term relationship between the country's 5 year-CDS prim and Brent petroleum price, Dow Jones index, USA short and long term interest rates. According to Granger causality test result among the variables, a causality finding was reached as one directed to Turkey's 5 year-CDS prim from USA long term interest rates.

### 2.4. Unemployment Rate

Unemployment is depended on working power and willingness so that it is meant to working power which is ready to work but not able to find a job. In the countries which have high level of unemployment rate, serious macroeconomic issues, firstly employment problems might be experienced. Therefore, a strong relationship between unemployment rate and CDS spreads is expected to be found. In the analysis of the related literature, in their studies, Brandorf & Holmberg (2010) found unemployment rate as an important macroeconomic variable affecting CDS spreads for the chosen countries.

### 2.5. Inflation Rates

High level streaming inflation problem could not have been handled in developing countries for years. In the literature research for inflation effects on CDS spreads, studies of Brandorf & Holmberg (2010) stand out. In their studies, they found the finding of that inflation rates had less effect on CDS spreads comparing to the macroeconomic variables.

### 2.6. Current Accounts Balance (GDP %)

In this study, current accounts balance is expected to have effect on CDS spreads. The situation of that, current accounts balance has deficits or could not be settled, might create serious issues in terms of economic and financial risks. Especially in the past, unsustainable current accounts deficit problem had important role on economic crisis. However, in the literature research regarding in this study, little amount of study found considering this important variable affecting on CDS spreads.

In his study, where Ho (2014) examined 8 developing countries' CDS spreads' long term determinants for the period of first quarter of 2008 and second quarter of 2013, he used current account, external debt and international reserves as macroeconomic variables affecting CDS spreads. As a conclusion of the study, in which panel co-integration analysis was used, it was reached that current account coefficients, external debt and international reserves were effective on CDS spreads in all countries in the long term. On the other hand, in the short term, only external debt and international reserves were found to have an important effect on CDS spreads while current accounts to have not an important effect on CDS spreads. In his study, Haksal (2013) mentioned similar Dynamics behind financial crisis experienced in developing market: excess valued currency which leads to unsustainable current account deficit and high level of risk which is caused by unsustainable current account deficit.

### 2.7. Stock Market Index and Factors

With parallel to increased globalization over the whole world, many countries', companies' or institutions' stocks are exchanged in international markets.

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Therefore, stock market transactions and index data are considered as one of the main risk indicators. In this context, data belong to different index, and especially index obtained through Dow Jones, is utilized in many studies regarding to CDS spreads. In their studies, where Ersan & Günay (2009) examined not only the relationship between Turkey CDS spreads and variables affecting CDS spreads in Turkey but also the effect of closing file for Turkey's dominant party on the country's risk prim, they found that the closing file had no meaningful effect on the country's CDS spreads. In the study, they concluded that foreign based Eurobond incomings and Dow Jones Index incomings variables were variables which were effective on the country's spreads instead of local variables. In the study, econometric analysis was made with VAR model. The variables used in the study were as follows; Turkey's 5 year- CDS data, Dow Jones Index, the interest of 2030 termed Turkey indicator Eurobond, Turkey local indicator interest, Turkey stock market 100 Index Volatility and dummy variables which were used for the closing party filed for the dominant party of Turkey that was opened in March, 14 2008 and decided in July, 30 2008.

In their studies where Eyssell *et al.* (2013) examined CDS variables (2001-2010) and its determinants for China, they reached the finding of that unique factors depending on the country (reel interest rate, China Stock Market Index etc.) and global factors (USA S&P Stock exchange option volatility, default spreads, global stock market factors excluding North America) had significant explaining power on CDS changes and levels.

VAR model regression analysis was used to analyze the findings in the research. Variables used for the analysis were as follows; CDS levels, monthly changes of China CDS spreads, month-end level of Shangai Stock Market index, monthly stock market incomings calculated through Shangai Stock Market index, daily revenue volatility of China stock market, which was considered through daily revenue on the previous month, China reel interest rate, which was calculated as applying inflation rate which was influenced by Fisher, and China monthly 1 year-termed nominal deposit interest rate, ratio of China external debts to GDP, ratio of China reserves to GDP, constructive volatility for S&P 500 index option, 10 year-USA treasury revenue and 3 month- USA treasury bill of exchange rates, the difference between USA company bill of exchange revenues which had "Aaa" and "Baa" rated, monthly profits for stock markets from MSCI excluding North America, and the amount of suppliers which issued CDS spreads' quotes and of dummy variables equating to 0 or to 1 if they were effective as of September, 2008.

### 2.8. Government/Country Debts

It carries vital importance in terms of country risk that the ratio of government/country debts to GDP should be manageable/ sustainable in the long term. Especially in the last 2008 global crisis, serious financial and economic problems were experienced in Portugal, Italy, Ireland, Greece and Spain because such countries' country risks were not sustainable. In their studies, where Aizenman *et al.* (2011) worked on prediction study of country risk pricing about many countries depending on monetary concepts and other economic principles for the countries both inside of and outside of Europe for both period of before and after financial crisis, they concluded that the focus was highlighted on PIIGS countries. In the related study, the finding of that default risk was way higher than it was on the matched countries. Moreover, in the same study, they realized that country debts, which were calculated through CDS spreads, were able to be explained partially with market price, monetary concepts and other economic determinants. In the study, government debt default risks were measured with CDS spreads. CDS spreads (3-, 5-, 10- years), belong to 121 countries, were measured

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with panel regression analysis as using government debt/ tax revenue, monetary deficit/ tax revenue and nominal depreciation variables.

In his study, Haksal (2013) comparatively studied the possibility of Turkey and EU economies (Portugal, Spain and Greece) to fall into default through CDS spreads. In his study, Haksal presented a CDS pricing mechanism, which he created using the formulas, which were commonly used for fixed income quantitative studies. In the study, CDS data, which was belong to the period of the last quarter of 2009 and the third quarter of 2010 for the chosen countries. As a result, the possibility of Turkey to fall into default risk was observed as less comparing to many other EU countries' risk. Moreover, nominal interest rates of Turkey were observed as higher comparing to many other EU countries. It was concluded that this situation caused short term capital inflow to the country. In the study, where the relationship between variable were tried to be established through VAR model, the variables were as follows; Turkey's 5 year- CDS prim with Brent petroleum price, Dow Jones Stock Market Index, USA short term and long term interest rates.

### 3. Methodology and Data

#### 3.1. Methodology

Since selecting macroeconomic variables affecting CDS spreads of Turkey and chosen 10 developing countries has a dynamic importance in this study, they were established through Residual Linear Regression Model and Generalized Moments Method (GMM) from dynamic panel data methods. Panel data analysis is a method of assuming economic relations as a result of using section series with time frame (Pazarlıoğlu & Gürler, 2007). Panel data analysis, which has unit and time frames, causes to increase independency level and to decrease multicollinearity problem (Ari & Özcan, 2011). The increase in the amount of observation adds more variability in the measured relationship while eliminating the problem of multicollinearity (Zeren & Ergun, 2010). Additionally, panel data analysis not only measures the effects of solely observable forces on the dependent variables but also analyses the effects of unobservable or unmeasurable forces on the dependent variables (Erataş *et al.*, 2013). Positioning the variables, which are excluded in panel data analysis, in the model enables to establish more comprehensive models comparing to section data and time series so that more information could be gathered (Ari & Özcan, 2011). GMM method was firstly brought into attention in the study of Hansen (1982), where he claimed that time series could be applied to parameter estimations under weak assumptions in a consistent manner (Tellalbaş, 2012). With utilization of GMM method in the model, autocorrelation and heteroskedastic problems, which are prone to occur, could be eliminated while analyzing the relationships among the variables (Gozgor, & Piskin, 2011). Therefore, GMM method provides consistent forecasters when independent variables are in correlation with error term (Cangir & Turan, 2014). Arellano & Bond (1991) suggested GMM estimator method while emphasizing that GMM method provided better results while having normal distribution, variable variance and measurement errors, comparing to other methods (Coşkun & Kök, 2011). GMM-System estimator method is another model forecaster depending on GMM method. Blundell & Bond (1998) concluded that GMM-System estimator was a better forecaster as comparing it to their GMM forecasters (Bahar & Bozkurt, 2010). In addition to Blundell & Bond (1998), Blundell *et al.* (2000) claimed that GMM-System had more strong assumption power as they showed that difference GMM had a weak assumption power in finite sample and coefficient assumptions

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were variant (Dökmen, 2012). In this context, GMM-System estimator method was found appropriate to use in this study.

Fixed Effects Model (AR(1)) under framework of Residual Linear Regression Model is another analysis method used in this study. Since they are pooled with presence of unit effects and an important assumption might be eliminated, Random Effects forecasters are not found feasible to use in dynamic panel data models (Tatoğlu, 2012). Therefore, using Fixed Effects Model (AR(1)) is more practical. In the related model, sample effects are evaluated, and conditional assumptions are applied so that interpretations for a certain part of the sample, which is analyzed, are conducted (Uğurlu, 2015). The coverage of this study is developing countries. The sample of the study includes Turkey, Russia, Brazil, China, South Africa, Mexico, Thailand, South Korea, Poland and Malaysia.

### 3.2. Data

In the coverage of the study, countries' 5- year CDS data is obtained from the research of Longstaff *et al.* (2011), data of 2003-2010 period and 2013 year data from S&P Capital IQ institution's 4 different study named "Global Sovereign Debt Credit Risk Report", and 2014-year data from 4 different study named "Global Sovereign Debt a Market Driven Perspective". Thus, macroeconomic variable for the countries are obtained from World Bank.

**Table 1.** Variables, Expected Signs and Related Researches

Variables	Definition	Expected Signs	Researches
CDS	Countries' 5-year CDS data (2003-2014)		Baklaci & Arslan (2009), Abid & Naifar (2006), Longstaff <i>et al.</i> (2007), Ersan & Günay (2009), Ismailescu & Kazemi (2010), Brandorf & Holmberg (2010), Anton (2011), Aizenman <i>et al.</i> (2011), Haksal (2013), Eysell <i>et al.</i> (2013), Gündüz & Kaya (2013), Ketten <i>et al.</i> (2013)
CAB	Current Accounts Balance (GDP %)	-	Ho (2014)
ICP	Inflation, Customer Prices (Annual %)	-	Brandorf & Holmberg (2010)
GDPG	GDP Growth (annual %)		Brandorf & Holmberg (2010), Anton (2011), Kargı (2014a)
SPGRI	S&P Global Reit Index (annual change %)	+	Eysell <i>et al.</i> (2013)
LIR	Lending Interest Rate (%)		
RIR	Reel Interest Rate (%)	-	Abid & Naifar (2006), Ersan & Günay (2009), Eysell <i>et al.</i> (2013), Ketten <i>et al.</i> (2013), Kargı (2014a)
DFINI	Direct Foreign Investments, Net Inflow (GDP %)		
TCGD	Total Central Government Debt (GDP%)		

Explanatory variables which are used in the study could be explained as follows: *5-Year CDS Spreads*: CDSs are mutually carried, double sided agreement for a conditional payment protection as a protection buyer quarterly pays to a protection seller through a reference obligation or a specified another loan's default situation (Maas, 2001). 5- year CDS spreads are important indicators for loan and country risks. In this research, CDSL-1 spreads are included into the model.

*Current Accounts Balance (GDP %)*: Current Accounts Balance Show which degree a country's local savings (private and public) is able to compensate the

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country's investments (private and public) (Bildigin Ekonomi, 2015). Data related to current accounts balance, which is included into this study, in the coverage of the research covers total of product and service net total export, and net primary and secondary incomes; they are utilized with USA Dollar currency (World Bank, 2015). In the coverage of the study, an increase in current account balance is expected to increase CDS spreads. Moreover, a positive relationship is expected to be found in this study between increases in current accounts balance and CDS spreads.

*S&P Global Reit Index (annual change %)*: Leading index provider as included into S&P index family with 1,25 trillion USA Dollar volume also including S&P 500, which is globally the most observed stock exchange index (TURSP, 2015).

*Inflation, Customer Prices (Annual %)*: Annual changes of customer prices, which belong to inflation data, experienced in the countries that are chosen for this study, are added. A negative relationship is expected in the coverage of this study between increases in the inflation rates and CDS spreads.

*GDP Growth (Annual %)*: Annual growth rates of gross domestic product of the countries chosen for this study are added into the model. In the coverage of this study, a negative relationship is expected to be found between GDP growth rates and CDS spreads.

*Lending Interest Rates (%)*: Annual lending interest rates of the countries chosen for this study are added into the model. In the coverage of this study, a negative relationship is expected to be found between lending interest rates and CDS spreads.

*Real Interest Rates (%)*: In addition to lending interest rates, annual real interest rates of the countries chosen for this study are added into the model. In the coverage of this study, a negative effect of real interest rates is expected to be found on CDS spreads.

*Direct Foreign Investments, Net Inflow (GDP %)*: The rates of annual net inflows data, which belong to direct inflows coming from foreign countries to the chosen countries for this study, to their GDP are used. In the coverage of this study, a negative relationship is expected to be found between direct foreign investments (DFI) and CDS spreads.

*Total Centered Government Debt (GDP %)*: As being the last variable to analyse the countries chosen for this study, annual total centered government debts' ratio to GDP is used. In the coverage of this study, a positive relationship is expected to be found between total centered government debt (TCGD) and CDS spreads.

## 4. Analysis and Findings

Descriptive statistics related to the explanatory variables used in this study is presented in Table 1. Through the table, basic data about frequency distributions of the chosen countries' CDS spreads and macroeconomic variables could be reached.

**Table 2. Descriptive Statistics**

Developing Countries					
Variables	Sample	Average	S. Deviation	Min.	Max.
CDS	90	141.8378	140.963	13.88	880.784
CAB	90	1.034645	5.9822728	-9.691074	16.84688
ICP	110	5.025164	3.762569	-.8457161	25.29637
GDPG	110	4.601467	3.425428	-7.820885	14.16239
SPGRI	109	21.90515	41.53578	-73.43062	147.18
LIR	104	12.74136	13.05856	4.248333	67.08334
RIR	103	6.355012	11.32649	-7.349732	46.91683
DFINI	110	2.679737	1.388006	-.8720853	6.267277
TCGD	30	32.12121	16.53094	6.495297	54.01662



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Correlation Matrix significant data in which relationships among independent variables used in this study is presented in Table 3.

**Table 3.** *Correlation Matrix significant table*

	CDS	CAB	ICP	GDPG	SPGRI	LIR	RIR	DFINI	TCGD
CDS	1.0000								
CAB	-0.4106	1.0000							
ICP	0.4999	-0.3051	1.0000						
GDPG	-0.7511	0.2909	0.0725	1.0000					
SPGRI	-0.0195	0.1507	-0.1777	-0.4024	1.0000				
LIR	0.7470	-0.5202	0.7699	-0.3144	-0.0600	1.0000			
RIR	0.4907	-0.2795	-0.2783	-0.8003	0.2802	0.2286	1.0000		
DFINI	-0.4160	-0.0769	0.1377	0.6165	-0.3084	-0.0696	-0.3909	1.0000	
TCGD	-0.0264	0.1416	-0.5954	-0.2764	0.0042	-0.2446	0.3743	-0.4393	1.0000

In the analysis of the table, relationships of the chosen macroeconomic variable with each other and with CDS spreads could be statistically observed. For instance, there is statistically negative relationship between CDS variable and CAB, GDPG, SPGRI, DFINI and TMMHB while there is statistically positive relationship with ICP, LIR and RIR.

### 4.1. Dynamic Panel Data Analysis (GMM) Findings

GMM estimator model is used to measure the effects of the chosen variables on CDS spreads. GMM estimator results are provided in the table, below.

**Table 4.** *GMM estimator Findings*

<i>Dependent Variable: CDS</i>	<i>Dynamic Model -1</i>	<i>Dynamic Model- 2</i>	<i>Dynamic Model- 3</i>
<i>CDS L-1</i>	-1.261703 (.3696578) 0.001***	-1.380772 (.3603201) 0.000***	-.50166 (.4336164) 0.247
<i>CAB</i>	7.295393 (2.93761) 0.013**	9.053916 (2.657498) 0.001***	6.546222 (2.167152) 0.003***
<i>ICP</i>	18.1698 (3.911061) 0.000***	19.40048 (3.727466) 0.000***	9.2142 (4.678266) 0.049**
<i>GDPG</i>	-32.64934 (5.342492) 0.000***	-34.61949 (4.24265) 0.000***	-27.14252 (4.151081) 0.000***
<i>RIR</i>	-.9203604 (2.155617) 0.669	-	-
<i>DFINI</i>	-13.13502 (9.65875) 0.174	-	-
<i>TCGD</i>	.5570358 (4.261669) 0.896	4.386268 (3.315009) 0.186	.048998 (3.525732) 0.989
<i>SPGRI</i>			-.6194089 (.2298079) 0.007***
<i>LIR</i>			-.5572697 (4.203305) 0.895
<i>Sargan Test (P-Value)</i>	0.5281	0.5306	0.4507
<i>Arellano-Bond Order</i>	0.9544	0.8660	0.9548
<i>Wald Chi2</i>	180.85	174.38	333.46
<i>Sample</i>	13	13	13
<i>Group</i>	4	4	4

**Notes:** \*: Significant in level of 10%; \*\*: Significant in level of 5%;\*\*\*: Significant in level of 1%; (The data provided within square brackets represents the standard deviation values.)

According to the analysis results, the first independent variable CDS L-1 statistically affects CDS variable in “Model-1” and “Model-2” negatively in the level of 1%. On the other hand, in “Model-3”, there could not be found statistically

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a significant relationship between CDS L-1 and CDS variable. As the second variable, CAB variable is observed that it statistically affects CDS variable in the level of 5% in “Model-1” and in the level of 1% in both “Model-2” and “Model-3”, in positive direction. As the third variable, ICP variable is observed that it statistically affects CDS variable in the level of 1% in “Model-1” and “Model-2”, and in the level of 5% in “Model-3”, in positive direction. The fourth variable, GDPG variable is observed that it statistically affects CDS variable in the level of 1% in “Model-1” and “Model-2” and “Model-3”, in negative direction. Being the fifth variable, RIR variable is found to have no statistically significant effect on CDS variable. Likewise, there could not be found statistically significant effects of direct foreign investments (net inflows) abbreviated as DFINI and total central government debts abbreviated as TCGD on CDS primis variables. Another independent variable, SPGRI variable has statistically negative effects on CDS in the level of 1%, as seen in “Model-3”. As the last variable, LIR variable is observed that it has no statistically significant effect in CDS variable. According to the analysis, Sargan test results in “Model-1”, “Model-2” and “Model-3” are found as 0.5281, 0.5306 and 0.4507, respectively. Sargan test reflects whether instrumental variables have internality problem, or not (Ari & Özcan, 2011). In other words, Sargan test provides the validity of instrumental variables which are used within the model (Dökmen, 2012). Accordingly, Arellano-Bond Order test results are found as 0.9544, 0.8660 and 0.9548, respectively. Arellano-Bond Order test shows whether the model has autocorrelation problem (Dökmen, 2012). In the research, Wald Chi2 test result is found as 180,85 for “Model-1”.

Results of the same test are as follows; 174.38 and 333.46, respectively. Wald Chi2 test shows whether all the independent variables used in the model is significant to explain dependent variable (Özcan & Ari, 2010). Lastly, the observation amount in the models is 13. Group amount for the models is 6.

### 4.2. Findings of Residual Linear Regression Model Analysis

As previously described, Residual Regression Model Analysis is another analysis conducted to determine which macroeconomic variables affect CDS spreads for the chosen countries, within this research. In this context, findings related to fixed effect model (AR(1)) is presented in the table, below.

**Table 5.** *Fixed Effects Model (AR(1))*

Dependent Variable: CDS	Model-1	Model-2
CAB	-4.96273, (2.814128) 0.088*	-7.88437 (3.152764) 0.018**
ICP	9.539865 (4.278355) 0.033**	4.611634 (4.947986) 0.359
GDPG	-17.35568 (2.149586) 0.000***	-20.25836 (2.624718) 0.000***
SPGRI	-3343271 (.153357) 0.037**	-2758411 (.1511759) 0.078*
LIR	-2.233243 (3.564853) 0.536	5.359285 (5.395114) 0.328
CONS	210.6202 (31.30556) 0.000***	195.3023 (30.55835) 0.000***
RIR	-	-6.005945 (3.281732) 0.077*

Model-1

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R-sq:	Within: 0.7301 Between: 0.4631	Observation: 46 Group:10	F Value: 16.77 Prob. Value: 0.0000
Model-2			
R-sq:	Within: 0.7560 Between: 0.6048	Observation: 46 Group:10	F Value: 15.49 Prob. Value: 0.0000

**Notes:** \*: Significant in level of 10%; \*\*: Significant in level of 5%; \*\*\*: Significant in level of 1%; (The data provided within square brackets represents the standard deviation values.)

The main difference between the models operated under the framework of Fixed effects Model (AR(1)) is that lending interest rate is used as interest indicator for “Model-1” while real interests is used in “Model-2”. According to the analysis, conducted for the study, CAB variable is observed that it statistically affects CDS variable in the level of 10% in “Model-1” and in the level of 5% in “Model-2”, in negative direction. As another independent variable, ICP is observed that it statistically affects CDS variable in the level of 5% in “Model-1” in positive direction while it has no significant effect on CDS variable in “Model-2”. GSYİHB is observed that it statistically affects CDS dependent variable in the level of 1% in both “Model-1” and in “Model-2”, in negative direction. As another independent variable SPGRI is observed that it statistically affects CDS dependent variable in the level of 10% in both “Model-1” and in “Model-2”, in negative direction. As observed, LIR variable does not have a significant effect on CDS variable in “Model-1” and in “Model-2”. As being a fixed variable, CONS variable is observed that it statistically affects CDS dependent variable in the level of 1% in both “Model-1” and in “Model-2”, in positive direction. The last independent variable, RIR is observed that it statistically affects CDS dependent variable in the level of 10% in “Model-2”, in negative direction. Within values of t R-sq values in “Model-1” and in “Model-2” are 0.7301 and 0.7560, respectively. Between values are 0.4631 and 0.6048. Observation amount of Model-1” and “Model-2” is 46 while group amount is 10. Models’ F values are 16.77 and 15.49, respectively. Likewise, Prob values of the models are 0.000.

**Table 6.** Findings belong to Autocorrelation Test

	Model-1	Model-2
Durbin-Watson	1.4053761	1.4016472
Baltagi-Wu LBI	2.069680	2.0670861
Prob	0.5298	0.2716

Autocorrelation test Baltagi-Wu and Durbin-Watson test statistics are interpreted in Residual Linear Regression Model (AR(1)) process. Although any critical value could not be found in the analysis of the related literature, values, which were found equal to or greater than 2, were considered as not auto-correlated in the application.

**Table 7.** Findings belong to Hausman Test

	Model-1	Model-2
Chi2 (5)	11.66	13.69
Prob>Chi2	0.397	0.0333

Since P statistics was less than 0,05 ( $p < 0.05$ ) in Hausman Test, it was interpreted as preferring fixed effects model.

## 5. Discussion

In this study, GMM and Residual linear regression model analyses within panel data analysis are applied to determine which macroeconomic variables affect CDS spreads within the period of 2003-2014 for the chosen developing countries including Turkey. In the analysis of GMM findings, as being the first applied analysis method for this study, it could be observed that CDS spreads, which belonged to the previous year (CDS L-1) affected CDS variables in “Model-1” and “Model-2” statistically in the level of 1% and in negative direction. However, in “Model-3” there could not be observed any significant relationship between CDS L-1 and CDS variable. Through the interpretation of the findings of “Model-1” and “Model-2”, it could be reached that the increase in CDS spreads in a period could reduce direct CDS spreads. As being the second variable, CAB variable is observed that it statistically affects CDS variable in the level of 5% in “Model-1” and in the level of 1% in both “Model-2” and “Model-3”, in positive direction. Therefore, the increase in current accounts balance might cause a direct increase in CDS spreads. The increases in current account balance can be called as current accounts surplus. In a situation where current account surplus is experienced, some sort of economic problems might come into existence. Furthermore, a country might become more dependent to dynamics and turbulences and vulnerable to interactions occurred in other countries so that it might turn out to adopt more sensitive structure when its current account surplus ratio to GDP increases (Bilgiekonomi, 2015). Therefore, an increase in current accounts balance is naturally expected to increase CDS spreads. These findings are not matched with the research of Ho (2014) who made a similar study where he determined that current accounts coefficients had significant negative effects on CDS spreads in long term for all of the chosen countries while they did not have a strong effect for the short term. Ho (2014) interpreted this finding as the positive movements in the chosen countries’ current accounts balances would require CDS spreads to fall down since the governments would have more money to pay their loan debts. As the third variable, ICP variable is observed that it statistically affects CDS variable in the level of 1% in “Model-1” and “Model-2”, and in the level of 5% in “Model-3”, in positive direction. According to this finding, the increase in inflation (cpi) in the chosen countries is expected to increase CDS spreads. The related finding of this study is not matched with the similar study which belongs to Brandorf & Holmberg (2010). On the other hand, the researchers reached the conclusion that the increase in inflation rates would have decreased the CDS spreads.

According to GMM analysis conducted for this study, among the chosen macroeconomic variables belong to chosen countries; GDP was determined as the variable which had statistically most strong and significant effect on CDS spreads. On the other hand, the fourth variable, GDPG variable is observed that it statistically affects CDS variable in the level of 1% in “Model-1” and “Model-2” and “Model-3”, in negative direction. Through this particular finding, the increase in GDP growth rates is expected to decrease CDS spreads. GDP growth rates are very important for countries’ economies. Moreover, changes in GDP rates one of the variables which shows growth or recession situation the most clearly ways (Destek Menkul, 2015). On the other hand, the increase in GDP rates in developing countries including Turkey shows that these countries carry importance in terms of their current development status. In this context, positive changes in GDP growth rates are considered as promising positive developments for country economies, they are expected to decrease CDS spreads. In the related literature research about this finding, studies of Brandorf & Holmberg (2010), Anton (2011) and Kargı (2014a) come to prominence. In their studies, Brandorf & Holmberg (2010)

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determined that the increase in GDP rates had different effects on CDS spreads while in his study, Kargı (2014a) reached the finding of that there was not any strong relationship between GDP and CDS spreads even in long term. On the other hand, Anton (2014), in his study where he focused on East European countries, reached the finding that real GDP had low level of effect on CDS spreads.

In the interpretation of GMM analysis, the last variable which is found to have strong effect on CDS spreads is SPGRI variable. SPGRI is observed that it statistically affects CDS dependent variable in the level of 1% in “Model-3”, in negative direction. Therefore the positive changes, which are occurred annually in S&P Global Reit Index, are expected to decrease CDS spreads. The related finding of this study does not match with the study of Eyssell et al. (2013), which is a similar study conducted in this subject. In the study, where constructive volatility was considered as a variable for S&P index option, the related variable was observed as to have a significant positive effect on CDS spreads.

Fixed Effects Model (AR(1)) was applied as the second analysis method for this research. In the evaluation of the model findings, CAB variable is observed that it statistically and significantly affects affect CDS variable in the level of 10% in “Model-1” and in the level of 5% in both “Model-2”, in negative direction. This finding is opposite of the previous GMM analysis and parallel with the study of Ho (2014), who made a similar research on this subject. The third variable, GSYİHB is observed that it statistically affects CDS dependent variable in the level of 1% in both “Model-1” and in “Model-2”, in negative direction. This particular finding matches with the findings of GMM analysis, which is the previous analysis of this study. As another independent variable SPGRI is observed that it statistically affects CDS dependent variable in the level of 5% in “Model-1” and in the level of 10% in “Model-2”, in negative direction. This particular finding matches with the findings of GMM analysis, which is the previous analysis of this study. The last independent variable, RIR is observed that it statistically affects CDS dependent variable in the level of 10% in “Model-2”, in negative direction. Through this finding, the increase in real interest rates of the chosen countries are expected to decrease CDS spreads. In this context, the increase in interest rates would positively reflect on the chosen countries’ risk perceptions. The fundamental reason of this situation could be claimed as high level of interest rates would increase foreign currency inflow to the country so that the country’s local current would decrease and risk would indirectly be reduced (Eğilmez, 2015).

The findings of this study matches with the findings of Abid & Naifar (2006)’s study findings. Moreover, the researchers, who conducted a similar study, determined a negative relationship between risk-free interest rates and CDS spreads. Other researches, which are similar to this particular study, are Ersan & Günay (2009), Eyssell *et al.* (2013), Keten *et al.* (2013), Kargı (2014a) studies. In their studies, where Ersan & Günay (2009) found that 2030 yielded Turkey indicator Eurobond interest rates had effects on CDS spreads, determined that local indicator interest rates had no significant effects. In their studies, Keten *et al.* (2013) examined a relationship between CDS and just30-year interest rates for short term purposes, found one side directed causality from USA long term interest rates to only Turkey’s 5-year CDS prims according to Granger causality test results, which they conducted for the purposes of their studies. Additionally, in the study, they determined that the related interest rates were associated with CDS in the long term. In their studies, Eyssell *et al.* (2013) reached the finding of that real interest rates had significant effects in CDS spreads. The last study, in which similar findings to the related study findings were reached, was Kargı (2014a)’s study. The researcher, as previously put into words, determined that interest rates was the most effective variable on CDS spreads. The one, which was the most

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effective on CDS spreads among the interest rates, was found as market interest rate.

### 6. Conclusion

Many investors, money authority and reputable institutions closely follow credit default swaps while they regard them as reliable tool of measuring country credibility. Therefore, this phenomenon creates itself an area in academics, and examination of countries' default spreads and determining the macroeconomic variables affecting them become an important academic area. Even though the reliability of these financial tools was damaged in the last global financial crisis, they still have roles as the pharos of Alexandria<sup>1</sup> in the way many economists and fund raisers measure country and loan risks.

Apparently, many people are in consensus that the effect and status of this pharos will exist and even increase in the following years. Therefore, the subject of which macroeconomic variables have effects on CDS spreads have importance on both debt costs and economic and financial stability for countries. Especially when it comes to financial vulnerability of developing countries, the subject of determining which macroeconomic variables have effects on CDS spreads could be claimed as a very important problem.

In this research, the focus area is to define which macroeconomic variables have effects on CDS spreads for the chosen countries. In this context, two different models are established to examine the effects of macroeconomic variables on CDS spreads. In conclusion, it is determined that the increase in current accounts balances of the chosen countries, real interest rates, GDP growth rates, inflation rates and annual positive changes in S&P Global Reit Index have effects on CDS spreads in significant level. Among these variables, GDP is observed to have the most effect on CDS spreads.

<sup>1</sup> The pharos, which shows direction to ships in primary eras, has been considered as one of the seven wonders of the world.

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