DOI: 10.17065/huniibf.320139

EFFECT OF SOME MACROECONOMIC VARIABLES ON RISK PERCEPTION: THE TURKISH CASE

Hacettepe University Journal of Economics and Administrative Sciences
Vol. 36, Issue 4, 2018, pp. 117-147

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Abstract: Recently Turkish economy is classified as 'fragile five' with Brazil, India, Indonesia and South Africa because of some structural deficiencies and imbalances in its macroeconomic variables. Turkey's fragility can be observed or measured by some economic indicators and one of them is Credit Default Swap (CDS) spread. It represents default probability of Turkish economy and it's affected by many macroeconomic indicators. This study examines the determinants of CDS spread by using time series analysis for the period of 2011-2017 monthly data. On that note the relationships between the variables are tested with Johansen cointegration test to determine relationship in the long run. After determining long term relationship between the variables, the VECM (Vector Error Correction) model in cointegration framework is estimated in order to determine short term relationship. Lastly Granger test under VECM is applied in order to establish the uni or bi-directional causality between variables. In this frame we conclude that there is granger causality which directed from Current Account to Foreign Exchange and Foreign Exchange to CDS spread like a knock on effect. Also according to cointegration coefficient there is positive relationship between Foreign Exchange and CDS spread but we couldn't support statistically significant relationship between Current Account and CDS spread.

Keywords: *Credit default swap, current account deficit, exchange rate, VAR analysis, cointegration, VECM causality.*

Makale Başvuru Tarihi/Manuscript Received: 09/06/2017
Makale Kabul Tarihi/Manuscript Accepted: 12/10/2018

DOI: 10.17065/huniibf.320139

BAZI MAKROEKONOMİK DEĞİŞKENLERİN RİSK ALGISI ÜZERİNDEKİ ETKİSİ: TÜRKİYE ÖRNEĞİ

Hacettepe Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, Cilt 36, Sayı 4, 2018, s. 117-147

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Öz: Türkiye ekonomisi bazı yapısal yetersizlikler ve makroekonomik değişkenlerindeki bazı dengesizlikler nedeniyle yükselen piyasa ekonomileri içinde Brezilya, Endonezya, G. Afrika ve Hindistan ile birlikte kırılgan beşli olarak da adlandırılan ekonomilerden biri olarak gösterilmektedir. Söz konusu kırılganlığı birtakım ekonomik değişkenler üzerinden gözlemleyebilmek ya da ölçebilmek mümkündür. Bu değişkenlerden birisi olan Kredi Temerrüt Takası (CDS) Türkiye'nin borçlarını ödeyememe ihtimalini yansıtmakta ve diğer makro değişkenlerden etkilenmektedir. Bu çalışma 2011-2017 dönemi aylık verilerini zaman serisi analiz yöntemleriyle kullanarak CDS üzerindeki belirleyiciliğini inceleyecektir. Bu bağlamda değişkenler arasındaki uzun dönemli ilişkiler Johansen eş bütünleşme testi ile araştırılmıştır. Değişkenler arasında uzun dönemli ilişki belirlendikten sonra eşbütünleşme çerçevesinde VECM modeli ile kısa dönemli dinamikler incelenmiştir. Son olarak değişkenler arasında tek yada çift yönlü nedensellik ilişkisi olup olmadığı VECM nedensellik testi ile araştırılmıştır. Bu çerçevede tıpkı bir zincirin halkaları gibi cari açık değişkeninden kur değişkenine ve kur değişkeninde CDS değişkenine Granger nedensellik ilişkisi tespit edilmiştir. Ayrıca eşbütünleşme katsayıları, döviz kuru değişkeni ile CDS değişkeni arasında pozitif ilişkiye işaret ederken, cari açık değişkeni ile CDS değişkeni arasında istatistiksel olarak anlamlı bir ilişki tespit edilememiştir.

Anahtar Sözcükler: *Kredi temerrüt takası, cari açık, döviz kuru, analizi, VAR analizi, eşbütünleşme, VECM nedensellik testi*.

Makale Başvuru Tarihi/Manuscript Received: 09/06/2017
Makale Kabul Tarihi/Manuscript Accepted: 12/10/2018

INTRODUCTION

1.1. Some Risk Sources for Emerging Markets

Derivatives are financial instruments that help financial manager or investors to control their risk better and play an important role in hedging credit risk exposure. This term stands for a contract whose price is obtain from underlying financial assets (currency, bond, equities, commodities, stock index) or commodity to transfer risk, to discover the future price as well as current, to catalyse entrepreneur activity and to increase saving and investment in economy in the long run (Hayali, 2014: 22). They are both traded among market participants over the counter (OTC) or via regulated markets (on-exchange) but they are structured two main segment according to its underlying assets; a)-equity linked b)- the contract for difference (Deutsche Börse Group, 2009: 6-7).

The contract for difference drives their values from the performance of five underlying asset classes; i)-equity derivatives, ii)-fixed-income instrument, iii)-commodity derivatives, iv)-foreign exchange derivatives and v)-credit derivatives. Credit derivative is a bilateral contract allows users (creditor) to manage their exposure to credit risk in which one party (credit protection buyer) undertake credit event (generally on bonds or loans) in return for fee or default premium. There are five types of credit derivatives; credit default swap, total return swap, credit-linked notes, credit spread products and credit spread options. But the fastest growing type of credit derivatives over the past decade is Credit Default Swap (CDS) (Choudhry, 2012: 3-4). So CDS is a contract that the seller promise to repay a debt obligation (eg. bond) underlying the agreement at par value in the event of default. To secure this amount guarantee, a regular premium is paid by the buyer during a pre-specified period. CDS is positioned under the credit derivative markets with Total Return Swap (TRS) and Credit Spread Options (CSO) for which the redemption value is linked to a specified credit-related event such as a bankruptcy, a credit downgrade, non-payment or default. All of derivatives including CDS is used to hedge against risk of a borrower's default or price fluctuations. (BIS, 2016: 27).

Derivative markets have attracted considerable attention and despite economic and financial crisis in 1990s and 2000s they have grown impressively. According to the Bank for International Settlements, the total notional value of derivatives contracts around the world has ballooned to an astounding $710 trillion this means 10 times of world GDP (Snyder, 2014). Since its introduction in the mid-1990s, the growth of the CDS market has been dramatic and it's share rose in line with all derivative markets. But after 2008 financial downturn their value hit the peak point and then decreases gradually. The notional amount of credit derivative contracts outstanding in 2016 is $12 trillion, up 84% from 2004. This growth in the credit derivatives market has been driven

by the standardization of documentation, the growth of product applications, and diversification of participants (Beinstein and Scott, 2006: 6).

In a globalized world, investors in many developed markets have expanded their portfolios towards emerging countries (EM) to seek new profit opportunities. But they are very cautious on exposure to risks vary across countries. We can summarize them in a few topics; life cycle risk (a country that is still in the early stages of economic growth will generally have more risk), political risk (risk exposure can be affected by the political system), legal risk (investors are dependent upon legal system that respect and protect their property rights in a timely manner) and economic risk, e.g. high dependency of a country on specific commodity, product or service (Damodaran, 2015: 4-11).

So investors are needed to provide risk measures on each dimension. There are several indices attempt to measure country risk and one of them is CDS. Credit default swap (CDS), introduced in the 1990, not only measure the cost of insuring against default on debt by banks, private investors or non-financial corporations, they are also used to hedge against default of government bonds. So CDS index also measure credit risk of a country. The prices of these contracts represent market assessments of default risk in countries, updated constantly with sovereign ratings (Moody's or Fitch), equity risk premium, political risk score. Increase in CDS index means that increase in default probability of debt or risk of a country. Besides CDS spreads are more timely and dynamic than sovereign ratings and that they reflect fundamental changes in the issuing countries (Damodaran, 2015: 40-44).

Another risk source for EM's is exchange rate risk which is an integral part in every firm's decisions about foreign currency exposure. In the present era of increasing globalization and heightened currency volatility, changes in exchange rates have a substantial influence on companies' operations and profitability. Exchange rate volatility affects not just multinationals and large corporations, but small and medium-sized enterprises as well, even those who only operate in their home country. While understanding and managing exchange rate risk is a subject of obvious importance to business owners, investors should be familiar with it as well because of the huge impact it can have on their holdings. We can define it exchange rate risk as unexpected exchange rate changes on the value of the firm. It cause possible direct loss or indirect loss in the firm's cash flows, assets and liabilities, net profit and, in turn, its stock market value from an exchange rate move. So firms have to match it's currency follows, contract risk sharing agreements, arrange a back to back loans and use currency swaps. (Papaioannou, 2006: 3-4).

EM's also suffer from current account balance risk like Turkey especially rapid domestic financial liberalization period through 1980's and after 1990s, current account imbalances have become more divergent across EM's. This risk is very obvious for high capital account openness and fixed exchange rate regimes (Danninger, Jaumotte, 2008: 1-2). In addition to stabilizing foreign exchange, EM's need to ensure external economic balance to stability of macro economy. We mean by external balance is balance of payments but many EM economies suffer from imbalance of current account payment. Chronic current account deficits at high level (eg. %5 or more of GDP) imply various risks and payment crisis for an economy. Especially in developing countries, current account deficit is seen among the fundamental causes of instability (Özdamar, 2015: 633-634).

1.2. Overview of Turkish Economy

After severe setback of 2001 crisis, Turkish economy has achieved remarkable recovery and regains economic growth because of efficient market regulation, fiscal discipline and structural reforms. Following years of 2002-2013, Turkey has managed to attract a large number of foreign investors (Yılmaz, 2014). At the same time U.S. and European bond yields at low levels, investors move towards emerging market (EM's) stocks and bonds. In this period they have been affected by liquidity injections, low interest rates, increased government spending and expansion of commercial banking sector (Atradius, 2015). But after May 2013 Federal Reserve Governor announced the tapering of bond purchases and raised interest rates by 25 bp. in December 2015 and in March 2016 respectively. This means that excessive dollars in international markets due to Quantitative Easing-QE ($3.7 trillion money printing after 2008 mortgage crisis in U.S.A.) had been dried up gradually (Mishra *et al*., 2014: 6-8).

Tapering news leads to emerging economies entered into fragile period and many of them are struggling with the impact of the interest rate hike especially like Turkey which is highly dependent on foreign savings. Secondly, increase in interest rate, many EM have been accumulated significant foreign direct investment during 2001-2008 periods but at the end of expansionary period, higher interest rates lead to more investors back to their home countries and spark an outflow of capital from invested markets (Aizenman *et al.*, 2014: 2-3). Thirdly significant amount of EM have witnessed appreciation in their local currencies and in turn they are able to handle more U.S. dollars from lenders to finance economic growth and so increased government spending's. But the end of QE could make it more difficult for countries like Turkey to repay their debts (in U.S. dollar) especially faced by private companies. Also the end of QE could create volatility in dollar price of commodities which some EM heavily dependent on export means that they will get less revenue e.g. Brazil and Russia on crude oil and natural gas (Kuepper, 2016). Another struggle for EM is pressure on sovereign ratings. International spill over effects of the QE program leaded investors to

focus on their attention for countries with huge financing needs and macroeconomic imbalances, exerting severe pressure on countries like Turkey (Mishra *et al*., 2014: 6-8). Risk perception of emerging countries in this period changed negatively. Investors became more sensitive on exposure to risks that vary across countries and so risk indices of emerging market countries affected negatively. At this point there are several risk indices help investors to measure country risk and one of them is CDS.

Financial downturn in 2008 had derived world economy into highly volatile environment and the market prices commanded by government bonds (and the resulting interest rates) have yielded an alternate measure of sovereign default risk. CDS spreads are primarily monitored to assess default risk of country in international markets (Sazak, 2012: 2). CDS volatility provides information about country risk and many international investors evaluate it before investment. In this frame, *widening of CDS spreads means increase in the sovereign bond yields and tighter (smaller) spreads indicates a lower risk of default.* This is in turn has persuaded investors that subject countries is more or less riskier than before (Weltman, 2012). Table 1 summarizes CDS ratings and appropriate default spreads for various countries. CDS spreads of advanced economies are yielded between 20-50 bp. but the same number is over 150 bp. for highly debted emerging market economies.

Table 1. Default from 5Y CDS Spreads (% Basis Points, 30.05.2017)

Country	CDS Spread (Bp.)	Country	CDS Spread (Bp.)
Norway	19	Mexico	154
Germany	19	Russia	148
U.S.A.	20	Italy	170
Sweden	20	S.Africa	184
Finland	23	Brazil	237
Japan	45	Turkey	197
France	56	Portugal	198
Spain	77	Egypt	362
Chile	81	Ukraine	593
China	99	Venezuela	3522

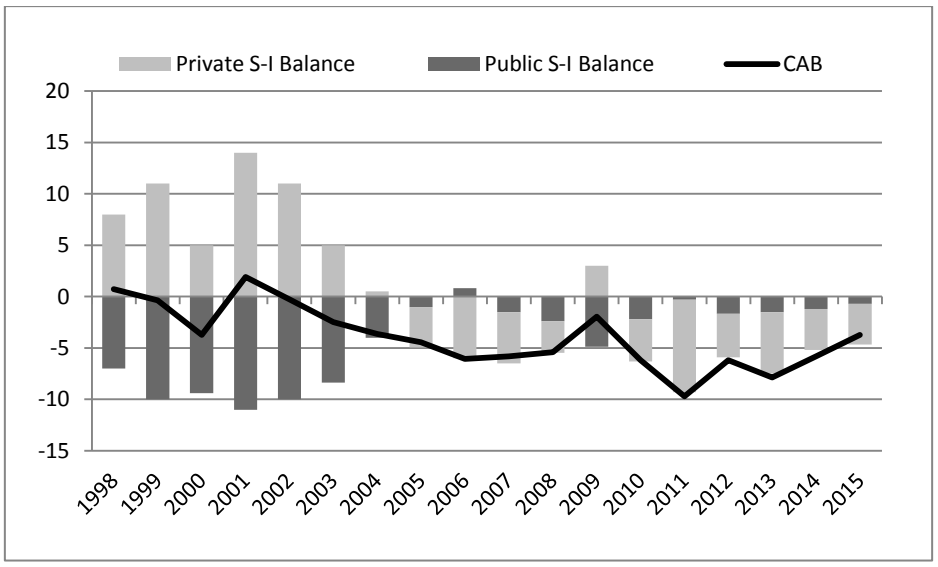
Source: Sovereign Default Probabilities Online, Deutsche Bank Research.

Actually the origins of Turkish economic fragility had especially risen after outward oriented period. After the 1980s, Turkey shifted its industrial model away from import substitution toward export-led growth strategy and this transformation required significantly opening up its domestic economy. Following the liberalization of capital account, Turkey has accumulated large capital inflow and became increasingly dependent on them for economic growth, because economic growth was largely based

on domestic consumption and investment. Instead of focusing on improvement in domestic intermediate goods or investment goods, Turkey's export capabilities did grow notably in the white goods sector (washing machines and other electrical appliances), its growth rested predominantly on consumption and construction sector (Stratfor, 2016).

Increase in dependency on foreign savings accompanied with undisciplined economic liberalization, fiscal profligacy, inadequate financial regulation and exchange rate policies cause to macroeconomic instability and sensitized economy to capital flows. It can be monitored from current account balance (CA) of Turkish economy. It's simply formulated as total exports less the total imports (CA= X-M) or it can be expressed as the national income notation that current account is equal of national savings less domestic investment; CA = (S-I) + (T-G). Current account deficit of Turkish economy is $3.1 billion averagely for the period of 2014-2016. But Turkish economy is an open economy and current account deficit is an issue of insufficient national savings. For the last thirty years Turkey's savings rate (%14 of GDP in 2016) has been lower than that for countries with similar levels of income per capita (Clark *et al*., 2012: 5-6; Orhan, Nergiz 2012: 139-145).

Figure 1. Savings and Current Account Balance in Turkish Economy (% of GDP)



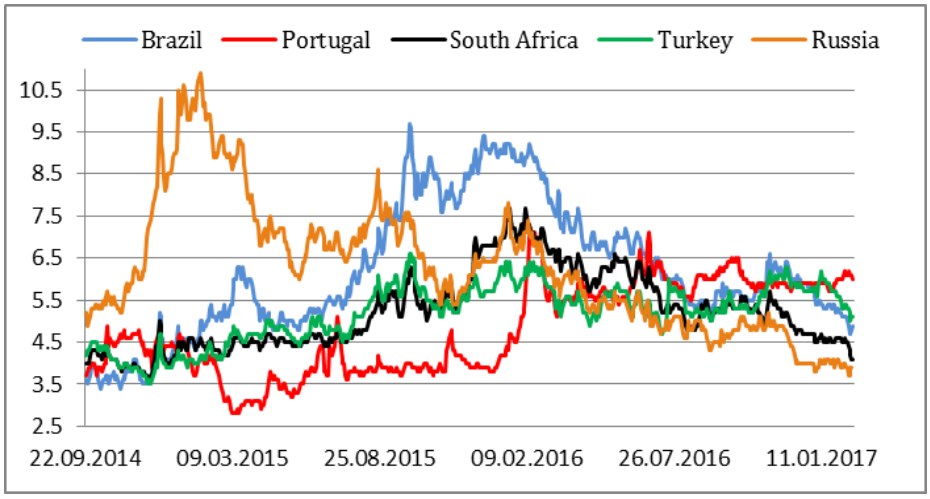
Source: Central Bank Republic of Turkey.

In figure 1 private and public investment - saving difference and current account balance are shown as a percentage of GDP. As can be seen from figure, as a result of decreases in saving-investment balance, current account deficit of Turkish economy has increased. Especially after 2001 crisis, deficit began to grow and savings began to fall.

The deficit reflects a country spending more on foreign goods and services than it receives from its exports. To finance this difference, it must obtain funds (FDI or portfolio investment) from abroad.

On the other hand such kind of macroeconomic imbalances biased investors about Turkey is able or not to finance its deficit and so lead to increase in default probability of Turkish bonds. Increase in default probability, induce rise in CDS spreads. As a result of negative perception about current account makes borrowing difficult from abroad because of arouses suspicion on foreign investors about whether Turkey is able to finance its deficit. During the taper tantum for instance value of CDS purchases of Turkish bonds rose sharply (Stratfor, 2016).

Figure 2. Annual Probability Default of 5Y CDS Spreads (%60 recovery rate)



Source: Deutsche Bank

As can be seen from figure 2, annual probability of default from 5Y CDS spreads of five emerging market economies move together. The yield on Turkey's five-year debt had started to climbed in 2014 and reached %6.5 as February 2016 but it has decreased towards 2017 and credit default swaps narrowed to %5 as of February 2017 second only to Portugal (%6.1) among 27 emerging-markets.

Secondly exchange rate volatilities may have created change in CDS spreads. As the exchange rate appreciates imports become relatively cheaper while exports become relatively expensive. In this case the result is decrease in the quantity of exports and increase in the quantity of imports especially for intermediate goods Because Turkish economy is highly dependent on (it averagely constitutes %75 of total import between 1970-2016) imported intermediate goods (Clark *et al*; 2012: 29-30). During the export

oriented policy, the nominal value of Turkish Lira was overvalued in real terms and lack of R&D (research and development) expenditure, insufficient production of domestic investment and intermediate goods, lack of technological improvement and innovations was shaped economy negatively. Thus increase in economic growth and export volume depends gradually on imports and does not have the capacity to produce such goods domestically hence even a high rise in exports does not help sufficiently toward containing the deficit (Akal, 2014: 2-3). So change exchange rate will affect the trade balance through prices and quantities of traded goods (intermediate goods). Deteriorating the trade balance would create negative perception on foreign investors about general macroeconomic conditions and investors think that this in turn may cause rise in the cost for insuring Turkish debt.

The paper's contribution is handled the subject (CDS, Exchange Rate and Current Account Balance) on Turkish economy. Explicitly looking at the destabilizing effect of exchange rates and current account deficit on CDS. Turkish economy has been continuous current account deficit annually for long years. Overvalued TL, insufficient saving rates and economic growth that more than it should need are the three main causes of current account deficit. So we address an issue on the context of grid relationship between these three variables. Secondly methodological contribution is in that we use a Johansen cointegration test to determine long run relationship and VECM to determine short term relationship. Also Granger test under VECM was applied in order to establish the uni or bi-directional causality between variables. The purpose of this study is to assign the interaction between Current Account deficit, Foreign Exchange rate and CDS Spread of Turkish economy. So the reminder of the paper is organized as follows. Section 2 a brief summary of literature regarding the association between CDS value and other macroeconomic and financial variables is given, in section 3 data set is introduced, and information about the methodology and empirical results are given respectively. The paper concludes with the discussion of results and the findings from the analysis are interpreted.

2. RELATED LITERATURE

As the CDS spreads regarded as a proxy for country risk by investors in financial markets, there have been growing body of literature on the role of CDS. While some papers pricing and predicting it's value and others seek to answer the question whether CDS spread and other risk measures have mutual interaction and some papers intended to assess whether an interaction between CDS and macroeconomic variables. So we can sum up them in two main section; determinants of CDS Spread at firm level and macroeconomic level. At macro level which we deal, some key variables have interacted with CDS Spread. Firstly we can express some related literature connected with Turkish economy.

Gün *et al*. (2015) try to figure out whether Gezi Park events (happened in 2013) lead to significant impact on Turkish CDS spreads or not by using VAR (Vector Auto-Regressive) method, Johansen co-integration test and causality with Granger test. According to the results there are significant correlations between Gezi Park events and CDS and also Eurobonds interest, the BIST 100 index, a basket of currencies with CDS spreads. Hassan *et al* (2016) examine possible links between CDS spreads and the value of the Turkish lira against the U.S. dollar by using the recently developed rolling window causality method as well as the Markov Switching Vector Autoregressive method. Results show that CDS Spread drive the value of the Turkish lira against the U.S. dollar in the post crisis period. Baltacı and Akyol (2016) researches the relationship between macroeconomic variables and Turkish CDS spreads by using Generalized Method of Moments (GMM) and Residual Linear Regression Model. The results showed that the selected variables which are increase in current account balance, real interest rates, GDP growth rates, inflation rates and positive changes in S&P Global Reit Index have important effects on CDS spreads. Kargı (2014) studies for the relation between credit default swap (CDS) spreads which is a kind of reliability index about information source about the general view of economy except the investee securities and interest rates and GDP by using granger causality test and Johansen cointegration test for 2005: 01 – 2013: 03 period. According to the results it has been precipitated that there is a long term relation between GDP interest rate and CDS variables in Turkish economy. At the same time, it has been detected that there is a bidirectional causality relation between CDS and the market interest rate. Also GDP and CDS spreads are move together in the long run. Ozdamar (2015) investigate relationships between current account balance and various macroeconomic variables in Turkish economy by using Johansen cointegration test and with cointegrating regression analyses (FMOLS, CCR and DOLS) for the 1994- 2014 period. It is found that foreign trade balance is a strong explanatory of the current account balance; terms of trade and gross domestic product also have statistically significant effects on the current balance. According to the results Harberger- Laursen- Metzler (HLM) hypothesis seems to be valid for Turkey. Besides, results of the study reveal that domestic interest rates and real effective exchange rate affects Turkey's current account balance as expected but these variables are found to be insignificant

Secondly we can also express some papers that handle the subject from the viewpoint of western developed economies and Emerging Markets (EM). Bhansali et al. (2008) confirm that economy wide risk (systematic risk) strongly priced CDS Spread in the U.S. and European credit derivatives markets. Wu and Zhang (2008) find that CDS Spread fluctuates with inflation, real output growth and financial market volatility. The paper links the dynamics and market pricing of the three risk dimensions to the term structure of U.S. Treasury yields and corporate bond credit spreads. Ho (2016) examined the long and short-runs determinants of sovereign CDS spread for eight EM

in terms of three macroeconomic determinants; current account, external debt and international reserves and he found that there is cointegration between these variables. Secondly the coefficients of the current account, the external debt and international reserves are highly significant to explain the long-run sovereign CDS spread for all countries. Thirdly international reserves are more important than the current account in order to reduce the sovereign CDS spread in long-run.

Tang and Yan (2010) reports that changes in GDP are significantly negatively conjunction with CDS spreads and positively related with GDP growth volatility and option-implied jump risk. Annaert *et al*. (2013) provide that business cycle and market-wide variables which can be considered as macroeconomic conditions are important in explaining a portion of CDS spread changes in Euro area. Ural and Demireli (2015) analyse the volatility transmission in Brazil, Russia, China, South Africa and Turkey and which country is more effective than others. The findings show that the CDS returns' volatility has increased during the global crisis, the source of degree of innovation is China CDS risk premium and the source of volatility transmission is Brazil and Turkey CDS risk premiums.

Anton (2011) investigates the determinants of emerging market sovereign CDS spreads in the light of European debt crisis. He finds that changes in the sovereign CDS spreads of CEE countries are (jointly) determined by the investors risk appetite, economic fundamentals, spillover effect, and rating downgrade. Eyssel *et al* (2011), analysed the determinants of levels and changes of CDS spreads in China from January 2001 to December 2010 periods. They found both country-specific factors (such as the China stock market index and the real interest rate) and global factors (the U.S. S&P 500 stock option volatilities and default spreads, and the non-North America global stock market factor) have significant explanatory effect on CDS spreads. Hassan *et al* (2015) document that sovereign CDS and bond markets are co-integrated. Breitenfellner and Wagner (2012) examine risk factors that explain daily changes in CDS spreads before, during and after the 2007–2009 financial crisis in European iTraxx CDS index universe and they found that before and after the crisis, spread changes are mainly determined by stock returns and implied stock market volatility.

3. DATA AND ECONOMETRIC METHOD

3.1. Data Set and The Model

The data used in the analysis cover a post crisis period of 5 years spanning from 2011-M01 to 2017-M03. Firstly we retrieve Turkish sovereign CDS spreads (cdssa) daily 5Y (maturity dates 5 year) which is expressed in basis points and then converted to monthly average from a comprehensive dataset provided by Bloomberg data. Second variable is current account balance (casa) monthly data that was obtained from data base

of CBRT-EDDS (Central Bank of Republic of Turkey-Electronic Data Delivery System) in billion USD units. Lastly we use monthly average of USD/Turkish lira (fxsa) buying quotations to measure value of the Turkish lira against usd. All variables are seasonally adjusted to remove seasonal component. We do not handle any dependent or independent variables in a VAR model. In a VAR/VECM, there are no "independent" variables, there are variables, even if some long-run exogeneity holds.

In time series analysis ordinary least squares and simultaneous equations systems are mostly used to estimate variables but on the other hand there is over parameterization and endogenity problems are accompanied. For these purposes, the Vector Auto Regressive (VAR) Model has been predicted in the study. An unrestricted VAR model is a method that brings no limitations to the structural model, reveals the dynamic relations between the variables, and explains the macroeconomic relations between the time series and future predictions (Brooks, 2008: 290). The advantage of VAR models is that all variables in model regarded as internal and so researcher are not to be experienced the difficulty of deciding about which of variable is internal or external and dependent or independent. In addition, VAR Model Predictions carried out by using the method of least squares, a simple method, give better results than more complex simultaneous equation model (Özcan, 2016: 191). A standard generalized VAR (p) model may be expressed as follows;

$$y_t = v + A_1 y_{t-1} + A_2 y_{t-2} \ldots\ldots\ldots\ldots + A_p y_{t-p} + u_t \qquad (1)$$

where p is a positive integer, A_i are fixed (K × K) coefficient matrices, v is fixed (Kx1) vector of intercept and u_t is K dimensional white noise with covariance matrix Σ_u . Also $cov(u_{1t} ; u_{2t}) = \sigma_{12}$ for t = s, 0 otherwise (Triacca, 2016: 3). The existence of CDS, current account and foreign exchange relationships or co-integration is a two-step approach involving (a) testing whether the variables are characterized by a unit root (non-stationary) and (b) testing for co-integration or long-term relationships using Johansen's (1991) approach.

3.2. Descriptive Statistics

In time series that follow a random process, it is extremely important whether the series is stable or not. The series must be defined as stable or non-stable prior to the prediction of the VAR Model. So it would be useful to see graphics of variables in level before VAR analysis to check unit root visually. Figure 3 below shows the time series plots of the three variables during the sample period. As it seen from figure 3 all series have deterministic upward trend. It would portend that series in level are not stable. Secondly we present common statistics of data set to describe basic features of variables in Table 2.

Figure 3. Time Series Plots of the Variables

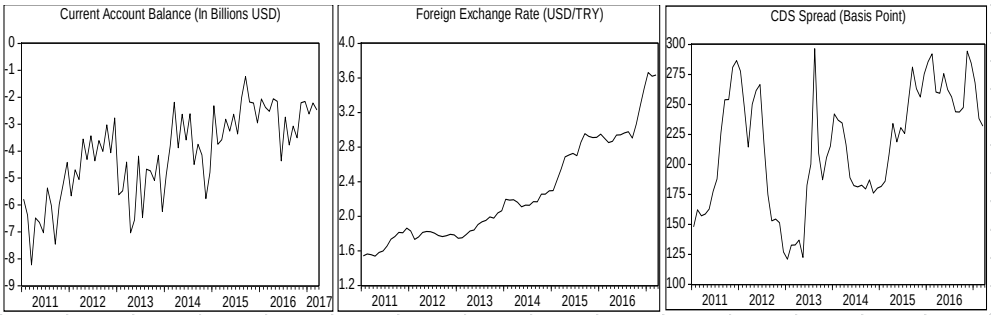


Table 2. Descriptive Statistics of Data Set

Proper Name	Casa	Fxsa	CDSsa
Mean	-4096276	2.27063	216.5389
Median	-3878767	2.128232	218.7478
Maximum	-1229628	3.66337	296.4822
Minimum	-8228604	1.539783	120.895
Std. Dev.	1581860	0.5772	48.71585
Skewness	-0.468212	0.722781	-0.211337
Kurtosis	2.41486	2.430167	1.948193
Jarque-Bera	3.81025	7.544864	4.015469
Probability	0.148804	0.022996	0.134293
Sum	-3.07E+08	170.2972	16240.41
Sum Sq. Dev.	1.85E+14	24.65379	175619.3

Descriptive statistics (mean, variance, skewness and kurtosis levels) of the dataset were examined and the results are shown in Table2. Skewness is the third moment of normal probability distribution and it refers to measurement of symmetry, or more precisely, the lack of symmetry. Its value can be either positive or negative. A distribution with an asymmetric tail extending out to the right is referred to as positively skewed, while a distribution with an asymmetric tail extending out to the left is referred to as negatively skewed, and symmetric distribution means skewness equals to zero (Doane, Seward, 2011: 2-3). For our dataset, as shown in Table 2, all variables are negatively skewed except Fxsa. On the other hand, kurtosis is a parameter that describes the shape of a random variable's probability distribution and can be formally defined as the standardized fourth population (β) moment about the mean. Distributions with positive kurtosis (leptokurtic), $\beta - 3 > 0$ has heavier tails and a higher peak, and distribution with negative kurtosis (platykurtic), $\beta < 0$ has lighter tails and is flatter in comparison with normal distribution (De Carlo, 1997: 292). As observed from Table 2, Kurtosis values of all variables are less than 3, and this indicates that distribution has

lighter tails and a flatter peak than the normal distribution. Therefore, from those kurtosis and skewness values it could be said that the dataset is normally distribute except for Fxsa, but to be more precise Jargue-Bera test statistic should be evaluated. According to Jarque-Bera test statistic, the null hypothesis of 'error terms are normally distributed' is rejected (0.0229<0.05 and 0.10 level) in terms of their probability for Fxsa values as shown means that only CDSsa and Casa series are normally distributed.

3.3. Unit Root Test

If the arithmetic average and its variance of time series are stable, it means that they don't show a systematic change or if the series don't include periodical fluctuations, we called this type of time series is stable (Isik *et al*., 2004). So we discuss the stationarity properties of the variables before undertaking the VAR analysis, because if time series are not stable (non-stationary or show systematic change) the problem of 'Fake Regression' may appear, and this will make a set of series seem as if it has a relation with another set of series (Başarır, Erçakar, 2016: 53). Thus to build an appropriate model, all series must be stationary. Therefore we should check the unit-root structure of the data. In order to test for unit root, we apply five different tests. We utilize the Augmented Dickey Fuller test (Said, Dickey, 1984), modified Dickey-Fuller (DF-GLS) test (Elliott *et al*., 1996), the Phillips-Perron (P-P) test (Phillips and Perron, 1988), Point Optimal test (Eliot *et al*., 1996) and the KPSS stationarity test (Kwiatkowski *et al*., 1992).

Table 3. Unit Root Tests

Test Type	**casa**		**cdsa**		**fxsa**	
	test stat.	p value	test stat.	p value	test stat	p value
ADF	-2.213	0.203	-2.481	0.124	0.882	0.994
PP	-3.374	0.015**	-2.526	0.113	1.388	0.999
DF-GLS	-1.589		-1.707*		1.701	
Point Optimal	6.054		6.264		93.196	
KPSS	0.897		0.377*		1.123***	
Test Type	**first difference**					
ADF	-10.144	0.00***	-8.139	0.000	-5.758	0.00***
PP	-16.478	0.00***	-8.147	0.000	-5.624	0.00***
DF-GLS	-12.486***		-7.637***		-5.775***	
Point Optimal	0.583***		0.791***		2.043***	
KPSS	0.042***		0.064		0.375*	

Note: H_0 : Null hypothesis of unit root. *, **, and *** indicate rejection of the null hypothesis (no causality) at the 1, 5, and 10 percent levels of significance respectively. The lag order is determined by Schwarz Bayesian Criterion (SBC).

Table 3 shows the results of unit root test for variables at their level. According to results for each test type the statistic values are greater than the critical values or p values are greater than %10 level so that the null hypothesis (unit root) has not been rejected at conventional test sizes. But after taking first difference we concluded that our time series are first order difference stationary I (1).

3.4. Cointegration Test

In this section we will be using the Johansen's cointegration test (Johansen, 1991) in order to identify cointegrating relationship (long-term relations) among the variables. Consider two time series x_t and y_t which are both I(1) are cointegrated if there is linear combination of them emerge as stationary process, they are said to be cointegrated (Dolado *et al*, 1999: 3-4). Once the variables have been classified as integrated of order say I(0), I(1) or I(2) it is possible to set up meaningful models that lead to stationary relations among the variables and standard inference becomes possible. So testing for cointegration is necessary to build empirically meaningful relationships. If variables have different order they cannot stay in long-run relationship with each other, implying that we cannot model them and when integrated variables are involved it is hard to establish valid inference that based on standard distributions. The most popular way of testing cointegration is Johansen cointegration test that seems to be more advantageous than two staged procedure, developed by Engle-Granger. (Sjö, 2011: 12). Johansen's methodology takes its starting point in the vector autoregression (VAR) of order p given by;

$$y_t = A_1 y_{t-1} + ...A_p y_{t-p} + Bx_t + \varepsilon_t \quad (2)$$

Where y_t is an nx1 vector of variables that are integrated of order one I(1), x_t is a d-vector of deterministic variables and ε_t is an nx1 vector of innovations. VAR (1) process can be reparameterized in the VEC (p-1) representation as;

$$\Delta y_t = \prod y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + Bx_t + \varepsilon_t \quad (3)$$

Where Γ matrix represents short run error correction parameters; $\Gamma_i = -\sum_{j=i+1}^{p} A_j$ and $\prod$ matrix is long run coefficient matrix that gives information about long run relationship of variables, represented as $\prod = +\sum_{i=1}^{p} A_i - I$. Coefficient matrix rank r (number of cointegrating relationship) is independent and stationary linear combination number of coefficient. The numbers of co-integrating vectors are identical to the number of stationary relationships in the $\prod$ matrix. We can decompose $\prod$

matrix as **α** and **β** $\prod = \alpha \cdot \beta'$ where matrix α is a number the adjustment parameters in the vector error correction model and matrix β is known as the loading matrix (cointegration vector) because its rows determine how many cointegrating relationships enter each of the individual dynamic equations (Hjalmarson and Österhölm, 2007: 4-5). The rank of $\prod$ matrix determines the number independent rows in $\prod$ and also the number of co-integrating vectors. If rank **(** $\prod$ **) r = k** (endogenous variable number) there is no cointegration relationship and it means all variables in the model are independent with each other's. In this case variables in the VAR model are level stationary I(0). Variables in level, I(0), already will establish equilibrium long run. If rank r = 0 there is no cointegrating relationship. In this case VAR model should be estimated by using variable in first difference. Thirdly if rank **r < k-1** there is r number of cointegration relationship (Dolado *et al.*, 1999: 12). Johansen proposes two different likelihood ratio tests of the significance of these canonical correlations and thereby the reduced rank of the Π matrix: the trace test and maximum eigenvalue test, shown in the following equation respectively;

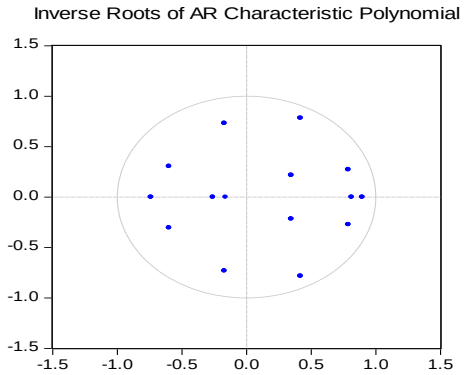
$$J_{trace} = -T\sum_{i=r+1}^{n}\ln(1-\hat{\lambda}_i) \quad and \quad J_{\max} = -T\ln(1-\hat{\lambda}_{r+1}) \tag{4}$$

T is the sample size and $\hat{\lambda}_i$ is the i th. largest canonical correlation. The trace test tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors. The maximum eigenvalue test, on the other hand, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of r +1 cointegrating vectors (Hjalmarson, Österhölm, 2007: 5). But before starting cointegration analysis we must specified appropriate VAR model for cointegration test. It was determined before that our variables are integrated first degree I (1) but to conduct Johansen test we have to use level of all variables in the VAR system in order to investigate the simultaneous interactions between them. In VAR models, we define a set of endogenous variables as a function of their lagged values. We express them as the following equations for our variables;

$$\begin{aligned} cdssa &= c_{10} + \sum_{k=1}^{p}\delta_{1k}casa + \sum_{k=1}^{p}\delta_{2k}\,fxsa + \sum_{k=1}^{p}\delta_{3k}cdssa \\ casa &= c_{20} + \sum_{k=1}^{p}\gamma_{1k}casa + \sum_{k=1}^{p}\gamma_{2k}\,fxsa + \sum_{k=1}^{p}\gamma_{3k}cdssa \\ fxsa &= c_{30} + \sum_{k=1}^{p}\zeta_{1k}casa + \sum_{k=1}^{p}\zeta_{2k}\,fxsa + \sum_{k=1}^{p}\zeta_{3k}cdssa \end{aligned} \tag{6}$$

As we mentioned above, all variables are I(1) process. After estimation of the model, we specify 5 lags for our VAR model. It means appropriate model is VAR (5).

Figure 4. Test for Stability Condition of VAR (5) Model



Serial Correlation LM test		
Lags	LM-Stat	Prob
1	6.9277	0.6446
2	11.4119	0.2485
3	12.4078	0.1913
4	9.5362	0.3893
5	6.6941	0.6689
6	18.1494	0.0335
7	6.3901	0.7003
8	4.2352	0.8953
9	5.9088	0.7490
10	7.3974	0.5958
11	8.6357	0.4716
12	9.50423	0.3921

Res. Heteroskedasticity Test		
Chi-sq	df	Prob.
217.169	192	0.1028

But we have to handle diagnostic test to control the robustness of model and we have used graphical analysis tools and statistical tests for the residuals for stability. Firstly AR Roots table reports the inverse roots of the characteristic AR polynomial. The model is tested if it is stable by checking all eigenvalues of modulus less than 1. A stable process is one that will not diverge to infinity. An important fact is that stability implies stationarity thus it is sufficient to test for stability to ensure that a VAR process is both stable and stationary. (Lutkepohl, 2011: 10-13). So AR roots graph show that characteristic roots are less than one or all the Eigen values stand inside the unit circle indicate that our model is stable. Secondly our model does not include residual autocorrelation according to serial correlation LM test. Null hypothesis of Breusch Godfrey LM test is that coefficient of residuals are equal to zero, indicate that residuals are serially uncorrelated versus and probability values imply that we accept null hypothesis. Lastly conditional Heteroskedasticity is often concern for models based on data with monthly or higher frequency. Presence of it in the disturbance leads to consistent but inefficient parameters estimates and faulty inferences will be drawn when testing statistical hypothesis. So we checked it by White Heteroskedasticity Test with includes cross terms which is the extension of White's (1980) test. Under the null of no Heteroskedasticity (or no misspecification), the non-constant regressors should not be jointly significant. According to p value we accept the null hypothesis at %1 and %5 level that our model has no heteroskedasticity. After satisfying stability conditions for our VAR (5) model, we use CDS spreads, current account balance and foreign exchange rate in the VAR system in order to investigate the simultaneous interactions between them. After determining appropriate VAR model for cointegration, we stepped forward to test and reported the results in Table 4.

Table 4. Johansen Cointegration Test Results

Model Type	Hyp. No. of	Eigenvalue	Trc. Statistic	Critical Value (0.05)	Prob.
Model 2	None *	0.322506	45.016	35.19275	0.000
	At most 1	0.143045	17.761	20.26184	0.058
	At most 2	0.094590	6.955	9.164546	0.076
Model 3	None *	0.301842	39.027	29.79707	0.003
	At most 1	0.133088	13.875	15.49471	0.086
	At most 2	0.053898	3.878	3.841466	0.048
Model 4	None *	0.303538	43.519	42.91525	0.043
	At most 1	0.145112	18.197	25.87211	0.331
	At most 2	0.098034	7.222	12.51798	0.321

It's observed that the maximum eigenvalue statistics and the trace statistics results are less than the critical value; and therefore, the hypothesis, which was established as "H_0: There is no cointegration", was rejected; and it is concluded that there is at least one cointegrated vector among the variables. As can be seen from table 7, eigenvalue and trace statistics are estimated according to case 2, case 3 and case 4.

Table 5. Pantula Principle

Rank r	Case 2	Case 3	Case 4
None *	45.016 (H_0 Reject)	39.027 (H_0 Reject)	43.519 (H_0 Reject)
At most 1	17.761 (H_0 Accept)	13.875 (H_0 Accept)	18.197 (H_0 Accept)
At most 2	6.955 (H_0 Accept)	3.878 (H_0 Accept)	7.222 (H_0 Accept)

Pantula Principle: It is a method that help procedure which has been considered for choosing both the cointegrating rank and the deterministic term simultaneously is based on the so-called Pantula principle (Pantula (1989). The procedure was suggested by Johansen (1991) for use in the context of cointegrating rank testing. In the Johansen analysis the deterministic components can be modelled in five different ways in which cases are ordering according to starting from the most restrictive (Case 1), to the least restrictive (Case 5). However we disregard Case 1 and Case 5 because Case 1 does not allow for any deterministic components in the data. This is rather unusual and should only be used with great caution. Case 5 places no restrictions on the deterministic components and also this case is considered to be unusual (Ahking, 2001: 55). So we have 3 case remain. To conclude any result in the analysis we use pantula principle. According to this principle, it involves testing sequentially a series of joint hypotheses, we start with case 2 and co-integration rank of zero flit to next case as long as if cointegration is rejected by critical values (%5 or %10). This process continues until the preferred model is identified by the first time that the joint hypothesis is not rejected

firstly. It means the junction point of *''case 2''* cell and *''at most 1''* cell in table 5, we accept null hypothesis and conclude that there is at most one cointegration relationship within case 2.

3.6. Granger Causality Test on VECM

After determining the cointegration relationships between variables we can move on VECM to describe the dynamic interrelationship among variables. Detecting cointegration between series means that there exists long term equilibrium relationship between series or they move together in the long run. A VAR in first differences, although properly specified in terms of covariance-stationary series, will not capture those long-run tendencies. In this case VECM is more suitable technique which adjusts to both short run changes in variables and deviations from equilibrium in addition to long-run structural relations plus information on adjustment. According to Engle and Granger (1987) if cointegration relationship exists it would be better to estimate VAR model as Vector Error Correction Model. Accordingly, the VAR concept may be extended to the vector error-correction model. The model is fit to the first differences of the non-stationary variables, but a lagged error-correction term is added to the relationship (Baum, 2013: 36-39). Let's assume VAR model with matrix notation on three variables that $z_t = [y_t, \quad x_t, \quad w_t]$

$$z_t = A_1 z_{t-1} + A_2 z_{t-2} + ...A_p z_{t-p} + u_t \tag{8}$$

without deterministic terms. Subtracting z_{t-1} on both sides of the equation and rearranging terms yields the VECM as;

$$z_t = \Gamma_1 \Delta z_{t-1} + \Gamma_2 \Delta z_{t-2} + ...\Gamma_{p-1} \Delta z_{t-p+1} + \Pi z_{t-1} + u_t \tag{9}$$

As it seen from equation (6) VECM is constructed from first differences of cointegrated I(1) variables, their lags, and error correction terms. In the equation m x m coefficient matrix Π, contains information regarding the long-run relationships. u_t is an m × 1 error vector with contemporaneous correlation but no autocorrelation, like the error vector in a VAR (Magee, 2013: 18). We can decompose $\Pi = \pi\beta'$ where β' is long-run matrix of coefficients which columns contain m cointegrating vector. The columns of α show adjustment vectors and it will include the speed of adjustment to equilibrium coefficients. For simplicity, we assume that p = 2, so that we have only two lagged terms, and the model is then the following;

$$\begin{pmatrix} \Delta y_t \\ \Delta x_t \\ w_t \end{pmatrix} = \Gamma_1 \begin{pmatrix} \Delta y_{t-1} \\ \Delta x_{t-1} \\ w_{t-1} \end{pmatrix} + \Pi \begin{pmatrix} \Delta y_{t-1} \\ \Delta x_{t-1} \\ w_{t-1} \end{pmatrix} + u_t \tag{10}$$

$$\begin{pmatrix} \Delta y_t \\ \Delta x_t \\ w_t \end{pmatrix} = \Gamma_1 \begin{pmatrix} \Delta y_{t-1} \\ \Delta x_{t-1} \\ w_{t-1} \end{pmatrix} + \begin{pmatrix} \pi_{11}\ \pi_{12} \\ \pi_{21}\ \pi_{22} \\ \pi_{31}\ \pi_{32} \end{pmatrix} \begin{pmatrix} \beta_{11} & \beta_{21} & \beta_{31} \\ \beta_{12} & \beta_{22} & \beta_{32} \end{pmatrix} \begin{pmatrix} \Delta y_{t-1} \\ \Delta x_{t-1} \\ w_{t-1} \end{pmatrix} + u_t \tag{11}$$

Let us analyse only the error correction part of the first equation (i.e. for ΔY_t on the left-hand side) which gives;

$$\Pi_1 z_{t-1} = \left(\left[\pi_{11}\beta_{11} + \pi_{12}\beta_{12}\right]\left[\pi_{11}\beta_{21} + \pi_{12}\beta_{22}\right]\left[\pi_{11}\beta_{31} + \pi_{12}\beta_{32}\right]\right) \begin{pmatrix} y_{t-1} \\ x_{t-1} \\ w_{t-1} \end{pmatrix} \tag{12}$$

We can rewrite equation (9) as follows;

$$\Pi_1 z_{t-1} = \pi_{11}(\beta_{11} y_{t-1} + \beta_{21} x_{t-1} + \beta_{31} w_{t-1}) + \pi_{21}(\beta_{12} y_{t-1} + \beta_{22} x_{t-1} + \beta_{32} w_{t-1}) \tag{13}$$

which shows clearly the two co-integrating vectors with their respective speed of adjustment terms π_{11} and π_{12}. With this multiple equation approach we can calculate all three differing speeds of adjustment coefficients, π_{11} π_{21} and π_{31}. Suppose that we have k variables in a VECM, the k x k matrix Π contains the error correction terms. If rank of Π matrix is zero means that there is no cointegration or no stable long run relations between variables. If rank 0< r < k, There are r cointegrating vectors. These vectors describe the long-run relationships between variables. We should forecast VECM model. If rank r = k all variables are already stationary and so there is no need to estimate the model as VECM (Binh, 2013: 72-73).

Before forecasting VECM, we should check presence of variables in VECM forecast by applying weak exogenity test. Exogenity is the property of being 'determined outside the model under analysis and it relates with contemporaneous explanatory variables to parameters of interest, to sustain valid conditional inference, forecasting, and policy analysis respectively (Hendry, Mizon, 2013: 131) By using weak exogenity test we decide whether any variable will be inside or outside of the VECM estimation. At this point researchers typically impose identifying assumptions on the cointegrating vectors β. Then testing for weak exogeneity means testing zero restrictions on the speed of adjustment matrix if H_0: π_{11} =0 ; H_0: π_{21} =0 ; H_0: π_{31} =0 do not reject null hypothesis means endogenous variables y_t, x_t or w_t is weakly exogenous

respectively (Binh, 2013: 73, Brüggemann, 2002: 2-6). Results of test are being presented in Table 6;

Table 6. Test Results for Weak Exogenity

Variable	Restriction	Chi-Square(1)	Prob.
Casa	A(1;1)=0	8.287	0.003***
Fxsa	A(2;1)=0	3.461	0.062*
Cdssa	A(3;1)=0	13.236	0.000***

Null hypothesis of weak exogenity *, **, and *** indicate rejection of the null hypothesis (related variable is weakly exogenous) at the 1, 5, and 10 pc. levels of significance respectively.

According to test results we do not reject null hypothesis for three variables means that all variables will be exist in the VECM estimation or related variables will be in the redressing on long run equilibrium. Now we can estimate VECM and as it seen from table 7;

Table 7. Test Results for VECM

Cointegrating Eq.	CointEq1	Error Correction	CointEq1
CDS_SA(-1)	1	D(CDS_SA)	-0.149239
CA_SA(-1)	9.30E-05		(-0.04767)
	(-1.90E-05)		[-3.13062]
	[4.79567]	D(CA_SA)	-4525.616
FX_SA(-1)	-285.2619		(-2146.33)
	(-51.3433)		[-2.10853]
	[-5.55597]	D(FX_SA)	-0.000512
C	750.4944		(-0.00012)
	(-183.725)		[-4.45063]
	[4.08487]		

Note: Standard errors are reported in round brackets and t statistics are reported in box brackets.

The long run relationship between CDS spreads, current account and foreign exchange for one cointegrating vector for the Turkey in the period 2001M01-2017M03 is displayed. From this table, we show that CDS spreads, and foreign exchange have a statistically significant and negative ECT coefficient (-0.149 for CDS spread and -0.00051 for Foreign Exchange) that means CDS spreads and foreign exchange have a feedback to long-run equilibrium: adjusting in the short-run to restore long-run equilibrium by decreasing. Restoring in the long run equilibrium, CDS spreads remove %14.92 and foreign exchange remove %051 of generated shock in the first month.

On the other hand to determine short run causality, we conduct granger causality on VECM model. As a result of VECM model applied in first differencing series for the 2011m1-2017m3 time period in table 8, the Wald statistic (5.66) for Current Account is statistically insignificant and wald statistic (9.92) for Foreign Exchange is statistically significant in CDS Spread equation. There is therefore no short run causal relationship running from Current Account to CDS Spread but there is casual relationship running from Foreign Exchange to CDS Spread in %5 and %10 level. This implies that in the short run, Foreign Exchange has an Granger causality effect on CDS Spread. Secondly the Wald statistic (3.25) for CDS Spread is statistically insignificant and wald statistic (3.79) for Foreign Exchange is statistically significant (their prob. value are 0.51 and 0.43 respectively) in Current Account equation. So in the Current account equation, there is no causal relationship running from both CDS Spread and Foreign Exchange to Current Account variable. Lastly in the Foreign Exchange equation, the Wald statistic (4.06) for CDS Spread is statistically insignificant and Wald statistic (16.9) for Foreign Current Account is statistically significant (their prob. value are 0.39 and 0.00 respectively). It means while there is no causal relationship running from CDS Spread to Foreign Exchange variable but there is granger causality running from Current Account to Foreign Exchange at the %1 level.

Table 8. Granger Causality Test by Vector Error Correction Model

Dependent Variable	Wald Statistics			ECT (-1)	t-Stat.
	CDS Spread	Current Account	Foreign Exchange		
D(CDS Spread)	-	5.66 (0.22)	9.92** (0.04)	-0.14(-0.047)	-3.13
D(Current Account)	3.25 (0.51)	-	3.79 (0.43)	-4525.61(-2146.33)	-2.10
D(Foreign Exchange)	4.06 (0.39)	16.90* (0.00)	-	-0.000051(-0.00012)	-4.45

'*' and '**'indicates the test statistics are significant at the 1% and %5 level respectively.

3.7. Estimating Cointegration Coefficients

After determining cointegration relationship between variables, we can estimate long-run relationship involving cointegrated variables. It is known that in a cointegrating regression the ordinary least squares (OLS) estimator of the parameters is super-consistent. Because existence of cointegration leads to endogenity problem. Endogenity means disturbances are with the regressors or exogenous shocks are correlated with endogenous variables in the model and it is said to occur in a multiple regression model if $E(u|x) \neq 0$ (Gujarati, 2004: 754). In this case OLS estimates of the β's will no longer be unbiased. So there are three methods that address this problem: the fully modified OLS estimator proposed by Phillips and Hansen (1990), Park's (1992)

canonical cointegrating regression estimator, and the dynamic OLS (DOLS) estimator of Phillips and Loretan (1991), Saikkonen (1991), and Stock and Watson (1993). These three estimators are known to be asymptotically equivalent and efficient (Hayakawa and Kurozumi, 2006: 2). Firstly we consider a typical cointegrating regression and regressors equation model as follows;

$$y_t = x_t\beta + D_{1t}\Upsilon + \varepsilon_t \quad (11) \text{ and } \quad x_t = \Gamma_{21}D_{1t} + \Gamma_{22}D_{2t} + w_t \qquad (14)$$

From this equation we get ε_t (cointegration equation error term) and w_t (regressor equation error term) by OLS. At the second stage we estimate long run covariance matrix by using ε_t and w_t ;

$$\lambda = \begin{bmatrix} \lambda_{11} & \lambda_{12} \\ \lambda_{21} & \lambda_{22} \end{bmatrix} \quad W = \begin{bmatrix} w_{11} & w_{12} \\ w_{21} & w_{22} \end{bmatrix}$$

λ is long run covariance matrix and W is the (bias due to endogenity) covariance matrix that endogenity problem stems from that w_{ij}'s are different from zero. At the third step dependent variable y_t transformed to y_t^* ;

$$y_t^* = y_t - w_{12}\hat{\Omega}^{-1}\hat{u}_{2t} \qquad (15)$$

Where $\hat{u}_{2t} = \Delta\hat{w}_t$ and y_t^* is the modified series which endogenity is corrected. When $w_{12} = 0$, than $y_t^* = y_t$ means that transformed series and original series are equal and in this case OLS estimator would be unbiased and consistent. Lastly coefficients will be estimated by using modified y_t^* series. Both λ and W matrix are estimated by kernel. These estimates require a choice of kernel and also bandwidth parameter. But firstly VAR (1) model fit to the residuals $\hat{u}_t = \hat{\phi}\hat{u}_{t-1} + \hat{e}_t$ From this, a kernel estimator is than applied to the whitening residuals $\hat{e}_t$;

$$\hat{\lambda}_e = \sum_{j=0}^{n} w\left[\frac{j}{M}\right]\frac{1}{n}\sum_{t=j+1}^{n} e_{t-j}\hat{e}_t' \qquad \hat{\Omega}_e = \sum_{j=-n}^{n} w\left[\frac{j}{M}\right]\frac{1}{n}\sum_{t=j+1}^{n} e_{t-j}\hat{e}_t$$

Where w is weight function or kernel which weighted covariance's with j/M and M is bandwith parameter (e.g. lag). In here any kernel that yields positive semi-definite estimates can be used. These are Barlett, Parzen and Quadratic Spectral (Hansen, 1992: 323). Second method is Cannonical Cointegration Regression (CCR). CCR estimator is based on a transformation of the variables in the cointegrating regression that removes

the second-order bias of the OLS estimator. When we estimate coefficients by CCR, using unlike from the third step of FMOLS method, CCR also requires a consistent estimator of the contemporaneous covariance matrix $\hat{\Sigma}$. The matrix Ω (covariance matrix) can be represented as $\Omega = \hat{\Sigma} + \Gamma + \Gamma'$. Where;

$$\Sigma = \lim_{n\to x} \frac{1}{n} \sum_{t=1}^{n} E(u_t u_t') \quad \Gamma = \lim_{n\to x} \frac{1}{n} \sum_{k=1}^{n-1} \sum_{t=k+1}^{n} E(u_t u_{t-k}') \quad W = \Sigma + \Gamma = (W_1, W_2) = \begin{bmatrix} W_{11} & W_{12} \\ W_{21} & W_{22} \end{bmatrix}$$

and then transform (y_{1t}, X_t^*) using;

$$X_t^* = X_t - (\hat{\Sigma}^{-1}\hat{W}_2)'\hat{u}_t \tag{17}$$

$$y_t^* = y_t - \left(\hat{\Sigma}^{-1}\hat{W}_2\beta + (0, \Omega_{12}\Omega_{22}^{-1})'\right)' u_t \tag{18}$$

Than CCR is defined as ordinary least squares applied to the transformed data;

$$y_t^* = \beta' X_t^* + u_{1t}^* \tag{19}$$

Where $u_{1t}^* = u_{1t} - \Omega_{12}\Omega_{22}^{-1}u_{2t}$ (Montalvo, 1995: 230-231). Last method is Dynamic OLS that corrects for possible simultaneity bias amongst the regressors. This method involves augmenting the cointegrating regression with lags (q) and leads (r) values of the first differences of the regressors (ΔX_t) to correct for the (second-order) endogenity bias. Firstly we consider standard OLS model;

$$y_t = X_t\beta + D_{1t}\lambda + \varepsilon_t \tag{20}$$

Than we added lead and lag values of the first differences of the regressors;

$$y_t = X_t\beta + D_{1t}\lambda + \sum_{j=-q}^{r} \lambda_{j-r}\Delta X_{t+j} + \varepsilon_t \tag{21}$$

From this equation we estimate β's and as a result these lead and lag eliminate asymptotically any possible bias due to endogenity but before running this regression we have to decide degree of 'q' and 'r' by using information criteria. For all methods we use Barlett as kernel estimator and Andrews Automatic as bandwith method. In CCR method, automatic leads and lags specification determined as lead=2 and lag=3 based on SIC criterion, max=5.

Estimates of the three techniques are summarized in the Table 9. To run the methods we handle CDS as dependent variable and FX and CA as dependent variables. Because CDS is a risk measure of a country and they are both affected by FX and CA. Increase in foreign exchange rates and increase in current account balance level are

expected to lead widening CDS spreads. Widening of CDS spreads means increase in the sovereign bond yields and this is in turn has persuaded investors that subject countries is more riskier than before. From this table results of all three estimation techniques (FMOLS, DOLS & CCR) in addition to OLS for cointegrating regression shows a negative relationship between Current Account and CDS Spread but there is positive relationship for OLS method and their coefficients are statistically insignificant except for DOLS method. Secondly there is positive relationship between Foreign Exchange and CDS Spread for all four methods and their coefficients are statistically significant. However, DOLS has increased explanatory power of independent variables and the adjusted R^2 (0.642) is highest score among them. The results are more robust because we use different coefficient estimating methods in addition to traditional OLS which existence of cointegration leads to endogeneity problem in this method. But apart from this DOLS, FMOLS and CCR are new methods that provide disturbances or exogenous shocks are no longer correlated with endogenous variables in the model and this makes estimated coefficients are unbiased.

Table 9. Comparison of the Cointegration Regression Estimates

	Dep. Var.: cdssa	Coefficient	S.E.	Prob.	Adj. R^2	Remarks
Method : OLS	casa	2.89E-06	4.28E-06	0.5	0.319	Insignificant and Positive Relationship
	fxsa	43.01282	11.72	0		Significant and Positive Relationship
	C	130.7096	41.37	0		Significant and Positive Relationship
Method: DOLS	casa	-3.01E-05	9.35E-06	0	0.642	Significant and Negative Relationship
	fxsa	139.11	25.61	0		Significant and Positive Relationship
	C	-198.04	89.11	0.03		Significant and Negative Relationship
Method: FMOLS	casa	-5.94E-07	7.38E-06	0.93	0.296	Insignificant and Negative Relationship
	fxsa	51.11	20.28	0.01		Significant and Positive Relationship
	C	101.06	71.43	0.16		Insignificant and Positive Relationship
Method: CCR	casa	-1.55E-06	8.26E-06	0.85	0.291	Insignificant and Negative Relationship
	fxsa	53.98	22.53	0.01		Significant and Positive Relationship
	C	90.76	80.02	0.26		Insignificant and Positive Relationship

RESULTS AND CONCLUDING REMARKS

This study investigated the cointegration and causality relationships between Current Account Balance, Foreign Exchange and CDS Spread using 2011m01-2017m03 data period in Turkish economy. The outcome of this paper implies that all three variables are cointegrated in the long run and the relationship holds in the short run as well. Our innovation introduced into the empirical analysis of estimation of cointegrating vector using FMOLS, DOLS and CCR.

Firstly according to granger causality on VECM, there is causality relationship that runs from Current Account to Foreign Exchange and Foreign Exchange to CDS Spread like a knock on effect. This may imply that Current Account may affect CDS Spread via Foreign Exchange. Secondly after detecting cointegration relationship, we determined cointegration coefficients according to three estimating method DOLS, FMOLS and CCR. Result of both methods indicates that there is positive relationship between Foreign Exchange and CDS Premium. This positive relationship can be attributed to deterioration in the trade balance, bad economic performance, rising political turmoil after failed military coup of 15 July 2016 that created negative investment climate in front of both domestic and foreign investors. Especially some major financial variables affected negatively after failed coup of 15 July. For instance CDS spreads increased 220 to 300 basis points, Moody's credit note of Turkey was Baa3 (Under Review) as of 18 July 2016 but decreased to Ba1 (Negative) as of 03 March 2017. Likewise Fitch downgraded credit note of Turkey BBB- (Stable) to BBB-(Negative) between June 2016 and August 2016. Also exchange rate of US Dollar was 2.87 TL as of 14 July 2016 but spiked to 3.09 TL on 16 July 2016. But citizens and domestic investors prevented more depreciation of the Turkish lira by exchanging much of the foreign currency in their portfolios and wallets. In a single week after the coup attempt, $11.5 billion worth of currency was exchanged to the Turkish lira. In addition 2 year bond interest rate was climbed to 14 weeks high after 15 July coup and hit % 9.60 from %8.44. Lastly BIST 100 Index dropped 82825 points to 71595 points. Another turmoil has arisen from tightening of liquidity conditions in international financial markets and captured Turkish economy with high outstanding external debt. Also the negative impact of geopolitical developments on the risk perception towards our region was the main reason for the low-level, flat trend in direct investment inflows in this period. Under these adverse conditions, current account deficit displayed a gradual deterioration and it had been rapidly increased to 6,3% of GDP. Besides CDS spreads rise from 154 bp. in the beginning of 2018 to 300 bp. as of 5 th. July 2018. In addition nearly 20% selloff realized in the Turkish lira this year versus the US dollar. Correspondingly, depreciation in financial conditions worsening the perception of investors on Turkish economy and resulted with increase in CDS premium. So decrease in volatility of foreign exchange rates and current account deficit are expected to ease

risk perception of both domestic and foreign investors and in turn CDS spreads would be smaller that indicates a lower risk of default. According to table 9 there is negative relationship between Current Account deficits (deficit means negative numbers) and CDS spread according to both estimating methods but we couldn't support enough evidence (It's probability is more than 10%) about increase in shortfall of Current Account leads to larger spreads suggesting a higher country risk.

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