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DANIŞMAN: PROF. DR. JALE ORAN

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TEZ ONAY BELGESİ

İŞLETME (İNGİLİZCE) Anabilim Dalı MUHASEBE FİNANSMAN (İNGİLİZCE) Bilim Dalı DOKTORA öğrencisi OSMAN ALTAY'nın
SOVEREIGN CREDIT RATING SYSTEM AND DETERMINANTS OF SHORT TERM SOVEREIGN RISK:EVIDENCE FROM TURKEY

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Öğretim Üyesi Adı Soyadı			**İmzası**
1.	Tez Danışmanı	Prof. Dr. JALE SÖZER ORAN	
2.	Jüri Üyesi	Doç. Dr. EMİN AVCI	
3.	Jüri Üyesi	Yrd. Doç. Dr. MELTEM ULUSAN	
4.	Jüri Üyesi	Yrd. Doç. Dr. TUBA DUMLU	
5.	Jüri Üyesi	Doç. Dr. YAMAN ÖMER ERZURUMLU	

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ABBREVIATIONS

A.I.G.	:	American International Group
BISTVO	:	BIST Volatility
BP	:	Balance of Payments
BRSA	:	Banking Regulation and Supervision Agency
CAB	:	Capital Adequacy of the Banks
CBB	:	General Government Consolidated Budget Balance
CBOE	:	Chicago Board Options Exchange
CDO	:	Collateralized Debt Obligations
CDS	:	CDS Premium Rates for Five Year of Tenure
CDS	:	Credit Default Swap
CESR	:	Committee of European Securities Regulators
CPI	:	Consumer Price Index
CRA	:	The Credit Rating Agency
CUA	:	Current Account
DBA	:	Total Domestic Bank Asset
DBD	:	Domestic Banking Deposit
DBL	:	Domestic Banking Loan
DGB	:	Domestic Government Bond
EC	:	European Commission
ECB	:	European Central Bank
ED	:	External Debt
EDC	:	European Debt Crisis
EFSF	:	European Financial Stability Facility
ER	:	USD/TRL Monthly Average
ERA	:	European Rating Agency
EU	:	European Union
EXPO	:	Export
FDI	:	Foreign Direct Investment
FSB	:	Financial Stability Board
GDP	:	Gross Domestic Product
GDPc	:	Gross Domestic Product Per Capita
GGD	:	General Government Debt

GPO	:	US Government Publishing Office
IBCA	:	International Bank Credit Analysis Ltd
IMF	:	International Monetary Fund
IMP	:	Import
INCRA	:	International Non-profit Credit Rating Agency
IOSCO	:	International Organization of Securities Commission
ISIN	:	International Securities Identification Number
LTD	:	Banking System Loan to Deposits
LTL	:	Non-Performing Loans to Total Loans
MIGA	:	Multilateral Investment Guarantee Agency
MSPTR	:	Monthly S&P 500 Total Return
MVIX	:	Monthly CBOE Volatility Index
NRSRO	:	Nationally Recognized Statistical Rating Organizations
NUMFIT	:	Numeric Expression of the Fitch's Sovereign Credit Rates of Turkey
NUMMO	:	Numeric Expression of the Moody's' Sovereign Credit Rates of Turkey
NUMSP	:	Numeric Expression of the S&P's Sovereign Credit Rates of Turkey
ON	:	Overnight Interest Rate
PB	:	Primary Balance
PNUMFIT	:	Proportional Change in Numeric Expression of the Fitch's Sovereign Credit Rates of Turkey
PNUMMO	:	Proportional Change in Numeric Expression of the Moody's' Sovereign Credit Rates of Turkey
PNUMSP	:	Proportional Change in Numeric Expression of the S&P's Sovereign Credit Rates of Turkey
RES	:	International Reserves
S&P	:	Standard and Poors
SEC	:	Securities and Exchange Commission
SMR	:	Stock Market Return
TB	:	Trade Balance
TRV	:	Foreign Trade Volume
UN	:	United Nations
UR	:	Unemployment Rate
USA	:	United States of America
WEF	:	World Economic Forum

ABSTRACT

In this study, sovereign risk of Turkey has been examined analyzing the relations among economic, fiscal, money market, event risk factor variables and sovereign credit rates of Turkey. Short term variables which are in association with sovereign risk of Turkey have been determined through time series analysis modeling. Considering the critiques regarding credit rating agencies not being able to reflect current situations of sovereigns, determination of those short term variables effective on the credit rates and sovereign risk is gaining a great importance. Variables which are thought to have effect on the sovereign credit rates of the agencies are investigated through least square methodology of the times series analysis using Eviews software of statistical and econometric analysis.

The study consists of two parts. In the first part of the study, sovereign credit rating system is explained within the context of the borrowing, country risk and credit rating with the history and critiques of the system. In the second part empirical study is conducted and results are presented with interpretations and suggestions.

Key Words: Credit Rating Agencies, Sovereign Rating, Credit Rating System, Country Risk, Credit Default Swaps, CDS, Eurobond Spreads, Standard & Poors, Moody's, Fitch

ÖZET

Bu çalışmada, Türkiye'nin ülke kredi riski, ekonomik, mali, parasal ve olay risk faktörleriyle Türkiye'nin ülke kredi notları arasındaki ilişki analiz edilerek sorgulanmıştır. Türkiye'nin ülke riskiyle ilişkili kısa dönem değişkenler zaman serisi analizi modellemesi yapılarak belirlenmiştir. Kredi derecelendirme kuruluşlarının ülkelerin mevcut durumlarını yansıtmada başarısız olduklarına dair eleştiriler dikkate alındığında, kredi notları ve ülke riski üzerinde etkili olan kısa dönem değişkenlerin belirlenmesi büyük bir önem kazanmaktadır. Derecelendirme kuruluşlarının ülke kredi notları üzerinde potansiyel etkisi olduğu umulan değişkenler istatistik ve ekonometri analiz programı olan Eviews kullanılarak, zaman serisi analizinin en küçük kareler yöntemi metoduyla analiz edilmiştir.

Çalışma iki bölümden oluşmaktadır. İlk bölümde ülke kredi derecelendirme sistemi; borçlanmanın içeriği, sistemin tarihi ve sisteme yöneltilen eleştirilerle ülke riski ve kredi derecelendirme sistemi alt başlıklarıyla açıklanmaktadır. İkinci bölümde ise bu tezin ampirik çalışması yorumlar ve önerilerle birlikte sunulmaktadır.

INTRODUCTION

Liberalization of the financial markets pursuant to global financial integration caused the capital movements between the countries to reach significant levels. In the markets, national & international, where countries, public and private entities and individual investors searching for financial opportunities and desiring to evaluate their funds efficiently, true/accurate evaluation and determination of the borrowing entities is of great importance. The Credit Rating Agencies (CRAs), at this point, assuming the role of evaluation of the borrowing entities, has been developing their services. The interest to the evaluation facilities and the credit ratings greatly increased especially in 1990s parallel to the increase in the capital movements through financial integration and liberalization processes.

Credit ratings are used as an important tool for limitation of the portfolio risks and revealing of the significant components of the market discipline. As well as risk adjustment requirements, regulation and supervision arrangements in the markets increased the importance of the credit rating. The matter of accuracy of the credit ratings used actively in regulatory process in global and national level gained great advantage in allocation of the international capital. Indeed, failure of the credit ratings to indicate the real credit risks during a period when the international capital is very liquid may lead systemic crises. Failures of the credit rating also worsen the situation in cases of the debt crisis when repayment of the public debt is at risk relative to the revenues and expenditures of the sovereign. Severe examples of debt crisis are experienced in Latin American countries during the 1980s, and the United States and the European Union since the mid-2000s.

In general, rising private and government debt levels around the world and increasing risk levels and borrowing cost lead to the sovereign debt crisis, while causes of

the crisis varied by country. In several countries, private debts arising from a property bubble were transferred to sovereign debt as a result of banking system bailouts and government responses to slowing economies post-bubble.

The financial crisis erupted in years 2007/2008 endangered the stability of the world-wide financial system. Governments paid an effort in order to lessen effect of the financial crisis in both short and long run. They introduced bailout packages and provided mixture of generous public guarantees and fiscal stimulus. Burden of these efforts together with existing crisis conditions brought sovereign risk back on the agenda. Some countries - most notably Greece - experienced a dramatic loss of market confidence and saw the interest rates on their debt skyrocketing.

Credit rating agencies and their rating approaches are widely criticized during and after the financial crisis. The sovereign credit rates given by those agencies were expected to reflect forthcoming adversities in the economies. Many international authorities proposed new frameworks for the regulation and supervision of the credit rating sector, and various steps have been taken in this respect. General themes of the discussions are dealing with reducing the overreliance on credit ratings, regulating and reshaping the credit rating industry and development of alternative systems which make it possible to determine risks necessary to predict financial crisis accurately.

Within this perspective, main focus of this study is determination of the short term variables in association with sovereign risk of Turkey in order to develop a suggestion for the interpretation of the sovereign credit risk. To this aim, credit ratings by the three big credit rating agencies, namely Standart&Poors, Moody's and Fitch, are to be analyzed with respect to their conformity to the market indicators as a measure of the sovereign credit risk. Variables which better reflect short term sovereign risk condition of Turkey are to be defined in this study.

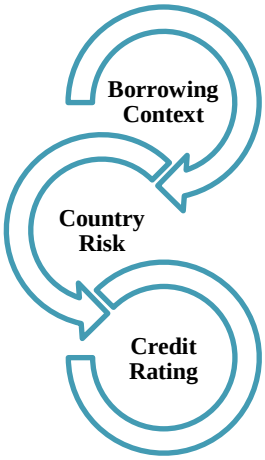
The study consists of two parts. In the first part of the study, sovereign credit rating system shall be explained within the context of the borrowing, country risk and credit

rating. History of the credit rating and critiques regarding credit rating and credit rating agencies are explained under the title of credit rating. The most recent European Debt Crisis (EDC) and sovereign defaults are also discussed in this part. In the second part, empirical study of this dissertation is presented with interpretations and suggestions.

1. SOVEREIGN CREDIT RATING SYSTEM

Sovereign credit rating system can be understood better when it is considered within the contexts of the borrowing and the country risk.

Figure 1: Context of the Sovereign Credit Rating



Source: Solberg, R.L. (1992), Country Risk Analysis

1.1. Sovereign Borrowing

Countries want to raise large volumes of funds at the lowest possible cost level. Balancing the profile of the debt portfolios, roll over risk and, exchange rate risk and liquidity risk etc. are the challenges faced by the debt managers.

Complications generated by the pressures of a rapid increase in sovereign risk are the challenges to be dealt with by the governments and the debt managers. There should be a consensus on what exactly constitutes sovereign risk in order to properly measure and price this risk. Since the 'sovereign risk pricing' performance is not very impressive, suggested market measures of this risk should be treated with great caution (OECD 2012).

1.1.1. Public Debt Management

Public debt management concerns with funding collective or governmental activities. Main purpose of this field is to determine what the government or collective organizations should do with respect to priorities of these activities and public fund resources. (Samuelson and Nordhaus 1992) Public fund resources or governmental resources mainly consist of taxes, capital revenues, special revenues such as donations and aids and revenues of administrative organizations. Public borrowing is an alternative source to these fund resources in time for a government's financing of public expenditures.

Public debt management is in interaction with monetary and fiscal policy and it should be coordinated accordingly, public debt management is part of the integrated financial management of the government and is closely linked to budget execution and treasury operations, in particular with cash flow management (Cecchetti et al. 2010).

Public debt management is also effective on development of domestic financial markets of countries as the activities of the public debt management become benchmark for the other market participants. By this way a good public debt management can promote economic development and growth of the countries (Cecchetti et al. 2010).

"Guidelines for Public Debt Management" which was prepared by the Staffs of the International Monetary Fund and the World Bank and published on March 21, 2001, provides a good explanation of what public debt management is and why it is important.

According to this guideline governments should seek to ensure that both the level and rate of growth in their public debt is fundamentally sustainable, and can be serviced under a wide range of circumstances while meeting cost and risk objectives. Guideline advises debt managers to ensure that the fiscal authorities are aware of the impact of government financing requirements and debt levels on borrowing costs. Examples of indicators that address the issue of debt sustainability include the public sector debt service ratio, and ratios of public debt to GDP and to tax revenue.

"Several debt market crises have highlighted the importance of sound debt management practices and the need for an efficient and sound capital market. Although government debt management policies may not have been the sole or even the main cause of these crises, the maturity structure, and interest rate and currency composition of the government's debt portfolio, together with substantial obligations in respect of contingent liabilities have often contributed to the severity of the crisis. Even in situations where there are sound macroeconomic policy settings, risky debt management practices increase the vulnerability of the economy to economic and financial shocks" (World Bank 2001a).

Public debt levels increased dramatically since the start of the financial crisis. The increase in the public debt level in the industrial countries may not be sustained due to the rising future costs related to the ageing of their populations. Application of drastic measures should be considered as the growth of current and future liabilities of governments prevails (Cecchetti et al. 2010). Serious fiscal vulnerabilities arise from long lasting of the higher debt levels and create complex interactions between public debt management and monetary policy (Blommestein and Turner 2012).

1.1.1.1. Principles of Debt Policy

General objective of debt policies of the government is to optimize the strategic use of debt and to achieve the lowest cost of funding. Debt policy helps determination of the costs and benefits of debt within established principles. Debt policy and its principles are also required to guide governments' on-going relationship with the rating agencies and the related investors (World Bank 2001a).

Main principles of debt policy are listed as liquidity, transparency and accountability.

Liquidity

Governments have current and future liquidity needs. Information of liquidity need of the government should be shared by debt management, fiscal, and monetary authorities,

because, monetary operations conducted using government debt instruments and markets effect the functioning of government debt markets, and financial condition of dealers in these markets. Therefore, the efficient conduct of monetary policy requires a solid understanding of the government's short- and longer-term financial flows. Consequently, at the operational level, debt management, fiscal and monetary authorities generally share information on the government's current and future liquidity needs (World Bank 2001b).

Liquidity means conversion of a security to cash in a considerably short time and with minimum or no loss of value. To accomplish the aim of the liquidity enhancement, existing securities may be reopened with shorter maturities. Liquid markets also serve as pricing mechanism. In those markets without liquidity, prices cannot properly reflect true values of the securities. Initial offerings of those securities which have strong secondary markets would be more successful (Fama 1970).

Transparency and Accountability

Transparency strengthens effectiveness of debt management operations. In the name of transparency, goals and instruments of policy should be disclosed to the public (financial markets) and related authorities should make a credible commitment to meeting them. Transparency also serves in accountability through enhancing good governance by the central banks, finance ministries, and other public institutions involved in debt management (Kopits and Craig 1998).

Transparency requires clarity of roles, responsibilities and objectives of financial agencies in charge of debt management. Common responsibilities among the ministry of finance, the central bank, or a separate debt management agency should also be clearly defined. Allocation of the duties such as debt management policy advice for undertaking primary debt issues, secondary market arrangements, depository facilities, and clearing and settlement arrangements for trade in government securities, should be made and publicly disclosed. A transparency in this way can help resolve conflicts between monetary and debt management policies and operations, help issuers reduce transaction costs and meet their

portfolio objectives and also reduce uncertainty among investors, lower their transaction costs, encourage greater investor participation. Transparent and clear debt management which reduces uncertainty made positive effect on decreasing cost and risk of borrowing (Kopits and Craig 1998).

Materially important aspects of debt management operations should be publicly disclosed. Regulations and procedures for the primary distribution of government securities, including the auction format and rules for participation, bidding, and allocation should be conveyed to all participants. Information on the past, current, and projected budgetary activity, including its financing, and the consolidated financial position of the government should also be disclosed to public (Sağlam 2008). Debt management activities should be audited in different periods by external auditors. Disclosure of audit reviews of debt management operations strengthens accountability framework for debt management (Sağlam 2008).

Simplicity

This principle requires easy understanding and realization of borrowing procedure, borrowing tools and issuance of these tools, and redemption and clearing transactions in the secondary market (World Bank 2001a).

1.1.2. Debt Securities

In the context of finance, security is an investment instrument, other than an insurance policy or fixed annuity, issued by a corporation, government, or other organization which offers evidence of debt or equity (The United States Securities Exchange Act of 1934).

Financial securities are classified in two types; equity and debt. Equity is ownership interest in a corporation in the form of common stock or preferred stock while, debt security is a financial instrument in the form of bond or note with specified interest,

representing a loan to an entity (such as a government or corporation) in which the entity promises to repay the bondholders or note-holders the total amount borrowed. That repayment in most cases is made on maturity although some loans are repayable in installments. Unlike shareholders, holders of bonds and notes are not owners of an entity, but its creditors.

In return for the loan, the entity will usually compensate the bondholders or note-holders with interest payments during the life of the bond or note. The interest rate on bonds and notes can be a fixed or floating rate.

Literally debt securities are studied under the subject of fixed income securities. Main debt securities are debentures, bonds, deposits, notes or commercial papers with their certain characteristic features such as maturity and interest rate. The holder of a debt security is typically entitled to the payment of principal and interest, together with other contractual rights. Debt securities are generally issued for a fixed term and redeemable by the issuer at the end of that term (Sundaresan 2009, Rajwade 2008).

Debt securities accompanied by collateral called protected security and those are without collateral called unsecured (Sundaresan 2009, Rajwade 2008). Unsecured debt securities may be attributed as “senior” through a contractual right which provides priority to other unsecured debt securities in case of bankruptcy of the issuer. Debt that is not senior is called "subordinated".

Euro debt securities are securities issued internationally outside their domestic market in a denomination different from that of the issuer's domicile. They are often called eurobonds and euronotes (Sundaresan 2009, Rajwade 2008).

Government bonds are medium or long term debt securities. They are issued by sovereign governments or their agencies. Typically they carry a lower rate of interest than corporate bonds, and serve as a source of finance for governments.

Sub-sovereign government bonds are known as municipal bonds; represent the debt of state, provincial, territorial, municipal or other governmental units other than sovereign governments. Supranational bonds represent the debt of international organizations such as the World Bank, the International Monetary Fund, regional multilateral development banks and others.

1.1.2.1. Features of a Debt Security

Issuer: An entity such as a listed company, government or supranational organization like the Asian Development Bank or the World Bank that borrows the money.

Principal: The par value or the face value of the debt security payable at maturity (Fabozzi 2007).

Coupon rate: The stated annual rate of interest that the issuer pays on the principal to the holder of the debt security. Coupon rates can be divided into three main categories:

Table 1: Interest Rate Types of the Debt Securities

Fixed rate	There is a fixed rate of interest over the life of the debt security.
Floating rate	The interest rate is adjusted periodically according to a predetermined benchmark.
Zero-coupon	There are no periodic interest payments.

The debt securities are usually issued at a discount to its par value. On maturity, investors receive a payment comprising principal and interest.

Term: The period of time, usually stated in years, over which the issuer of a debt security has promised to meet its obligations.

Guarantor: A debt security may be guaranteed by a third party called a guarantor which agrees to repay the principal and/or interest to holders of the debt security if the issuer defaults.

Callable or Convertible: A debt security may be callable meaning that the issuer may redeem the debt security before it matures. A debt security may also be convertible which gives the holder the right to convert the debt security into a specified number of shares in a company. In certain cases, issuers may have the right to convert a debt security if certain pre-determined conditions are met (Sundaresan 2009, Rajwade 2008).

1.1.2.2. Price of a Debt Security

Debt securities have face values, or par values, which is projected to be redeemed at their maturities. But prices of the debt securities are subject to fluctuation in cases of buying or selling them prior to their maturities. Therefore investors should be aware of the potential fluctuations in debt prices. Similar to other types of securities, debt security prices fluctuate in response to the forces of supply and demand. These forces are in general associated with interest rates, time to maturity, and degree of certainty of repayment (reflected in the credit rating), yield and overall economic conditions (Sundaresan 2009, Rajwade 2008).

In addition, exchange rate risk (if applicable), liquidity risk and the terms of the debt issued are also important factors effective on price. When the price of a debt security increases above its face value, it is said to be selling at a premium. When a debt security sells below its face value, it is said to be selling at a discount (Sundaresan 2009, Rajwade 2008).

Interest Rate

The price of a fixed rate debt security usually changes in reverse direction of market interest rates. On the condition of other factors being equal, if interest rates go up, the price of the debt security will go down and if interest rates go down, the price of the debt security will increase (Fabozzi 2001). The price of the debt security, therefore, may be higher or lower than the original investment if it is sold before maturity.

Time to Maturity

It is a general rule that if there is a long time to maturity the price of the debt security is likely to be more volatile because the longer the time, the greater the risk (Fabozzi 2001). In general, the market price of a long-term debt security will change more with a given change in market interest rates than the market price of a short-term debt security.

Credit Rating

Credit rating considers risk of payment of the interest and principal are subject to the credit risk associated with the issuer. The credit rating agencies usually base their ratings on the financial condition of a debt issuer, the likelihood of it repaying the principal amount at maturity and its ability to meet the scheduled interest payments. However, a credit rating not only considers issuer's ability to repay the debt, it also considers the return on a debt security (Cantor and Packer 1995).

Yield to Maturity

The yield to maturity on a debt security is the internal rate of return an investor will receive by holding the security to maturity. It takes into account the sum of the interest payments, the redemption value at maturity and the purchase price. The yield to maturity on a debt security moves in the reverse direction to the price.

When the price goes up, the yield to maturity will fall, and vice versa (Fabozzi 2001). Generally, the relationship between yield to maturity and price is as follows:

Price = Par	Yield = Coupon rate
Price > Par	Yield < Coupon rate
Price < Par	Yield > Coupon rate

Credit (Bond) Spread

Difference in yield of a security with respect to another benchmark security is called credit spread, bond or yield spread. This difference is due to the difference in the credit qualities of the securities. Risky debt securities offer more yields. Generally, a credit risk-free benchmark security or reference rate, such as U.S. Treasury bonds or LIBOR is used in order to quote credit spread of a particular security.

1.1.3. Bond Market

Bonds are commonly referred to as fixed-income debt securities which are issued by public authorities, credit institutions, companies and supranational institutions in the primary markets (Sundaresan 2009, Rajwade 2008). The most common process of issuing bonds is through underwriting. In underwriting, one or more securities firms or banks, forming a syndicate, buy an entire issue of the security from an issuer and re-sell them to investors. The security firm takes the risk of being unable to sell on the issue to end investors (Sundaresan 2009, Rajwade 2008). However, government bonds are conventionally auctioned.

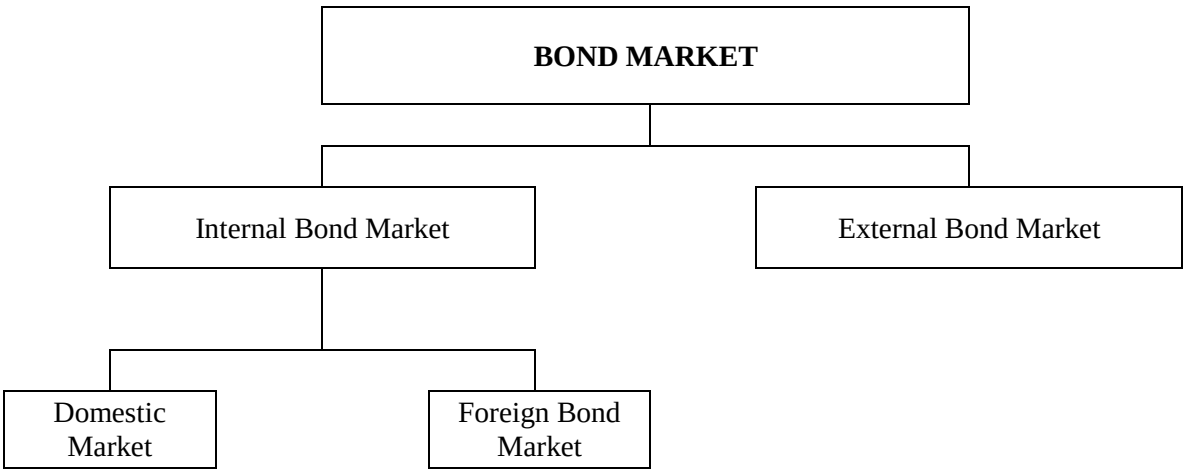
There is no uniform system for classification of bond market of a country. In the book, Fixed Income Analysis, by Frank J. Fabozzi, bond market of a country classified into two, internal bond market and external bond market.

The internal bond market of a country is also called the national bond market. It is divided into two parts: the domestic bond market and the foreign bond market. The domestic bond market is where issuers domiciled in the country issue bonds and where those bonds are subsequently traded.

The foreign bond market of a country is where bonds of issuers not domiciled in the country are issued and traded. For example, in the United States, the foreign bond market is the market where bonds are issued by non-U.S. entities and then subsequently traded in United States. In the U.K., a sterling-denominated bond issued by a Japanese

corporation and subsequently traded in the U.K. bond market is part of the U.K. foreign bond market. Bonds in the foreign sector of a bond market have nicknames. For example, foreign bonds in the U.S. market are nicknamed "Yankee Bonds" and sterling-denominated bonds in the U.K. foreign bond market are nicknamed "Bulldog Bonds." Foreign bonds can be denominated in any currency. For example, a foreign bond issued by an Australian corporation in the United States can be denominated in U.S. dollars, Australian dollars, or Euros (Fabozzi 2007).

Figure 2: Bond Market Sector



Source: Fabozzi 2008, 'The Handbook of Fixed Income Securities'

1.1.4. Treasury Borrowing Tools

Treasury borrowing tools vary in type and function. But the most generic treasury borrowing tools are Domestic Government Bonds (DGB), Foreign Exchange Bonds and Eurobonds.

In brief, Eurobonds are such bonds which are denominated in U.S. Dollars or other currencies and sold to investors outside the country whose currency is used for denomination. Eurobonds are usually issued by large underwriting groups composed of banks and issuing houses from many countries. Eurobond market serves as an important source of capital for multinational companies and foreign governments and they are attractive borrowing tools. Because, Eurobonds give issuers the flexibility to choose the country in which to offer their bond and in which currency they prefer. Eurobonds are also attractive to investors as they have small par values and high liquidity (Eun and Resnick 2009).

On the other side, foreign bonds are the bonds which are issued in a domestic market by a foreign entity, in the domestic market's currency. They are regulated by the domestic market authorities and are usually given nicknames that refer to the domestic market in which they are being offered, like bulldog bonds, matilda bonds, and samurai bonds (Eun and Resnick 2009).

Foreign bonds differ from Eurobonds in another aspect which is the composition of the underwriting syndicate. Eurobonds are underwritten by an international syndicate and is not subject to the rules and regulations of any country. However, Foreign Bonds are underwritten in the country of currency denomination, and are therefore subject to the regulations of that country (Eun and Resnick 2009).

1.2. Credit Rating

Credit rating (rating) is an evaluation of credibility and repayment capability of a specific debt. It is a classification system used to estimate whether an entity or financial asset will perform its financial obligations within due times, conducted on the past and current qualified data of the cited entity or financial asset, and in which performance analyses were conducted on the prospective projections (Kräussl 2003, Kaminsky 2002). In order to insure better understanding of the classification, the results obtained from the date shall be converted into the symbols unique to each of the CRAs and classified into

categories (see Table 5). In this manner, each of the entities or financial instrument divided into categories is named with the credit rating of that category.

The rating activities aim at measuring the refunding capacity of the debt by the borrower entity within due times and regularly (Moody's 2009). Those realizing these activities are specialized professional analysts. Not only are the analysts involved at the credit rating assignment phase to each of the entities and financial assets, rather, a Board is involved actively.

The credit ratings are used in risk analyses of the entities operating in money and capital markets, investors issuing or investing in the debt instruments as well as all intermediary and regulatory entities and bodies (Infrangilis 2012, Kaminsky 2002). Symbols have universal application. The country credit ratings provide easily obtainable, comparable and reliable information determined by CRAs in principle, to the investors related to refunding capacity of the debt of the country. Country credit ratings are of great importance since they provide borrowing opportunity at different markets for borrower countries.

It is obvious that rating process brings advantages in many aspects. In summary, credit ratings contribute to reliable, transparent and stabilized operation of the financial markets in an economy. Besides, it insures integration by insuring external funding by the (public, private etc.) economic agents and integrated operation of domestic markets with international markets.

It is accepted that the modern credit rating agencies play an important role in the financial market. Credit rating agencies assess the default risk of corporate and governmental borrowers and issuers of the other fixed income securities, such as commercial paper, preferred stocks, bank certificates of deposit, mortgage backed securities, and several other financial derivatives.

However, all such advantages may be effective in the markets operating, regulated and audited effectively. In the current application, since all rating works are conducted subject to the payment of fees by the issuer entity, this application has been the center of criticisms especially in the recent periods. Insufficiency of the national and international regulations caused significant criticisms to the CRAs that CRAs lost their objectivity and acted too optimistic or pessimistic (Alexe et al. 2003).

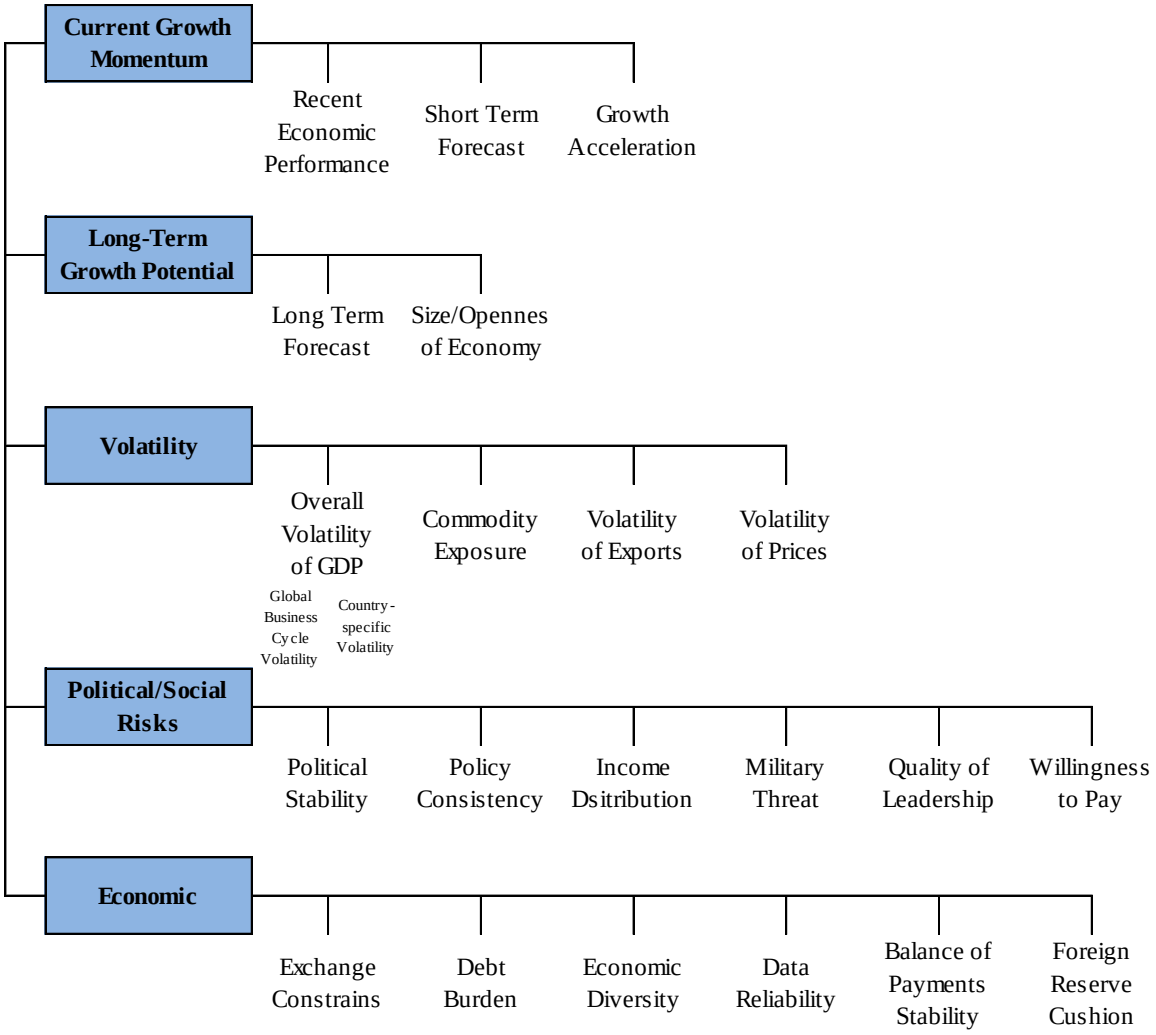
1.3. Country Risk

In country level there are two risk terms: political risk and country risk, which are two terms used interchangeably. In spite of conceptual association between them, they are different terms with respect to their area of expression. Country risk is a collection of risks associated with investing in a foreign country. These risks include political risk, exchange rate risk, economic risk, sovereign risk and transfer risk, which is the risk of capital being locked up or frozen by government action. Country risk is also used interchangeable with the sovereign risk (Conklin 2002, Jarvis 2008).

According to Ronald L. Solberg (1992) country risk is the risk that a country will be unable to service its external debt due to an inability to generate sufficient foreign exchange. Within this perspective, country credit risk ratings compiled by commercial sources as an attempt to estimate country-specific risks, particularly the probability that a country will default on its debt-servicing obligations (Haque et al. 1997)

World Bank Group's Multilateral Investment Guarantee Agency defines political risk as the probability of disruption of the operations of multinational enterprises by political forces or events, whether they occur in host countries or result from changes in the international environment. In host countries, political risk is largely determined by uncertainty over the actions not only of governments and political institutions, but also of minority groups such as separatist movements (MIGA 2011).

Figure 3: Dimensions of Country Risk



Source: http://www.qfinance.com/

Studies proves that increase in country risk due to the debt burden have adverse effect on borrowing cost of the corporations in the countries. Ağca and Celasun document that the corporate sector faces higher borrowing costs when the external debt of the public sector is higher. They argue that an increase in sovereign debt by one standard deviation from its sample mean is associated with 9 percent higher loan yield spreads. According to their study correlation is considerably higher in countries with weak creditor rights and past sovereign default episodes (Ağca and Celasun 2012).

1.4. History of the Credit Rating Companies

Historically, initial credit rating service came on the scene in United States. The services were in two formations and provided by the firms founded accordingly; credit reporting agencies and credit rating agencies. Although their services were similar, credit reporting agencies provided information to the investors in order to give decision about how much credit to offer, credit rating agencies provided standardized ratings of large borrowers (Geisst 2006, Langohr and Langohr 2008).

The root of rating concept depends on the rating method developed by Lewis Tappan in 1837, a dry goods dealer from New York, to determine the statuses of his customers at economic crisis environment. Tappan established a network including 180 correspondents many of whom being lawyers in the East and West states to determine the credibility of the debtors laid the foundation of rating. The Mercantile Agency of the Levis Tappan was the first organized effort to systematically collect and collate information about thousands of scattered small businesses and provide that information to the lenders in useful form. Later, Robert Dun became the owner of this establishment and published the first ratings guide in 1859 and the name of the company changed to Dun & Company which later changed to Dun & Bradstreet after the merger with the Bradstreet in 1932. Bradstreet Agency was founded by John Bradstreet a lawyer from Cincinnati and published first standardized firm ratings in 1849. Dun & Bradstreet it acquired Moody's Investor Service in 1962 (Geisst 2006, Langohr and Langohr 2008).

In United States, there are currently four full service credit rating agencies, in addition to the several agencies that provide credit rating for specific industries, such as banks and insurance companies. The earlier full service rating agency was Moody's Investor Service established by John Moody in 1909. Poors Publishing Company was opened in 1916; Standard Statistic Company and Fitch investor service in 1922 (Geisst 2006, White 2010).

Conduct of rating studies in sectoral basis was started with John Moody's start to rate the bonds of the US railroads. After one year, Moody extended the rating operations to the bonds of the utility services companies and manufacturing entities. Standard and Poor's rated the company bonds starting from 1923, municipality bonds from 1940s, and then the commercial papers from 1969, as Standard Statistics Company before merger under this name. All shares of Standard and Poor's continued the operation as an independent company until 1966 in which it was transferred to McGraw-Hill a large printing house (Geisst 2006, White 2010).

The most important enterprise realized in the USA until such time was "Duff and Phelps" established in 1982 and started to rate the bonds of the group of companies spread on a large area. Three important CRAs established in 70s McCarthy, Crisanti and Maffei joined with Duff and Phelps in 1991. International Bank Credit Analysis Ltd, IBCA established in 1978 operated on rating of the banks and financial institutions especially. This entity was merged with Euronation a French CRA in 1992 making the largest and independent CRA in Europe. The capital flow to the international financial markets caused replacement of the capital markets with the banks, and such caused the rating operations to be conducted in overseas countries (Geisst 2006, White 2010).

As Rating operations are applied in the financial markets of the developed countries they are applied in different countries with the markets newly emerging. With the increasing demand in such countries, the number of CRAs increased fast. On the other hand, increase in the external demand became effective on establishment and spreading of the CRAs in the overseas countries. In the mid of the 90s Moody's opened the offices in Tokyo, London, Paris, Sydney, Frankfurt and Madrid. Standard and Poor's established offices in Tokyo, London, Paris, Melbourne, Toronto, Frankfurt, Stockholm and Mexico City; besides it took over or established close relationship with the local rating companies in Sweden, Australia, Spain and Mexico.

Credit rating agencies historically provided rating of the issuers without charge and generated revenues by selling publications reporting the ratings. As the materials were easily copied, potential revenues were lost. Following the default of the Penn Central Railroad in 1970, issuers of commercial paper preferred to pay for objective ratings of their commercial papers in order to assure investors. This new practice quickly became a standard practice in the industry (Geisst 2006, White 2010).

In brief, rating is an evaluation of credibility and repayment capability of a specific debt. There are two types of uses as external rating and internal rating within the scope of rating.

1.5. Critiques Regarding Sovereign Credit Rating System

Consolidation of variety of information about a country into a single alphanumeric symbol which is used in investment decision making processes and in the comparisons between different countries is not an easy task. The interpretation of ratings is complicated by the heterogeneity of indicators (political stability, inflation, etc.) which may have been used in deriving them. However, it is not clear which ones of the many possible factors do actually influence the payback capacity of a country.

Recent global financial crisis intensified the ongoing discussions on the creditworthiness of the credit rating agencies. Especially the criticisms to the CRAs increased with the allegation of wrong rating of the derivative products after bankruptcy of Lehman Brothers Eurozone debt crisis. The center of the criticism is the lack of transparency in the process of the credit ratings of the countries. Another complaint is that the credit ratings follow the market indicators with significant delay and unnecessary distortion potential of the changes to the market perception. Further elevation of the problems after the rating decrease of a country being in financial and economic problems causes the CRAs are deemed as entities triggering the crises in systematic manner.

Final report of the U.S. National Commission on the causes of the financial and economic crisis in the United States conclude that the failures of credit rating agencies were essential cogs in the wheel of financial destruction. The three credit rating agencies were key enablers of the financial meltdown. The mortgage-related securities at the heart of the crisis could not have been marketed and sold without their seal of approval. Investors relied on them, often blindly. In some cases, they were obligated to use them, or regulatory capital standards were hinged on them. This crisis could not have happened without the rating agencies. Their ratings helped the market soar and their downgrades through 2007 and 2008 wreaked havoc across markets and firms (The Financial Crisis Inquiry Commission, 2011).

Using the credit rates of the countries in risk management as a tool intensively is also criticized and it is recommended to use different indicators as alternatives to the credit ratings. Compared to developed countries, developing countries are more vulnerable to the ratings by the agencies because of the developing countries' limited access to the capital markets. In such a situation, the methodology used and the factors or indicators included in the rating process by these agencies are very important and there is a need for increase in the objectivity of the rating decisions and greater transparency and rationalization of the criteria used by the rating agencies. Improvement in this way is expected to contribute to the reliability and consistency of the credit rating. It is also expected to diminish non-essential negative effects (Loser 2004, Iyengar 2012)

Financial Stability Board settled principles regarding reduction in reliance on CRA ratings in 2010 and published those principles under the title "Principles for Reducing Reliance on CRA Ratings". The principles envisages amendments in standards, laws and regulations, reduction in market reliance on CRA ratings, Central Banks', commercial banks', investors', investment manages' reliance in their operations (Financial Stability Board, FSB, 2010).

Table 2: Sovereign Credit Rating System Problems and Consequences

Problem Drivers	Consequences	Global Problems
Requirements to use external credit ratings in legislation	Overreliance on external ratings leading to procyclicality and "cliff" effects in capital markets	**Risks to market stability** **Low confidence in financial market** **Undermined investor confidence** **Undermined ratings quality**
Excessive use of external ratings for internal risk management		
Investment strategies directly linked to ratings		
Insufficient information on structured finance products		
Insufficient objectivity and completeness of the sovereign rating process	Contagion effects of sovereign debt rating changes	
Lack of transparency on the sovereign rating process		
Inappropriate timing of ratings publication		
High market concentration in the credit rating market	Limited choice and competition in the credit-rating market	
High barriers of entry into the market of credit ratings		
Lack of comparability of ratings		
Lack of civil liability regimes in some Countries	Insufficient right of redress for investors	
Risk of regulatory arbitrage		
Potential conflicts of interest due to ownership structure	Undermined independence of credit rating agencies	
Potential conflicts of interest due to the "issuer-pays" model		
Insufficient communication and transparency of ratings and their underlying methodologies	Insufficiently sound credit rating methodologies and processes	
Inappropriate timing of ratings publication		

Source: Moody's Investor Service, Sovereign Ratings and Regulation: The Problem of Intervention

Alongside the developments in the markets Rating Agencies enhanced their improvements regarding rating quality, transparency, and corporate governance since the onset of the financial crisis. These self-improvement measures include revision in rating methodologies, staff training, and better transparency applications.

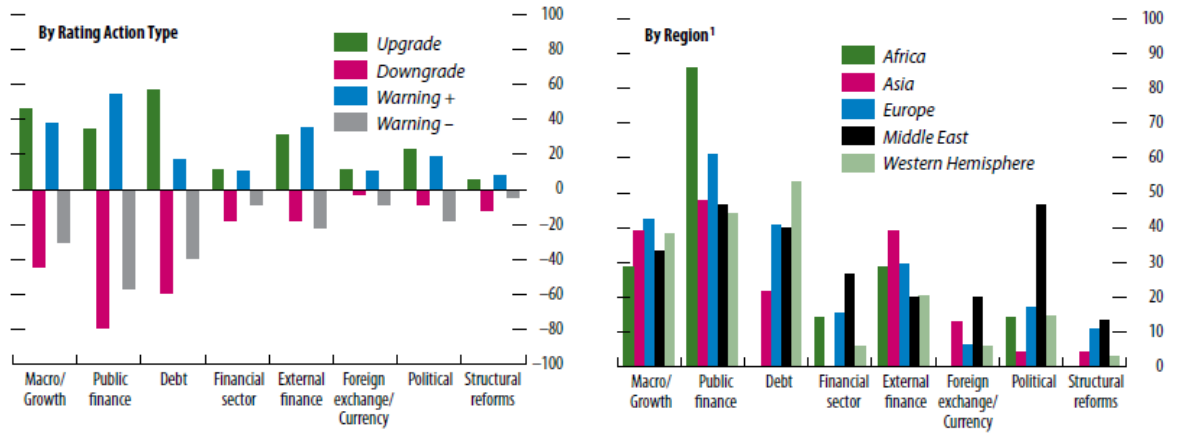
Critiques regarding of the sovereign credit rating system are grouped and detailed under the following titles.

1.5.1. Weak Early Warning Capacity

The primary purpose of obtaining a rating is to enhance access to private capital markets and lower debt issuance and interest costs. Credit rating agencies as information gatherers and processors, can reduce a country's borrowing costs by certifying its value in a market, thus solving or reducing the informative asymmetries between purchasers and issuers. In spite of this crucial importance credit rating agencies and their rating methodologies are under criticism since almost their emergence (IMF 2010).

It is expected that CRAs will provide with information about the risk of the country assets principally by assigning the credit rates to the countries. However, delayed following of market indicators by the credit note changes –especially in financial stress periods- is the center of the criticisms. Although CRAs defend themselves by alleging that they rate the countries based on long term projections, the credit rate changes of the CRAs expected to direct the markets by determining the country risks beforehand are not functional and do not act as early warning mechanism. Considering better signal concerns some CRAs started publishing early indicators of a potential rating change over the next one- to two-year period in the forms of "outlooks," "reviews," and "watches" (IMF 2010).

Figure 4: Rating Drivers, May 2007–June 2010 (In percent of total rating actions)



Source: IMF Financial Stability Report 2010

According to an analysis conducted by the IMF staff through calculations using data from Fitch, Moody's, and Standard & Poor's shows that the drivers changes in credit rating were not uniform across types of rating actions or geographic regions (Figure 4) For instance while fiscal balance and debt level were the most commonly cited variables across rating action types and geographic distribution, they played a proportionally greater role in driving negative rating actions than positive ones. However, external financing conditions and political factors seem to matter more in an upgrade/ positive outlook decision (IMF 2010).

The 1997–1998, Asian crisis highlighted CRAs' potential for reinforcing booms-and-busts of capital flows. As ratings lagged, instead of leading market events and over reacted during both the pre-and post-crisis periods, they may have helped to amplify these cycles. Sovereign ratings are sticky, lagging market sentiment and overreacting with a lag to economic conditions and business cycles (United Nations Conference on Trade and Development - UNCTAD, 2008).

Table 3: Sovereign Rating Failures Statistics, 1997-2002

Failure	Failed rating (and date)	Corrected rating (and date)	Notches Adjusted	Key Factor
S&P				
1997: Thailand	A (3 Sep. 1997)	BBB- (8 Jan. 1997)	4↓	Evaporation of Reserves
1997: Indonesia	BBB (10 Oct. 1997)	B- (11 Mar. 1997)	7↓	Collapse of Asset Quality
1997: Rep. of Korea	AA- (24 Oct. 1997)	B+ (22 Dec. 1997)	10↓	Evaporation of Reserves
1997: Malaysia	A+ (23 Dec. 1997)	BBB- (15 Sep. 1997)	5↓	Collapse of Asset Quality
1998: Rep. of Korea	B+ (18 Feb. 1998)	BBB- (25 Jan. 1999)	4↓	Reserves Replenishment
1998: Romania	BB- (20 May 1998)	B- (19 Oct. 1998)	3↓	Evaporation of Reserves
1998: Russian Federation	BB- (9 June 1998)	B- (13 Aug. 1998)	3↓	Evaporation of Reserves
2000: Argentina	BB (14 Nov. 2000)	B- (12 July 2000)	4↓	Fiscal Slippage
2002: Uruguay	BBB- (14 Feb. 2002)	B (26 July 2002)	5↓	Evaporation of Reserves
Moody's				
1997: Thailand	A2 (8 Apr. 1997)	Ba1 (21 Dec. 1997)	5↓	Evaporation of Reserves
1997: Rep. of Korea	A1 (27 Nov. 1997)	Ba1 (21 Dec. 1997)	6↓	Evaporation of Reserves
1997: Indonesia	Baa3 (21 Dec. 1997)	B3 (20 Mar. 1998)	6↓	Collapse of Asset Quality
1997: Malaysia	A1 (21 Dec. 1997)	Baa2 (14 Sep. 1998)	4↓	Collapse of Asset Quality
1998: Russian Federation	Ba2 (11 Mar. 1998)	B3 (21 Aug. 1998)	4↓	Evaporation of Reserves
1998: Moldovia	Ba2 (14July 1998)	B2 (14 July 1998)	3↓	Evaporation of Reserves
1998: Romania	Ba3 (14 Sep. 1998)	B3 (6 Nov. 1998)	3↓	Evaporation of Reserves
2002: Uruguay	Baa3 (3 May 2002)	B3 (31 July 2002)	6↓	Evaporation of Reserves

Source: UN, Credit Rating Agencies and Their Potential Impact on Developing Countries, 2008.

CRAs especially received intensive criticisms since they could not foresee the crisis in Asia. Despite the fragile circumstances occurred due to macroeconomic instability and external financing difficulties, the capital flows to such countries continued. As the instability in such countries showed themselves with some events like bankruptcy of big companies and failure to pay the debts to the foreign Lenders. The investors in international markets showed their inconvenience by requesting repayment of the funds provided to such countries beforehand. The lack of trust to the markets in the cited countries caused the investors to take out the assets of that countries from their portfolio. As a result of this, the value of the assets of such countries started to fall down before the reduction of the credit ratings of these countries (UNCTAD, 2008).

Despite their inability to manage the crisis period good enough and to foresee the crises beforehand CRAs revised the credit ratings of the countries after the crisis. CRAs

acting more prudent renewed their methodologies, especially, on the natters such as the short term debt stock, the share of the short term debt stock to the total debt stock, strength of the banking industry, and will of the foreign creditors to withdraw their funds at risky periods. However, realization of the revision period after the crises is an indication of continuance of the risk of inability to foresee by CRAs.

1.5.2. Procyclicality

It can be observed in the market that economic and financial conditions of the countries with the problematic financial indicators and economies may be worsening after rating decreases. The country ceiling evaluated by the CRAs for country economies limits the borrowing opportunity of many private entities operating in the relevant countries. Especially the investment funds issued on the country assets and decreased borrowing opportunities due to decrease in liquidity push the countries experiencing difficulties in performing their obligations to borrow at higher costs and further increase the country risks (Ferreira and Gama 2007).

Therefore, CRAs are blamed to further increase the fragility of the financial markets and to cause systemic crises. The experiences during the Asian crisis related to further distortion in the markets after the rating decreases may be given as examples to back such hypothesis. As it may be remembered, no change was made on the credit ratings of the Asian countries however after such date CRAs started to decrease the ratings of the cited countries one by one. These actions of CRAs were criticized in the international markets based on the fact that they were decreased after realization of the crisis, they worsened the financing opportunities of the countries from which significant amounts of capital exited already, further escalating the panic of the international investors (pro-cyclical effect) (Ferri et al. 1999).

Another criticized point is that the CRAs may decrease the country ratings more than one level at a time. The profound rating decreases without significant change in the

financial and economic indicators of the countries foster the critics that CRAs do not make healthy analyses or the country ratings are not reliable.

In 2003 Moody's reported on pro-cyclicality claims that the relative stability of credit ratings compared to market-based indicators suggests that ratings were more likely to dampen rather than to amplify the credit cycle, and that most rating changes reflected long lasting changes in fundamental credit risk rather than temporary cyclical developments. The relationship between credit ratings and the cyclicality, and thus the impact of changes in the CRAs' practices in response to shortcomings revealed by the crises of the 1990s, remains an open empirical question (UNCTAD 2008, IMF 2010). However Financial Stability Board has stated that CRA Rating Downgrades can amplify procyclicality and cause systemic disruptions and herding in market behavior (FSO 2010).

1.5.3. Confidentiality

Company bankruptcies experienced due to wrong credit rating issuance since 2001 strengthened the opinion that the CRAs did not share their methodologies with the public sufficiently. CRAs frequently criticized after the Lehman Brothers' sinking attracted attention more after the Enron scandal in USA in 2001, Worldcom in 2002 and Parmalat in 2003, due to their issuance of high credit ratings to such firms. When all such negative happenings were about to be forgotten, it became generally accepted hypothesis that one of the key players causing the deepening of the financial crisis gaining a global dimension after sinking of Lehman Brothers was CRAs. Especially between 2004 and 2007, some of the investment banks in various countries including the USA attempted to issue Collateralized Debt Obligations (CDOs) being high risk house loans, by taking high credit ratings from CRAs (Ryan 2012).

As more regulators and rely on ratings, CRAs have become increasingly reluctant to downgrade. Even one notch downgrade of A.I.G. before it hit the crisis would have saddled it with extra $8 billion of obligation (Ryan 2012, p.10).

It is because of the situation that those instruments providing relatively higher yields with high credit ratings or another say with low default risk were preferred by the banks, pension funds and hedge funds intensively. Such debated ratings issued by top three CRAs were highly criticized and after such pressures they were pushed to decrease the ratings of many investment instruments suddenly.

The critics towards lack of transparency and insufficient disclosure of the methodologies applied in the ratings of the derivative products and structured products also include the country ratings. Certain part of the critics is stemmed from the failure of CRAs to share sufficient information about the country rating methodologies. Although CRAs issue reports and updates from time to time, these reports are far from being sufficient on explaining the country rating process. In the cited reports, the indicators used in rating process and the effect of such changes in the indicators on the credit ratings are shared. However the issues such as how the final decision process of CRAs works, how the factors affecting the credit rating are weighted, how the comparisons with the similar countries are conducted, how the extent of the characteristic elements such as "political situation of the country" affect the decision making process are not clear (Iyengar 2012).

On the other hand, the effectiveness of the doubtful points such as repayment ability and in particular willingness of a country to repay its debts in the credit rating process such as the development level, social development level of a country is criticized (Iyengar 2012).

1.5.4. Dependency

As it was observed in their history, emergence of the CRAs is based on the information need of the investors about the persons, companies and states. Standardized and qualitative information by the CRAs let investors make comparison credit users' reliability and riskiness. On the other side issuers also benefit from credit ratings to be able to convince the finance providers to invest in their assets (Geisst 2006, Langohr and Langohr 2008, Erkan and Demircioğlu 2011).

Besides, credit ratings are used by professionals as one of the primary variables in analysis related to risk management in the global finance system and many institutions are obligated to be rated by one or more CRA in order to offer securities to various markets. Therefore, the credit ratings are applied to meet certain mandatory requirements in many regulations rather than just providing information on the risks (Partnoy 2006). Yet, the credit ratings are of significant importance in the capital and liquidity regulations required in the latest Basel III (Hache 2012).

Alphanumerical formation of the credit rating is also criticized due to its credit threshold intervals. The most notable of such criticisms is that the credit threshold intervals are too big (cliff effect). For example, an asset being at the lowest level of the investable level (BBB-) is considered as risky but the immediate lower category under the investable level (i.e. BB+), in the speculative category, is considered as risky as well. But one step change from BB+ to BBB- as change category of the asset from speculative grade to investment grade. Therefore, it may be useful to establish the risk intervals narrower so that the costs may be shared more fairly (IMF 2010, Destraz and Lahaye 2012).

It is frequently argued that CRAs don't reflect the risk of an entity or an asset appropriately. Indicators in the markets such as CDS premiums and bond yields may be used to reveal the credit risk effectively and appropriately (Partnoy 2006). It is also argued that the cited indicators through which the country risk is priced instantly show more appropriate evaluation with reference to the efficient market hypothesis (Partnoy 2006, Fama 1970).

Sovereign downgrades have important effects on corporate investments and capital structure due to the application of the sovereign ceiling. Almeida et al. asserts that sovereign downgrades lead to greater decreases in investment and increases in the borrowing costs of the corporates (Almeida et al. 2014). Their study concludes that public debt management generates negative externalities for the private sector and real economic activity.

In line with this argument, utilization of the cited indicators instead of credit ratings in the financial regulations and formation of more frequent intervals can be considered for the improvement of the sovereign credit rating system. Various variables in the market may be utilized to this aim. On the other side, a fact has also been considered that CRAs will not evaluate only the immediate risk but count the prospective projections, and market indicators may not indicate the prospective risks. Without ignoring this argument, econometric, mathematical and statistical methods can make it possible to form unbiased and consistent indicators from the market data.

1.5.5. Misuse of Power by CRAs

CRAs provide some of their services as free of charge and receive incomes from the sales of the notes and publications. However, those services with charge caused doubts considering the possibility of 'higher credit rating for higher fees' in the market. Assuming this situation is valid then higher credit rating issuance in consideration of higher fees would cause loss of transfer in the long run (Prieg 2011, Ryan 2012, Neate 2011).

In case of the charging fees to rated countries, then the agencies would be reluctant to downgrade the rates, considering not to jeopardizing their income sources and the commitment to the agency. This is claimed, for example, by Tom McGuire, an executive vice-president of Moody's, who states that "*the pressure from fee-paying issuers for higher ratings must always be in a delicate balance with the agencies' need to retain credibility among investors*" (Alexe et al. 2003, p.5). The necessity to please the payers of the ratings, investors as well as issuers, lead to what Robert Grossman, the chief credit officer at the rating agency Fitch, calls "*a tendency we do with investors – rating committees, outlooks, meetings, then the press release, all to soften the blow of the rating change*" (Alexe et al. 2003, p.5).

1.5.6. Regulations, Transparency, Accountability and Competition

Regulations related to CRAs have been continued from 1980s during which the credit ratings were started to be used intensively, and continued till today. The studies on regulations were accelerated in the periods during which the criticisms against the CRAs were increased. With most recent financial crisis, countries made huge improvements on the regulations regarding the CRAs based on the fundamental framework which was drawn by IOSCO.

Especially after the collapse of the Enron the debates on reliability of credit rating industry paved the way for the regulations, transparency and accountability of the CRAs. With the decision made by the European Commission on 6 June 2001, Committee of European Securities Regulators (CESR) was established and the Committee determined the regulation and audit principles related to the works of CRAs within the boundaries of the European Union (CESR 2006). In the USA, with the establishment of NRSRO (Nationally Recognized Statistical Rating Organizations) in 1975, it is insured that CRAs will be gathered under a single roof and afterward such roof gained a legal framework in 2006, with approval of "CRA Reform Act" in the Congress (The Financial Crisis Inquiry Report 2011, Utzig 2010).

The sluggish studies related to auditing of CRAs and regulation of rating industry gained a speed during and after the financial crisis. After the second half of 2007, CRA Code was reviewed established in 2004 due to the financial crisis, and re-published in 2008 in a manner to include the new regulations related to rating of financial assets. During the crisis period, IOSCO revealed a new framework in order to regulate the CRA operations with CRA Code 11. In G-20 Pittsburgh Summit, it was prescribed that each country was to complete its own regulations as of 2010 pursuant to such framework (FSB 2010, Utzig 2010).

The most recent regulation in the USA on rating operations was Dodd–Frank Wall Street Reform and Consumer Protection Act, aiming at increasing transparency, making the

audit standards tighter, and decreasing dependence on CRAs in the market, made by the Treasury Secretary in July 2010. With this new Act, it was targeted to grant more power to Securities and Exchange Commission (SEC) on supervision and audit of such entities in addition to decrease the conflict of interests in CRAs. Many regulations with the framework drawn by IOSCO became effective in many countries including mainly USA and EU (SEC 2013).

IOSCO defined a framework in order to make the rating operations conducted by CRAs clearer for the investors and to have sufficient information as to how the credit ratings were made. With this framework, it was made mandatory for CRAs to publicize their methodologies used in the rating activities. Related to such, it was required to establish an internal audit unit in each of the CRAs and such units to report the methodologies used (IOSCO 2003, Utzig 2010).

With the Act being effective in the USA, SEC requires certification of the policies and procedures followed in determination of the credit ratings. In this manner, SEC shall review internal controls, due diligence works and application of rating methodologies by all CRAs, and guarantee their compliance with their public disclosures. In the EU, it is required that CRAs should share in order to notify the public on assignment of proper credit rating (SEC 2014).

IOSCO required incomes of both CRAs and the employees of the CRAs would be more transparent and subject to accountability principles, and controlling/ auditing thereof. On the other hand, a requirement was prescribed for timely disclosure of the credit rating decisions and any updates not requiring any change in the existing ratings. It became necessary to give the detailed reasons for the decision in the press releases on credit rating changes or confirmations. In order to increase transparency a requirement was introduced to issue the default rates of each of the industries on which they operated. In this manner, it was aimed at providing with information about the performance of the applicable sector in the previous periods, to the investors (IOSCO 2003).

Transparency and accountability are matters consistently emphasized in the regulations made by both USA and EU. An entity which will issue a structured product before the financial crisis in the USA was able to request credit rating from them before deciding to work with any CRA, and then to decide executing a contract with the entity issuing the highest rating for the applicable financial product, releasing only such highest rating to the public. With effectiveness of the Act, it has become necessary to disclose all credit ratings issued by different CRAs, insuring the investors to make healthier decisions. On the other hand, different symbols shall be used to extract the risk of the structured products in rating terminology. With this, it was planned to forestall similar evaluation of the risks related to the structured products with those of the other instruments (The Financial Crisis Inquiry Report 2011).

It is frequently claimed that CRAs work without competition since the credit rating industry is in oligopolistic structure, and such nature caused such entities to avoid accountability and transparency. IOSCO encourages the countries to conduct studies in order to increase competition in the credit rating industry. Consequently, many countries made their regulations on CRAs and number of applications to SEC to be considered within the scope of NRSRO increased (The Financial Crisis Inquiry Report 2011).

Many countries, including Turkey, adopted the matters such as publicizing of the methodology followed in credit rating activities transparently, prevention of the conflict of interest and healthier sharing of the methodologies applied during the rating process, to a significant extent, with the new regulations they made.

Capital Markets Board of Turkey arranges credit rating matters in accordance with Principles of Credit Rating Activities and Credit Rating Agencies in the Capital Markets (the Communiqué Serial VIII No. 76). This legislation concerns principles relating to announcement of sovereign ratings, timing and reporting of sovereign rating announcements. According to the legislation credit rating agencies must disclose to the

public a detailed research report setting out all matters taken into account by them in determining the sovereign rating.

Oligopolistic structure of the credit rating industry drawing many criticisms during pre-crisis period has not been broken yet. Still the weight of Moody's, S&P and Fitch are felt in the credit rating industry. However, the efforts on gaining of more entities to the market in many countries including USA are in progress. In addition to increasing the audit on CRAs and regulations related to the rating activities, there are studies focusing on more structural problems.

After the latest global crisis, the regulations on global financial industry are made under the roof of FSB, Financial Stability Board. FSB deals with regulations on financial sector under many headings. One of the headings under discussion is to decrease dependency on CRAs. The studies conducted for this purpose discuss the alternatives which may be used instead of the credit ratings in addition to decreasing dependency on credit ratings. Liquidity and capital regulations decided within the scope of Basel III use the credit ratings as indicators intensively. In the event of decreasing dependency on credit ratings ultimately and progressing under the roof of FSB, the cited liquidity and capital regulations shall be cleared of being a function of the credit ratings. There are studies of IMF in addition to FSB, in which CRAs are debated within the scope of country ratings (FSB 2014).

Most recently, FSB decided on conduct of the studies to decrease excessive dependency on the credit ratings and wide spreading of the internal rating usage areas, in October 2010. On the other hand, in a report issued by the European Commission some suggestions were made on decreasing excessive dependency on credit ratings, and it was underlined that it should be studies on the parameters which may substitute the credit ratings (FSB 2014, Theis and Wolgast 2012).

FSB Senior Level Workgroup under the management of the president of the Bank of England prepared a draft document on August 10, 2010, in order to decrease dependency

on CRAs. The matters specified in the draft document have been agreed by D-20 members. According to such, opinion was given under five main headings related to limitation of utilization of the credit rating. The common point of the opinions sent under five headings is to encourage the banks, market players and corporate investors to self-evaluate the credit risk of the asset portfolios (FSB 2014).

Another structural regulation and amendment proposal related to credit ratings and CRAs were mentioned by the European Commission. The Commission, on 5th October 2010, prepared a report with the heading "Public Consultation on CRA". In the report, a series of advises were proposed. An important difference between the studies conducted by the EU commission and the studies conducted by FSB is suggestion of consideration of the different elements by the financial institutions in addition to the credit ratings in credit risk assessments. In the details of the cited proposal, it is emphasized that the data which may be obtained from "due diligence" processes conducted with the entity to evaluate the credit risk may use pubic data and current market data (i.e. bond prices, CDS premiums). In this manner, the EU Commission indicated, for the first time, that country ratings section is one of the problematic areas in the credit rating industry and the necessity to use the market indicators in determination of the country credit ratings was underlined. At this point, the Commission specified CDSs and country bond yields/spreads are expressed as representative of the market indicators ratings (European Commission 2010).

1.6. Review of the Methodologies of CRAs

CRAs use quantitative and qualitative factors to gauge a country's ability and willingness to repay its debt. There are significant overlaps and differences in which factors the CRAs use, and in the relative weightings of those factors. Each of the three main credit rating agencies identifies a set of key drivers which are utilized to determine sovereign credit ratings. For each driver, a range of quantitative and/or qualitative criteria is assessed. GDP per capita, the level and composition of debt, financial resources of the government, political and financial stability indicators constitutes example for overlapping factors while

weighting of the contingent liabilities of the government different for each credit rating agency constitutes example for the differences in the factors.

In general, the CRAs assign both foreign currency and local currency ratings to the sovereigns. There is often little difference between the two in the case of advanced economies. But in the case of emerging and developing economies the local currency rating is generally higher. When it is indicated as "the sovereign rating," it is generally referring to the long-term foreign currency rating, and the sovereign rates observed in this study are also long term foreign currency rates.

As it is discussed in the previous sections, rating agencies don't provide enough evidence for comprehensive analysis of their rating methodologies. Although CRAs issue reports and updates from time to time, these reports are far from being sufficient on explaining the country rating process. In the cited reports, the indicators used in rating process and the effect of such changes in the indicators on the credit ratings are shared. However the issues such as how the final decision process of CRAs works, how the factors affecting the credit rating are weighted, how the comparisons with the similar countries are conducted, how the extent of the characteristic elements such as "political situation of the country" affect the decision making process are not clear (Lawrence 2010).

Credit rating grids typically distinguish between two general types of grade, namely investment grade and non-investment grade (junk bonds belong to the latter category). Each CRA, however, uses a more accurate rating scale. A feature common to all of them is a reliance on a combination of alphanumerical characters to reflect the creditworthiness of debt issuers (see Table 6). Ratings are determined primarily using a 3–5 year time horizon—at least in case of S&P (Petit 2011).

1.6.1. Solicited rating

The rates provided by the CRAs are considered by the investors that trade in financial products, as well as issuers of the financial products, portfolio managers and the

other finance related actors in the market. Regulation obligations also require investors to hold financial products rated by CRAs. As a result, debt issuers that want to sell to investors have little choice but to request ratings from the CRAs in exchange for a price. Moreover, given investors' constant quest for high quality and independent assessments, debt issuers typically solicit ratings from two or three CRAs. CRAs are thus commonly depicted as the "gatekeepers" of financial markets (Petit 2011, Fulghieri et al. 2010).

In case of the solicited ratings process; firstly, the credit user awards the contract to a CRA of its choice. Subsequently the CRAs get in contact with the emitter and after collection of the required information about the emitter and its financial asset to be emitted and the analysis of the information gathered, prepare the report on the related credit rating. All collected information during this process has to be kept in confidence. Ratings are subsequently disclosed to the public for free.

1.6.2. Unsolicited rating

Occasionally, CRAs also issue unsolicited ratings based on publicly available information only. No consideration is provided by the debt issuer for such ratings. Now and again, it is advanced that CRAs issue unsolicited ratings with a view to increasing their customer base. Debt issuers that have been unwillingly rated might be incentivized to become customers of CRAs, so that their rating is based on more accurate data in the future (Petit 2011).

While CRAs are charged by the emitters during the solicited rating option, in case of the unsolicited rating charge is not applied to the service. But, CRAs are capable to generate revenue from subscription fees for their publications or from consultancy and advisory services. Fulghieri, Strobl and Xia assert that the issuance of unfavorable unsolicited credit ratings enables rating agencies to put pressure on issuers in order to extract higher fees from them when solicited rating needed (Fulghieri et al. 2010).

1.6.3. Sovereign rating

Generally, CRAs rate sovereigns in the form of unsolicited rating. All of the countries don't have contractual relationships with the CRAs. In principle, countries pay for the ratings of the specific bonds they issue, but they do not normally pay for the general (Fulghieri et al. 2010).

Sovereign ratings have significant differences from corporate ratings, due to the specific features of states as borrowers. Unlike firms, states cannot go bankrupt. States benefit from a monopoly on the legitimate use of violence and can thus coerce citizens to pay taxes. This makes sovereign debt a safe investment. On the other hand, unlike firms, states cannot be coerced to pay their debts (unless war is waged). Knowing this, states might just be unwilling to pay their debts. This makes sovereign debt a risky investment (Petit 2011).

Within this framework, sovereign rating methodology considers both quantitative review of states' finances and their willingness to pay. Therefore CRAs observe a range of additional qualitative factors, such as the state's institutional strength, political stability, fiscal and monetary flexibility, and economic vitality.

Table 4: Key Factors in Sovereign Credit Rating Assessments (IMF, 2010)

Fitch	Macroeconomic policies, performance, and prospects; structural features of the economy; public finances; external finances
Moody's	Economic strength; institutional strength; financial strength of the government; susceptibility to event risk
Standard & Poor's	Political risk; economic structure; economic growth prospects; fiscal flexibility; general government debt burden; offshore and contingent liabilities; monetary flexibility; external liquidity; external debt burden

*IMF (2010). Global Financial Stability Report. Sovereigns, Funding, and Systemic Liquidity (October 2010). Washington DC: International Monetary Fund.

The economic factors refer to the ability of repayment whilst the political risk measures the willingness of repayment. In reference to the political risk, the focal point is on the transparency, stability and predictability of political institutions.

Among the CRAs, S&P provides better documentations and explanations regarding their sovereign credit rating assessment methodology and criteria. S&P states that their sovereign rating methodology addresses the factors that affect a sovereign government's willingness and ability to service its debt on time and in full. Their analysis focuses on a sovereign's performance over past economic and political cycles, as well as factors that indicate greater or lesser fiscal and monetary flexibility over the course of future economic cycles (S&P 2011).

The five key factors that form the foundation of their sovereign credit analysis are:

- Institutional effectiveness and political risks, reflected in the political score.
- Economic structure and growth prospects, reflected in the economic score.
- External liquidity and international investment position, reflected in the external score.
- Fiscal performance and flexibility, as well as debt burden, reflected in the fiscal score.
- Monetary flexibility, reflected in the monetary score (S&P 2011).

Table 5: Sovereign Credit Rating Methodology of the Standard & Poors

Broad Rating Factors	Rating Sub-Factor	Sub-Factor Weighting (towards factor)	Sub-Factor Indicators
Factor 1 Economic Strength	Growth Dynamics	50%	Average Real GDP Growth
			Volatility in Real GDP Growth
			WEF Global Competitiveness Index
	Scale of the Economy	25%	Nominal GDP ($US)
	National Income	25%	GDP per capita (PPP,$US)
	Adjustment Factors	1-6 scores	Diversification
			Credit Boom
Factor 2 International Strength	Institutional Framework and Effectiveness	75%	World Bank Government Effectiveness Index
			World Bank Rule of Law Index
			World Bank Control of Corruption Index
	Policiy Credibility and Effectiveness	25%	Inflation Level
			Inflation Volatility
	Adjustment Factor	1-6 scores	Track Record of Default
Factor 3 Fiscal Strength	Debt Burden	50%	General Government Debt/GDP
			General Government Debt/Revenue
	Debt Affordability	50%	General Government Interest Payments/Revenue
			General Government Interest Payments/GDP
	Adjustment Factors	1-6 Scores	Debt Trend
			General Government Foreign Currency Debt/General Government Debt
			Other Public Sector Debt/GDP
			Public Sector Financial Assets or Sovereign Wealth Funds/GDP
Factor 4 Susceptibility to Event Risk	Political Risk	Max. Function	Domestic Political Risk
			Geopolitical Risk
	Government Liquidity Risk	Max. Function	Fundamental Metrics
			Market Funding Stress
	Banking Sector Risk	Max. Function	Strength of Banking System
			Size of Banking System
			Funding Vulnerabilities
	External Vulnerability Risk	Max. Function	(Current Account Balance+FDI)/GDP
			External Vulnerability Indicator (EVI)
			Net International Investment Position/GDP

Source: Standart and Poors, Global Credit Portal, Sovereign Government Rating Methodology And Assumptions

1.6.4. Rating scale

The three big CRAs present their ratings in form of numbers and letters. As it can be seen in Table 6, the different rating scales all make use of letters in combination with plus and minus or with numbers. Although the symbols differ from CRA to CRA, they are good to compare in accordance to their statement about the creditworthiness.

Table 6: Credit Rating Symbols of the Major CRAs

	Standard & Poor's	Moody's	Fitch
Investment Grade	AAA	Aaa	AAA
	AA+	Aa1	AA+
	AA	Aa2	AA
	AA-	Aa3	AA-
	A+	A1	A+
	A	A2	A
	A-	A3	A-
	BBB+	Baa1	BBB+
	BBB	Baa2	BBB
	BBB-	Baa3	BBB-
Speculative Grade	BB+	Ba1	BB+
	BB	Ba2	BB
	BB-	Ba3	BB-
	B+	B1	B+
	B	B2	B
	B-	B3	B-
	CCC+	Caa1	CCC+
	CCC	Caa2	CCC
	CCC-	Caa3	CCC-
	CC	Ca	CC
	C	C	C
Default	D	WR	DDD
			DD
			D

The upper range with grades better than BBB-, Baa3 and BBB- is called investment grade. These grades in the range below BBB-, Baa3 and BBB- are called non-investment or speculative grades.

1.7. Credit Rating and Debt Crises

Debt crisis is a type of financial crisis and classification types of the financial crisis provide better understanding of what is financial crisis. Claessens and Kose, (2013) in their working paper classify types of financial crisis as currency, sudden stop, banking and debt crisis. Among these foreign debt crisis takes place when a country cannot (or does not want to) service its foreign debt. It can take the form of a sovereign or private (or both) debt crisis. A domestic public debt crisis takes place when a country does not honor its domestic fiscal obligations in real terms, either by defaulting explicitly, or by inflating or otherwise debasing its currency, or by employing some (other) forms of financial repression (Claessens and Kose 2013).

Debt crisis is the term of the financial crisis situation when repayment of the public debt is at risk relative to the revenues and expenditures of the sovereign. Its severe examples are experienced in Latin American countries during the 1980s, and the United States and the European Union since the mid-2000s.

The financial crisis erupted in years 2007/2008 endangered the stability of the world-wide financial system. Governments paid a crucial effort in order to lessen effect of the financial crisis in both short and long run. They introduced bailout packages and provided mixture of generous public guarantees and fiscal stimulus. Burden of these efforts together with existing crisis conditions brought sovereign risk back on the agenda. Some countries - most notably Greece - experienced a dramatic loss of market confidence and saw the interest rates on their debt skyrocketing (Haidar 2012, Petit 2011).

In general, rising private and government debt levels around the world and increasing risk levels and borrowing cost lead to the sovereign debt crisis (Hawkins and Turner 2000). But, causes of the crisis varied by country. In several countries, private debts arising from a property bubble were transferred to sovereign debt as a result of banking system bailouts and government responses to slowing economies post-bubble (Fouskas 2012, Dufour and Orhangazi 2014).

Credit rating agencies and their rating approaches are widely criticized during and after the financial crisis. The sovereign credit rates given by those agencies were expected to reflect forthcoming adversities in the economies. Many international authorities proposed new frameworks for the regulation and supervision of the credit rating sector, and various steps have been taken in this respect (Petit 2011, The Financial Crisis Inquiry Report 2011, SEC 2013, IOSCO 2003, SEC 2014, FSB 2014, Theis and Wolgast 2012, Utzig 2010). General themes of the discussions are about reducing the overreliance on credit ratings, regulating and reshaping the credit rating industry and development of alternative systems which make it possible to determine risks necessary to predict financial crisis accurately.

1.7.1. Recent Sovereign Debt Crisis in the Eurozone

Debt levels of the sovereigns have reached unprecedented levels in advanced economies after the 2008 financial crisis. It has become a sovereign debt crisis that Western governments have to face, especially the Eurozone governments (Global Financial Stability Reports - IMF 2010&2013). Sovereign debt crisis has different story for each European country involved in this crisis. For example, Ireland banks' high amount of credits to property developers generated a massive property bubble. Ireland's government and taxpayers had to suffer from the burden of the private debts when the bubble burst. In Greece, the government increased its commitments to public workers in the form of extremely generous wage and pension benefits. In Iceland, banking system grew enormously, creating debts to global investors (external debts) several times GDP of the country (Claessens and Kose 2013, Cecchetti et al. 2010).

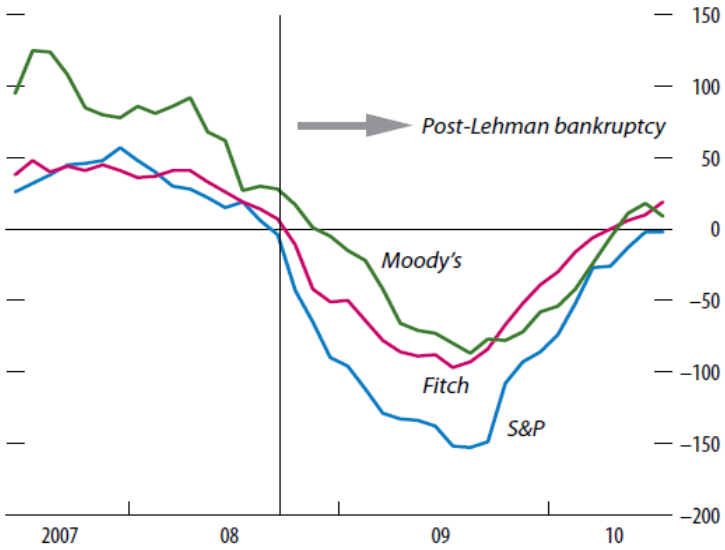
The interconnection in the global financial system causes to the financial contagion (Hawkins and Turner 2000). Another factor contributing to this interconnection is the concept of debt protection. One of the debt protection tools is the CDS. Institutions entered into contracts called credit default swaps (CDS) that provide payment guarantee to the debt instrument holders in case of default of the debtor. But, since multiple derivative

instruments can be purchased on the same security, it was unclear what exposure each country's banking system faces to. Contagion can also be transmitted via direct channels such as losses from balance sheets. Direct effects are easier to quantify while indirect channel can be more damaging and unclear (OECD 2012).

1.7.2. Reaction of Rating Agencies and Greece Case

It has been asserted that actions of the CRAs during the European sovereign debt crisis amplified the 'euphoria' and 'depression'. Negative feedbacks by the CRAs were aggravated by influential market participants. This interaction is defined as pro-cyclical which push-ups borrowing rates. *This is especially devastating at 'trigger' or 'cliff' moments as it may accelerate animal spirit-driven market dynamics already at work* (OECD 2012, p.37).

Figure 5: Sovereign Rating Changes and Warnings (IMF)[1]



Source: IMF staff calculations using data from Fitch, Moody's, and Standard&Poors.

[1] This figure shows rolling 12-month cumulative sums of all sovereign foreign currency rating actions across all sovereign ratings by each credit rating agency. For example, each positive (negative) rating outlook is +1(-1); a review for upgrade (downgrade) is +2(-2); and a positive (negative) rating changes is +3(-3)

The beginning of the reactions of the CRAs towards European states started with the downgrade of Greece by S&P on January 14, 2009. It was adjusted from 'A' to 'A-. 'This action was followed by several outlook changes of the three big rating agencies. It can be seen in Table 7 that the starting point of a range of downgrades of Greece was in the beginning of December 2009.

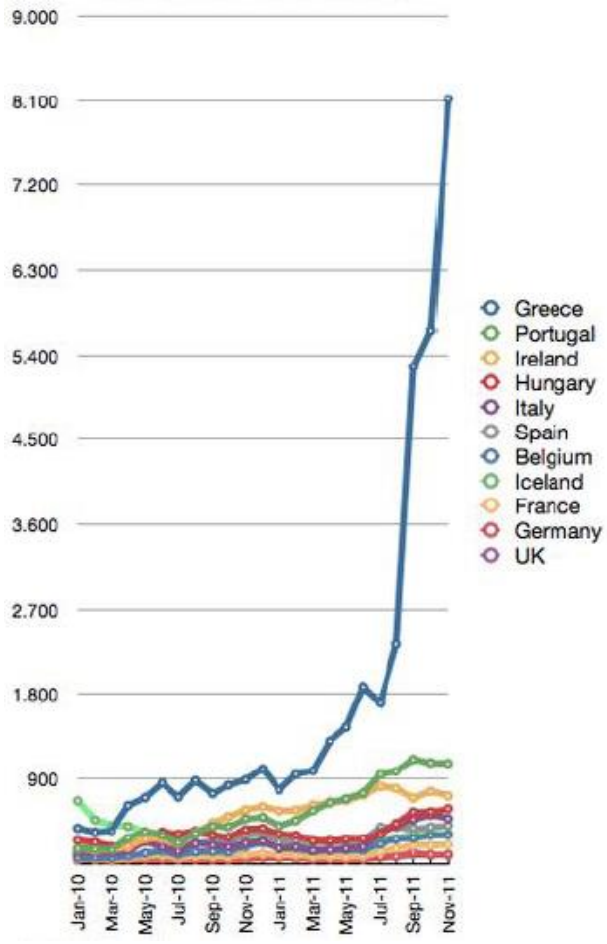
Table 7: Chronology of Greek Sovereign Rate Changes (January 2009-August 2010, IMF, 2010)

Date	Agency	Rating Action
January 9, 2009	S&P	Outlook change; from stable to watch negative
January 14, 2009	S&P	Downgrade; one notch to **A-**; outlook stable
February 25, 2009	Moody's	Outlook change; from positive to stable
May 12, 2009	Fitch	Outlook change; from stable to negative
October 22, 2009	Fitch	Downgrade; one notch to **A-**; outlook negative
October 29, 2009	Moody's	Outlook change; from stable to review for downgrade
December 7, 2009	S&P	Outlook change; watch negative
December 8, 2009	Fitch	Downgrade; one notch to **BBB+**; negative outlook
December 16, 2009	S&P	Downgrade; one notch to **BBB+**; watch negative outlook
December 22, 2009	Moody's	Downgrade; one notch to **A2**; negative outlook
March 16, 2010	S&P	Outlook change; watch negative to negative
April 9, 2010	Fitch	Downgrade; one notch to **BBB-**; negative outlook
April 22, 2010	Moody's	Downgrade; one notch to **A3**; review for downgrade outlook
April 27, 2010	S&P	Downgrade; three notch to **BB+**; negative outlook
June 14, 2010	Moody's	Downgrade; four notch to **Ba1**; stable outlook

Source: Online data dissemination facilities of the Rating Agencies.

The CDS spreads measure the market price of creditworthiness and, as expected higher spreads are associated with lower ratings (IMF 2010). Once the trend of downgrading Greece has started, the loss of confidence into Greece continued until the end of 2011. This situation can be proven by the change in the CDS premiums of Greece (see Figure 6).

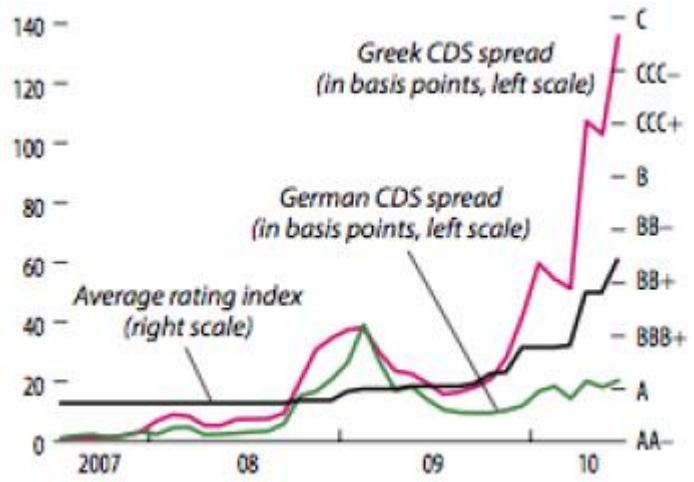
Figure 6: CDS Premiums of the European Countries, 2010-2011



Source: Bloomberg

Following figure depict the average of the ratings by the three rating agencies (Fitch, Moody's and S&P), CDS Spreads of Greece and CDS Spreads of Germany between 2007 and 2010. CDS spreads on Greece began to diverge from the general market trend in the summer of 2009. This leads to the assumption that the issuers of CDS reacted a bit earlier in comparison to the investors whose reaction became plainly visible only at the end of 2009 (IMF 2010).

Figure 7: Credit Default Swaps (CDS) and Average Rating (IMF, 2010)



Source: IMF

It has been discussed that the performance of the three CRAs within the EDC regarding Greece was unsatisfactory. The arguments are on the question is if the investors neglected the first signs of a possible negative development of Greece, and the numerous negative changes of outlooks and ratings of the CRAs regarding Greece in a very short time period.

Greece is accused of hiding its growing debt and deceiving EU officials with the help of derivatives designed by major banks. Although some financial institutions clearly profited from the growing Greek government debt in the short run, there was a long lead-up to the crisis (Balzli 2010).

In the early mid-2000s, Greece's economy was one of the fastest growing in the Eurozone and was associated with a large structural deficit. As the world economy was hit by the global financial crisis in the late 2000s, Greece was hit especially hard because its main industries were especially sensitive to changes in the economy. The government spent heavily to keep the economy functioning and the country's debt increased accordingly (Athanassiou 2009).

On 23 April 2010, the Greek government requested an initial loan of €45 billion from the EU and IMF to cover its financial needs for the remaining part of 2010. A few days later Standard & Poor's slashed Greece's sovereign debt rating to BB+ or "junk" status amid fears of default, in which case investors were liable to lose 30–50% of their money. Stock markets worldwide and the euro currency declined in response to the downgrade (Lethbridge 2013).

On 1 May 2010, the Greek government announced a series of austerity measures to secure a three year €110 billion loan. This was met with great anger by the Greek public, leading to massive protests, riots and social unrest throughout Greece. The Troika (EC, ECB and IMF), offered Greece a second bailout loan worth €130 billion in October 2011. But activation of this loan was conditional on implementation of further austerity measures and a debt restructure agreement (Donadio and Kitsantonis 2011, Lethbridge 2013).

All the implemented austerity measures helped Greece bring down its primary deficit. But the measures had a side-effect of contribution to a worsening of the Greek recession, which began in October 2008. The austerity relies primarily on tax increases which harms the private sector and economy. Overall the Greek GDP had its worst decline in 2011 with −6.9%, and with 111,000 Greek companies going bankrupt. As a result, the seasonal adjusted unemployment rate also grew from 7.5% in September 2008 to a record high of 19.9% in November 2011 (Henley 2012, Lethbridge 2013) It has been also argued that the withdrawal of Greece from Eurozone would be best option for both Greece and EU, through application of an “orderly default”. However, if Greece were to leave the euro, the economic and political consequences would be devastating (Dammann 2013).

In order to prevent realization of these scenarios the troika (EC, IMF and ECB) agreed in February 2012 to provide a second bailout package worth €130 billion, conditional on the implementation of another harsh austerity package (Dammann 2013). For the first time, the bailout deal also included a debt restructure agreement with the private holders of Greek government bonds (banks, insurers and investment funds), to

"voluntarily" accept a bond swap with a 53.5% nominal write-off, partly in short-term EFSF notes, partly in new Greek bonds with lower interest rates and the maturity prolonged to 11–30 years (independently of the previous maturity) (Sels 2012).

According to Forbes magazine Greece's restructuring represents a default. It is the world's biggest debt restructuring deal ever done, affecting some €206 billion of Greek government bonds. The debt write-off had a size of €107 billion, and caused the Greek debt level to fall from roughly €350bn to €240bn in March 2012, with the predicted debt burden now showing a more sustainable size equal to 117% of GDP by 2020 (Fontevecchia 2012).

Recently, ratings on Greece were raised by S&P to 'B-/B' from "Selective Default" on completion of debt buyback; outlook stable. S&P announced that the upgrade reflects their view of the strong determination of European Economic and Monetary Union (Eurozone) member states to preserve Greek membership in the Eurozone.

The international credit rating agencies, such as Moody's, S&P and Fitch, have played a central and controversial role in the sovereign debt crisis. The agencies have been accused of giving overly generous ratings due to conflicts of interest. Ratings agencies also have a tendency to act conservatively, and to take some time to adjust when a firm or country is in trouble. In the case of Greece, the market responded to the crisis before the downgrades, with Greek bonds trading at junk levels several weeks before the ratings agencies began to describe them as such (Fontevecchia 2012, Dammann 2013, Sels 2012).

1.7.3. Efforts to Improve Structure of the Credit Rating System

Governments and International Organizations are in a struggle in order to achieve a better credit rating system after the experiences during the recent financial crisis. These efforts focus on possibilities for change in order to solve the previously revealed problems. Different options that are discussed in the public, by politicians, actors on the financial market or researchers are listed below.

1.7.3.1. European Rating Agency

Domination of the US-American CRAs on the market is criticized heavily by the Europeans. They also criticize behavior in the financial crisis. Therefore there are plans to create an individual European Rating Agency (ERA) (Bartels and Mauro 2013). The idea of ERA intensified during the European Debt Crisis. Besides, ERA is expected to contribute to the competition in the market.

The purpose of private CRAs to make profit is also discussed. Therefore possibility of an ERA that is financed or partly financed by the member states of the European Monetary Union is on the agenda. State-funded ERA idea originates from the purpose to solve the problem of conflicts of interests that the present CRAs are face to because of their charged services (Utzig 2010, Mackenzie 2012).

One idea is to associate the ERA with the European Central Bank (ECB) as it already has a department for the analysis of credit risks. Proponents of this suggestion claim that the advantage of this solution is the supposed high reputation and independency of the ECB. On the other side opponents claim that state funded ERA would cause political independency and again loose in trust (Utzig 2010, Mackenzie 2012).

1.7.3.2. International Non-Profit Credit Rating Agency

Another effort for the improvement of the credit rating system is development of a non-profit international credit rating agency idea by the Bartelsmann Foundation. This proposal was an effort to show possibility of a non-profit credit rating agency. The proposal claims that such an agency could be structured without the potential conflicts of interest the commercial agencies face. In light of the intense criticism leveled against credit rating agencies for their perceived failure to analyze adequately sovereign creditworthiness, the Bertelsmann Foundation has developed a blueprint for an international non-profit credit rating agency (INCRA), whose rating criteria are designed to increase credibility and international acceptance (Bertelsmann Stiftung 2012, Mackenzie 2012).

1.8. Evidences for Empirical Research

In the literature, many studies are conducted on CRAs and the credit ratings. Mainly those studies have emphasized on the factors affecting the credit ratings. Earlier researchers in this area evaluated measures of risk or presented a qualitative assessment of sovereign credit ratings. For example, Feder and Uy (1985) and Lee (1993) analyzed ordinal rankings of sovereign risk based on a poll of international bankers reported semiannually in Institutional Investor. Lee (1993) stated in his study that credit ratings provide a reasonable measure of borrower's creditworthiness (Lee 1993).

Cantor and Packer (1994) provide a broad overview of the history and uses of sovereign ratings and the frequency of disagreement between Moody's and Standard and Poor's. They are first in quantification of the determinants of the sovereign ratings assigned by Moody's and Standard and Poor's. Cantor and Packer (1996) also developed a model on estimation of the credit ratings in the past periods. In the analysis they used ordered probit model, and the probabilities of classification of the credit ratings in certain categories are estimated. High probability credit score category is determined as the credit rating of a country.

Cantor and Packer (1996) inspired many studies in the subsequent years. Those studies mainly compared their results of their model with the with the credit ratings of the CRAs consisting of the credit ratings given by three largest CRAs as predominant players of the market such as Moody's, S&P and Fitch. Effect of the economic, financial or political factors determining the credit ratings of the countries on the credit ratings was discussed over these results. They stated that "*ordering of risks is broadly consistent with macroeconomic fundamentals. Of the large number of criteria used by Moody's and Standard and Poor's in their assignment of sovereign ratings, six factors appear to play an important role in determining a country's rating: per capita income, GDP growth, inflation, external debt, level of economic development, and default history… Sovereign ratings effectively summarize and supplement the information contained in macroeconomic indicators and are therefore strongly correlated with market-determined credit spreads…*

Nevertheless, we find evidence that the rating agencies' opinions independently affect market spreads" (Cantor and Packer 1996, p.39). Alexe et al. (2003) estimated the credit ratings of a certain group of countries during ten years period by using the variables which may represent summary of a country economy and be used by a CRA. They argued that the credit ratings of the model analyzed in their study (estimations) have high correlation with the realizations.

According to the results obtained through these studies, it was concluded that GDP and debt repayment performance of a country in the previous years have significant importance on the credit rating of a country (Feder and Uy 1985, Lee 1993, Haque et al. 1996, Cantor and Packer 1996, Hu et al. 2002, Alexe et al. 2003).

There are also some studies which investigate the relation between the sovereign risk and spreads, namely CDS spreads and credit (bond) spreads. Among these, Jun Pan and Kenneth J. Singleton states in their study that term structures of spreads reveal not only the arrival rates of credit events, but also the loss rates given credit events. They had applied their framework to Mexico, Turkey, and Korea, they show that risk premiums associated with unpredictable variation in credit event are found to be economically significant and co-vary importantly with several economic measures of global event risk, financial market volatility, and macroeconomic policy (Pan, J. and K. J. Singleton 2008). Besides, Laura Jaramillo and Catalina Michelle Tejada found that Sovereign investment grade status is often associated with lower spreads in international markets. Their study concludes that *investment grade status reduces spreads by 36 percent, above and beyond what is implied by macroeconomic fundamentals. This compares to a 5-10 percent reduction in spreads following upgrades within the investment grade asset class, and no impact for movements within the speculative grade asset class, ceteris paribus* (Jaramillo and Tejada 2011). David Haugh, Patrice Ollivaud and David Turner look at the relation between yield spreads and fiscal performance in euro area and found that incremental deteriorations in fiscal performance lead to ever larger increases in the spread (Haugh et al. 2009).

In general, academic studies test credit ratings with the assistance of the variables used by CRAs. Analysis test credit ratings with the market indicators such as CDS are very limited in number and scope. Reaction of the CDS spreads to the credit rating changes are discussed in different perspectives in the studies analyzing the CDS spreads and credit ratings. Alex et al. (2006) emphasized that it would not be possible to use the market indicators instead of the credit ratings since they are too volatile. On the other hand, the relationship between CDS premiums and the credit ratings of the developing countries have become subject to some studies in different senses.

Longstaff et al. (2007), made a study on CDS spreads of 26 different developing countries. US stock market, high yield bond market, global risk appetite and capital movements, and the credit ratings are also used as variable in this analysis. İsmailescu and Kazemi (2009) observed interaction between credit rating of some group of developing countries and their CDS spreads and it was concluded that the credit rating increases affected on the CDS spreads of the countries positively (İsmailescu and Kazemi 2009).

In a prominent article by Hiteshy Doshi, Kris Jacobs, Carlos Zurita, "Economic and Financial Determinants of Credit Risk Premiums in the Sovereign CDS Market, it is stated that "*spreads increase as a function of stock market and exchange rate volatility, but decrease as a function of interest rates and stock market returns. Estimated risk premiums are highly time-varying and peak during the 2008 financial crisis for nearly all countries. For European countries the risk premiums are also high during the Eurozone debt crisis*" (Doshi et al. 2014, p.4)

Longstaff et al. (2007) consider global factors as well as country specific factors and they also argue that a substantial part of the variation in CDS spread can be explained by global factors such as the VIX (Chicago Board Options Exchange Market Volatility Index). They state that dependence on common global factors such as U.S. stock market returns and high-yield spread changes induces significant correlation into the credit spreads of a broad cross-section of sovereign nations. Also, they found that global investment flows

are important for determination of the correlation structure of credit risk in sovereign debt markets (Longstaff et al. 2007).

Depending on the arguments that CRAs don't reflect the risk of an entity or an asset appropriately, it is frequently argued that the risk indicators in the markets (CDS premiums, bond yields, share process etc.) reveal the credit risk effectively and appropriately (Partnoy 2006). It is argued that the cited indicators through which the country risk is priced instantly show more appropriate evaluation (efficient market hypothesis) (Partnoy 2006, Fama 1970). In this manner, the study by Alexandre Jeanneret is in consistence with the literature on the risky debt pricing which was already theoretically spawned by the works of the Black and Scholes (1973). Jeanneret (2008) concludes that *defaulting is not exogenous to the sovereign decisions. It is an optimal outcome. When the choice of defaulting on foreign debt emanates from a value-maximizing behavior of the sovereign, the assessment of the country creditworthiness corroborates the empirics* (Jeanneret 2008, p.25). In compliance with this empirical findings, Jeffrey D. Amato in his study analyze the risk premium that CDS spreads are believed to include and suggest that default risk premium and risk aversion are strongly related to fundamental factors, such as indicators of real economic activity and the stance of monetary policy. He states that CDS spreads compensate investors for expected loss, but they also contain risk premium because of investors' aversion to default risk (Amato 2005).

At this point it can be suggested that utilization of the cited indicators instead of credit ratings in the financial regulations and formation of more frequent intervals as per the maximum and minimum premium, return or price levels may be more functional in the meaning of assessment and expression of the sovereign credit rating. Many different variables in the market may also have significant effect on the indicators.

This opinion can be criticized considering the fact that CRAs will not evaluate only the immediate risk but consider the prospective projections, and it can be claimed that market indicators may not indicate the prospective risks. Not being opposed to this reality,

it is possible to make the market data as unbiased and consistent indicators with econometric, mathematical and statistical methods used.

In the studies in which the credit ratings were analyzed with the market indicators including CDSs, where the credit ratings are independent variable, it was focused on how the market indicators such as CDS spreads are affected in various conditions. However, there is not a prominent study in which CDS spreads are used to adjust credit ratings in order to acquire better indicator reflecting current situation of the sovereigns. This study considers this situation as an opportunity in order to find the most relevant indicators which can be considered as evaluation and adjustment factor of the sovereign credit rates. The indicator or indicators aimed to be determined through this study will also facilitate better evaluation of short term riskiness of the sovereigns.

Table 8: Literature Review on Major Variables Used in Similar Studies

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
1970	Fama	Efficient Capital Markets: A Review of Theory and Empirical Work	Security Prices	Regression Analysis	A market in which prices at any time "fully reflect" available information is called "efficient"
1973	Black and Scholes	The Pricing of Options and Corporate Liabilities	Option Prices	Black–Scholes options pricing model	Actual prices at which options are bought and sold deviate in certain systematic ways from the values predicted by the formula. Option buyers pay prices that are consistently higher than those predicted by the formula. Option writers, receive prices that are at about the level predicted by the formula. There are large transaction costs in the option market, all of which are effectively paid by option buyers. The difference between the price paid by option buyers and the value given by the farmula is greater for options on low risk stocks than for options on high risk stocks.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
1985	Feder and Uy	The Determinants of International Creditworthiness and Their Implications	Ratio of debt to GNP, the ratio of reserves to imports, average export growth rate, GDP Growth, terms of trade, concentration of export, GNDP Per Capita, an oil exporter dummy, debt servicing difficulties dummy, political risk, (Cross section of countries within the period 1979–1983)	Dynamic simulation model	All of the variables are statistically significant. Higher rate of growth of GDP, holding export growth constant, improved the initial credit worthiness rating; however as this higher growth rate entailed heavier borrowing to provide for resources for increased investment, it could reduce creditworthiness in subsequent periods.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
1993	Lee	Are the credit ratings assigned by bankers based on the willingness of LDC borrowers to repay?	Growth, inflation, growth volatility, ınternational interest rates, industrial countries' growth rates, debt-to-export ratio, and dummies for geographical locations as explanatory variables for ratings.	Linear Regression Model with panel data for 40 developing countries	Credit ratings provide a reasonable measure of borrower's creditworthiness and second, the set of the explanatory variables included in the study is significant in explaining variations in the credit ratings.
1994	Cantor and Packer	The Credit Rating Industry	-	-	Provide a broad overview of the history and uses of sovereign ratings and the frequency of disagreement between Moody's and Standard and Poor's.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
1996	Cantor and Packer	Determinants and Impact of Sovereign Credit Ratings	Per capita income, GDP growth, Inflation, Fiscal balance, External balance, External debt, Indicator for economic development, Indicator for default history, Moody's, S&P, or average ratings, Spreads (Sovereign bond spreads over Treasuries, adjusted to five-year maturities)	Ordered Probit Model	Ordering of risks is broadly consistent with macroeconomic fundamentals. Of the large number of criteria used by Moody's and Standard and Poor's in their assignment of sovereign ratings, six factors appear to play an important role in determining a country's rating: per capita income, GDP growth, inflation, external debt, level of economic development, and default history… Sovereign ratings effectively summarize and supplement the information contained in macroeconomic indicators and are therefore strongly correlated with market-determined credit spreads… Nevertheless, we find evidence that the rating agencies' opinions independently affect market spreads.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
1996	Haque et al.	Rating the Raters of Country Creditworthiness	Ratio of nongold foreign exchange reserves to imports, the ratio of the current account balance to GDP, the country's rate of growth, rate of inflation, and its regional location are determined as effective on creditworthiness	Literature survey	The economic fundamentals that economists ordinarily use to determine a country's capacity and willingness to service external debt appear to play a key role in determining a developing country's credit rating. Our analysis also shows that a country tends to retain its rating over time unless significant adverse or positive developments occur.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
2002	Hu et al.	The Estimation of Transition Matrices for Sovereign Credit Ratings	Liquidity Variables: debt-service-to-export ratio, interest-service ratio, liquidity gap ratio Solvency variables: reserves-to-imports ratio, export fluctuations (export growth as a deviation from trend), debt to GDP ratio; Macroeconomic fundamentals: inflation rate, real exchange rate, GDP growth rate, growth rate of exports External Shocks: changes in US Treasury interest rates, changes in the real oil price	Ordered Probit Model	This paper shows how one may combine information from sovereign defaults observed over a longer period and a broader set of countries to derive estimates of sovereign transition matrices.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
2003	Alexe et al.	A Non-Recursive Regression Model for Country Risk Rating	Gross domestic product per capita, Inflation rate, Trade balance, Exports' growth rate, International reserves, Fiscal balance, Debt to GDP, Political stability, Government effectiveness, and Corruption, Exchange rate, Financial depth and efficiency	Non-recursive multiple regression model	Estimated the credit ratings of a certain group of countries during ten years period by using the variables which may represent summary of a country economy and be used by a CRA. They argued that the credit ratings of the model analyzed in their study (estimations) have high correlation with the realizations.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
2005	Amato	Risk aversion and risk premia in the CDS market	CDS Spreads, macroeconomic and credit market activity variables. Macroeconomic variables include measures of inflation, real economic activity, consumer confidence, risk-free interest rates and the stance of monetary policy	Regression Analysis	Analyze the risk premium that CDS spreads are believed to include and suggest that default risk premium and risk aversion are strongly related to fundamental factors, such as indicators of real economic activity and the stance of monetary policy. CDS spreads compensate investors for expected loss, but they also contain risk premium because of investors' aversion to default risk

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
2006	Partnoy	How and Why Credit Rating Agencies are Not Like Other Gatekeepers	-	Literature Survey and Interpretations	Credit ratings are used by professionals as one of the primary variables in analysis related to risk management in the global finance system and many institutions are obligated to be rated by one or more CRA in order to offer securities to various markets. Therefore, the credit ratings are applied to meet certain mandatory requirements in many regulations rather than just providing information on the risks. Reforms directed at credit rating agencies should reflect these differences between the agencies and other gatekeepers.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
2007	Longstaff et al.	How Sovereign is Sovereign Credit Risk	Sovereign CDS Spreads, Local Stock Market Returns, Exchange Rates, Foreign Currency Reserves, U.S. Stock Market Returns, Treasury Yields, Corporate Yield Spreads, Equity Premium, Volatility Risk Premium, Term Premium, Bond and Equity Flows, Regional and Global Sovereign CDS Spreads, Sovereign Credit Returns, Fixed Income Returns	Regression Analysis	Observed interaction between credit rating of some group of developing countries and their CDS spreads and it was concluded that the credit rating increases affected on the CDS spreads of the countries positively. Besides they argue that a substantial part of the variation in CDS spread can be explained by global factors such as the VIX, dependence on common global factors such as U.S. stock market returns and high-yield spread changes induces significant correlation into the credit spreads of a broad cross-section of sovereign nations, global investment flows are important for determination of the correlation structure of credit risk in sovereign debt markets.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
2008	Jeanneret	A Structural Model for Sovereign Credit Risk	Economic growth, volatility, risk-free interest rates, economic costs of defaulting, the incentive of issuing debt, and sovereign credit spreads	Regression Analysis, OLS	Defaulting is not exogenous to the sovereign decisions. It is an optimal outcome. When the choice of defaulting on foreign debt emanates from a value-maximizing behavior of the sovereign, the assessment of the country creditworthiness corroborates the empirics.
2008	Pan and Singleton	Default and Recovery Implicit in the Term Structure of Sovereign CDS Spreads	CDS Spreads, Credit Events of Mexico, Turkey, and Korea	Single-factor model	Term structures of spreads reveal not only the arrival rates of credit events, but also the loss rates given credit events. Risk premiums associated with unpredictable variation in credit event are found to be economically significant and co-vary importantly with several economic measures of global event risk, financial market volatility, and macroeconomic policy.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
2009	Haugh, Ollivaud and Turner	What Drives Sovereign Risk Premiums	Yield Spreads, Fiscal Variables	Panel Data Regression	Relation between yield spreads and fiscal performance in euro area and found that incremental deteriorations in fiscal performance lead to ever larger increases in the spread
2010	İsmailescu and Kazemi	The Reaction of Emerging Market Credit Default Swap Spreads to Sovereign Credit Rating	CDS Spreads, aggregate change in comprehensive credit ratings of all event countries	Regression Analysis	Positive rating announcements have a more consistent impact on sovereign CDS markets than do negative events. A credit upgrade in emerging markets conveys more significant information than a credit downgrade. CDS premiums move in the expected direction in anticipation of credit rating news, be it positive or negative. Positive ratings announcements are more likely to spill over into other emerging CDS markets than are negative announcements.

Year	Author(s)	Name of the Study	Variables Used in the Study	Method(s) Used in the Study	Empirical Findings
2011	Jaramillo and Tejada	Sovereign Credit Ratings and Spreads in Emerging Markets: Does Investment Grade Matter?	Ratings and macroeconomic control variables, specifically: external and domestic public debt to GDP, international reserves to GDP, real GDP growth,	Panel data regression	Investment grade status reduces spreads by 36 percent, above and beyond what is implied by macroeconomic fundamentals. This compares to a 5-10 percent reduction in spreads following upgrades within the investment grade asset class, and no impact for movements within the speculative grade asset class, ceteris paribus.
2014	Doshi et al.	Economic and Financial Determinants of Credit Risk Premiums in the Sovereign CDS Market	Economic and Financial Variables	Regression Analysis	Spreads increase as a function of stock market and exchange rate volatility, but decrease as a function of interest rates and stock market returns. Estimated risk premiums are highly time-varying and peak during the 2008 financial crisis for nearly all countries. For European countries the risk premiums are also high during the Eurozone debt crisis.

2. EMPIRICAL RESEARCH

Sovereign credit rates of Turkey given by the three big global credit rating agencies, Standard & Poors, Moody's and Fitch and variables which are assumed to be effective on credit rating and sovereign risk of Turkey are studied in this dissertation. Considering the critiques regarding credit rating agencies not being able to reflect current situations of sovereigns, those short term variables assumed effective on the credit rates and sovereign risk are analyzed.

In the first step of the empirical study, correlations among variables are calculated. Variables which are thought to have potential effect on the sovereign credit rates of the agencies are analyzed through least square methodology of the times series analysis using Eviews software of statistical and econometric analysis.

Stabilities of the regressions in the study are also tested by using the residual stability tests of cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residual (CUSUM of Squares). These tests are applied to understand if the credit rate changes were occurred as a result of structural breaks.

2.1. Variables and Data Sources

In this study, potential variables were determined in accordance with literature survey, current methodologies of the CRAs and the suggestions in the reports prepared by the national and international administrative and legislative bodies. Attention was paid to their characteristics whether they are capable to reflect current situation of a country, Turkey, in terms of sovereign credit risk. Therefore variables were mainly selected among the daily and monthly data.

As the sovereign rating methodologies of the CRAs observed and previous studies in this field are reviewed it has been concluded that risk ratings encompass economic, fiscal, event risk and money market factors. So the variables have been organized according

to these factor groups. Those variables which are capable of reflecting current situation in the market are heeded expecting to reach a conclusion of determining variables which are effective on sovereign risk perception in short term.

Credit rating methodologies of the CRAs group sovereign risk variables under different risk factors. Methodology of the Standard and Poors among these CRAs is more precise and sovereign risk factors in its methodology can be grouped under four factors, which are economic factor, fiscal factor, money market factor and event risk factor. Similar stance was applied in this study. Although rating agencies do not disclose the variables and the proportions that they take into account in their sovereign rating assessment processes, those most probable variables attributable to these risk factors were selected for this study.

Daily, monthly and quarterly variables are chosen for the analysis. Daily variables are transformed to monthly averages while quarterly variables are interpolated.

2.1.1. Economic Factor Variables

Following variables are selected as economic factor variables:

2.1.1.1. Nominal GDP (GDP)

GDP is an aggregate measure of production, equals to the sum of the gross values added of all resident institutional units engaged in production, plus any taxes, and minus any subsidies, on products not included in the value of their outputs (OECD). GDP is calculated commonly to measure the economic performance of a whole country or region.

Quarterly data is available at Turkish Statistical Institute. Quarterly data was interpolated and adjusted to the monthly series for this study.

2.1.1.2. Consumer Price Index (CPI)

Consumer price index (CPI) is the measure that shows the changes in the price level of a basket of consumer goods and services purchased by households in the market. The basket of consumer goods is constructed with prices and proportions of the goods. The

price data are collected for a sample of goods and services. The proportions of the goods in the basket (weighting) is determined usually through surveys on expenditure of households or upon estimates of the composition of consumption expenditure in the National Income and Product Accounts.

Consumer Price Index is a monthly data and it is available at web site of the Turkish Statistical Institute

2.1.1.3. Unemployment Rate (UR)

The unemployment rate is calculated by dividing the number of unemployed individuals by all individuals currently in the labor force. Methods of calculation and presentation of unemployment rate vary from country to country. In Turkey, unemployment is calculated by the Turkish Statistical Institute in accordance with the methods accepted by International Labor Organization, ILO.

Economies usually experience a higher unemployment rate during periods of recession. When an economy has a high rate of unemployment, it looses money or its GDP shrinks (Ball 2014).

Monthly Unemployment data of Turkey is available at web site of the Turkish Statistical Institute.

2.1.1.4. Export (EXPO)

Export means shipping the goods and services out of the port of a country to sell goods and services produced in the home country to other markets. The theory of international trade and commercial policy is one of the oldest topics of economics. Export data considered in this study because of its importance in reflecting revenue generation capacity of the economy.

Monthly export data of Turkey is available at web site of the Ministry of Economy.

2.1.1.5. Import (IMP)

Import is a good or service brought into one country from another. Export and import together form international trade of a country. If imports are greater than exports, it is said that country has trade deficit.

Monthly export data of Turkey is available at web site of the Ministry of Economy.

2.1.1.6. Trade Balance (TB)

Trade balance or balance of trade is the difference between a country's imports and its exports. Balance of trade is also considered in the calculation of the balance of payments of a country and it constitutes a major of the balance of payments. A country has a trade deficit if it imports more than it exports. In the opposite case it is called trade surplus.

Monthly Trade Balance data of Turkey is available at web site of the Turkish Statistical Institute

2.1.1.7. Foreign Trade Volume (TRV)

Foreign trade volume or the international trade is the total of the export and imports. Foreign trade volume data of Turkey is available at web site of the Ministry of Economy.

2.1.1.8. Data Omitted

Foreign Direct Investment, Real GDP Growth, Economic Development Index by IMF, WEF Global Competitiveness Index variables were also considered as economic factor variables for this study but they had to be omitted because of their improper frequencies and the some other reasons indicated below for each.

Foreign Direct Investment (FDI): Quarterly data is available. This quarterly data was transformed to monthly data through interpolation. But the interpolated data might decrease reliability of the analysis.

Real GDP Growth (GDP) & Gross domestic product per capita (GDPc): Quarterly data is available for these variables. Therefore GDP growth rates are also needed to be interpolated. Interpolated values decreased reliability of the analysis. Therefore these variables were omitted.

Same reason of Real GDP Growth is also valid for this variable.

Economic Development Index by IMF (IMF classification as an industrialized country as of September 1995): This variable was not suitable for monthly analysis because of its announcement frequencies.

WEF Global Competitiveness Index: Monthly data is not available.

2.1.2. Fiscal Factor Variables

Following variables are selected as Fiscal Factor Variables.

2.1.2.1. General Government Debt (GGD)

Government debt which is the debt owed by a central government is also known as public debt, national debt and sovereign debt. Borrowing is one method of financing government operations. Governments usually borrow by issuing securities, government bonds and bills. Governments can borrow both from internal debtors and external debtors in domestic or foreign currencies.

As it is stated in the Guidelines for Public Debt Management by IMF and World Bank , generally, rising private and government debt levels around the world and increasing risk levels and borrowing cost lead to the sovereign debt crisis. According to the guideline governments should seek to ensure that both the level and rate of growth in their public debt is fundamentally sustainable, and can be serviced under a wide range of circumstances while meeting cost and risk objectives. Even in situations where there are sound macroeconomic policy settings, risky debt management practices increase the vulnerability of the economy to economic and financial shocks. Sometimes these risks can be readily addressed by relatively straightforward measures, such as by lengthening the maturities of

borrowings and paying the associated higher debt servicing costs (assuming an upward sloping yield curve), by adjusting the amount, maturity, and composition of foreign exchange reserves, and by reviewing criteria and governance arrangements in respect of contingent liabilities" (International Monetary Fund and the World Bank, 2001).

On the other side credit rating (rating) is an evaluation of credibility and repayment capability of a specific debt. The rating activities aims at measuring the refunding capacity of the debt by the borrower entity within due times and regularly (Moody's 2009).

Government debt data of Turkey is available at web site of the Undersecretariat of Turkish Treasury.

2.1.2.2. External Debt (ED)

External debt is the total debt a country owes to foreign creditors. CRAs evaluate credibility and repayment capability of the sovereigns as a function of its economic position. A country with a strong economy, manageable debt burden, stable currency, strong tax collection and positive demographics will likely have the ability to pay back its debt.

Central government external debt stock monthly data in million USD is available at web site of the Undersecretariat of Turkish Treasury.

2.1.2.3. International reserves (RES)

International reserves are accumulated by the central banks in an acceptable form of payment which may either be gold or other precious metals and strong currencies, such as the dollar or euro.

International reserves are used for monetary operations and as an assurance against the liabilities. It is expected that international reserve position is relevant with riskiness of the country.

Monthly international reserve data of Turkey is available at web site of the Central Bank of Turkey.

2.1.2.4. Balance of Payments (BP)

The balance of payments (BOP) is a record of economic transactions of a country between residents of that country and exteriors. Summation of all components of the BOP accounts must come to zero when the all augmentative and abating factors are considered. In spite of this fact, imbalances are possible on individual elements of the BOP, such as the current account. Imbalance in the form of surplus may lead to wealth in the country, while deficit may lead to increase in debt level. Balance of payment data used in this study doesn't include reserving and financing accounts.

Balance of payment data of Turkey is available at web site of the Central Bank of Turkey

2.1.2.5. Current Account (CUA)

The current account is the sum of the balance of trade (difference between the exports and imports), factor income (difference between the foreign investments and payments made to foreign investors) and cash transfers. Countries with deficits in their current accounts are expected to increase their debt level which constitutes risk for the creditworthiness of that country. Current account surplus increases a country's net foreign assets while current account deficit decrease that amount. This variable is expected to be significant for the analysis of this study because it reflects the current situation of the related transactions.

Current Account data of Turkey is available at web site of the Central Bank of Turkey

2.1.2.6. General Government Consolidated Budget Balance (CBB)

General government consolidated budget balance is the overall difference between government revenues and spending. A positive balance is called a government budget surplus, and a negative balance is a government budget deficit.

General government consolidated budget balance data was obtained from Bloomberg.

2.1.2.7. Primary Balance (PB)

Primary balance is a government's net borrowing or net lending, excluding interest payments on consolidated government liabilities.

Monthly primary balance data of Turkey is available at web site of the Undersecretariat of Turkish Treasury.

2.1.3. Money Market Factor Variables

2.1.3.1. Stock Market Return (SMR)

Stock Market Returns are the returns that the investors generate out of the stock market. Return is the gain or loss of a security in a particular period. It consists of the income and the capital gains relative on an investment. Return is the capital gain and dividends given by the company to its shareholders. Stock market returns are not fixed ensured returns and are subject to market risks. In opposition to the fixed returns generated by the bonds, the stock market returns are variable in nature. Stock market returns are subjected to market risks (Economy Watch 2010).

Stock market return data was obtained from the web site of the Borsa İstanbul. Monthly average of the BIST 100 index return is calculated using MS Excel.

2.1.3.2. Overnight Interest Rate (ON)

The overnight rate is the interest rate that the Central Bank of Turkey uses to lend in the overnight market. At the end of the each operating day banks in the market may have surplus or shortage of funds. Banks that have surplus funds or excess reserves may lend to those in need of funds. The overnight rate is the interest rate used in these transactions.

Overnight interest rate data is available at web site of the Central Bank of Turkey. Monthly average of the overnight interest rates is calculated using MS Excel.

2.1.3.3. USD/TRL Monthly Average (ER)

Exchange rate is the price at which one currency will be exchanged for another. It is the value of one country's currency in terms of another currency. Exchange rates are determined in the foreign exchange market.

Daily exchange rates are available at web site of the Central Bank of Turkey. Monthly average of the USD/TRL exchange rate is calculated using MS Excel.

2.1.4. Event Risk Factor Variables

2.1.4.1. CDS Premium Rates for Five Year of Tenure (CDS)

Credit default swap (CDS) is a financial derivative invented by Blythe Masters from JP Morgan in 1994. It is a financial swap agreement that buyer of the CDS acquire right to claim compensation from the CDS seller, in cases of default of subjected loan or some other credit events. The buyer of the CDS is obliged make a series of payments which are called CDS "fee" or "spread" during the agreement period. In case of default, CDS buyer is compensated by the CDS seller. Compensation amount is usually the face value of the loan and possession of the defaulted loan passes to the CDS seller. CDS can also be purchased without having a loan instrument. This kind of CDSs are called "naked".

CDS data is used by investors, financial professionals and regulators to keep track of risk perception of entities on which CDS is available. In case of sovereign loans CDS data can be monitored in order to have an idea about credit risk of that country. Therefore this data is included in this study because of its capacity to be a proxy of the sovereign credit risk.

CDS premium data of Turkey was obtained from Bloomberg.

2.1.4.2. BIST Volatility (BISTVO)

BIST Volatility is considered as a potential variable because of its reference to the amount of uncertainty or risk about the size of changes in the index. A higher volatility means that prices of securities traded in the market can change dramatically over a short time period while lower volatility is associated with more stable market condition.

21 days of volatility data is available at the web site of the Borsa İstanbul.

2.1.4.3. Monthly CBOE Volatility Index (MVIX)

VIX is a trademarked ticker symbol for the Chicago Board Options Exchange Market Volatility Index. It is a measure of the market's expectation of stock market volatility over the next 30 day period based on weighted blend of prices for a range of options on the S&P 500 index. It is a measurement of the market perception regardin volatility in either direction, upside and downside.

The VIX is calculated and disseminated in real-time by the Chicago Board Options Exchange. Its data is available at web site of the CBOE.

2.1.4.4. Monthly S&P 500 Total Return (MSPTR)

The S&P 500 is an American stock market index based on the market capitalizations of 500 large companies listed on the NYSE or NASDAQ. The S&P 500 index components and their weightings are determined by S&P Dow Jones Indices. The index is considered as one of the best representations of the U.S. stock market.

The data was obtained from Bloomberg.

Following variables are considered in the analysis because of their presumable relation with the financial strength of the country and their ability of reflecting event risks in the market.

2.1.4.5. Capital Adequacy of the Banks (CAB)

Capital Adequacy of the Banks variable in this study is the ratio of total capital of the banks to their total assets. It is also calculated separately for each bank. Capital is measured as total capital and reserves as reported in the balance sheet. It indicates the extent to which assets are funded by other than own funds and is a measure of capital adequacy of the deposit-taking sector. Also, it measures financial leverage and is sometimes called as the leverage ratio (Capital to Assets, n.a.).

Data is available at web site of the BRSA

2.1.4.6. Non-Performing Loans to Total Loans (LTL)

Non-Performing Loans to Total Loans is the rate calculated by using the value of NPLs as the numerator and the total value of the loan portfolio as the denominator. This variable may be treated as a proxy for asset quality and is intended to identify problems with asset quality in the loan portfolio (Nonperforming loans to total gross loans, n.a.).

Data is available at web site of the BRSA

2.1.4.7. Domestic Bank Assets and Liabilities.

In this group there are 'Total Domestic Bank Assets (DBA)', 'Domestic Banking Loans (DBL)', 'Domestic Banking Deposits (DBD)', and 'Banking System Loan to Deposits (LTD)' variables. Data of these variables is available at web sites of the Central Bank of Turkey and BRSA.

2.1.5. Variables Explained

2.1.5.1. Sovereign Credit Rates

Sovereign credit rating is an assessment of that country's ability to pay its financial obligations. This ability is also called as "creditworthiness." There are no standard or agreed-upon methods to measure the creditworthiness because of the subjective nature of credit ratings.

Different rating agencies may use variations of an alphanumeric combination of lower and upper case letters. Therefore alphanumeric rates given by the credit rating agencies are transformed to numeric figure by the following method. Similar methods are also used in different analysis in the literature. This transformation provides an alternative way of assessment of the credit ratings by the three rating agencies; S&P, Moody's and Fitch.

Table 9: Numeric Interpretation of Alphabetic Rates by the Three Rating Agencies

	S&P	S&P Numeric	Moody's	Moody's Numeric	Fitch	Fitch Numeric
Investment Grade	AAA	100,00	Aaa	100,00	AAA	100,00
	AA+	95,45	Aa1	95,45	AA+	95,83
	AA	90,91	Aa2	90,91	AA	91,67
	AA-	86,36	Aa3	86,36	AA-	87,50
	A+	81,82	A1	81,82	A+	83,33
	A	77,27	A2	77,27	A	79,17
	A-	72,73	A3	72,73	A-	75,00
	BBB+	68,18	Baa1	68,18	BBB+	70,83
	BBB	63,64	Baa2	63,64	BBB	66,67
	BBB-	59,09	Baa3	59,09	BBB-	62,50
Speculative Grade	BB+	54,55	Ba1	54,55	BB+	58,33
	BB	50,00	Ba2	50,00	BB	54,17
	BB-	45,45	Ba3	45,45	BB-	50,00
	B+	40,91	B1	40,91	B+	45,83
	B	36,36	B2	36,36	B	41,67
	B-	31,82	B3	31,82	B-	37,50
	CCC+	27,27	Caa1	27,27	CCC+	33,33
	CCC	22,73	Caa2	22,73	CCC	29,17
	CCC-	18,18	Caa3	18,18	CCC-	25,00
	CC	13,64	Ca	13,64	CC	20,83
	C	9,09	C	9,09	C	16,67
Default	D	4,55	WR	4,55	DDD	12,50
					DD	8,33
					D	4,17
Rate Count	**22**		**22**		**24**	
Numeric Interval Between Rates	**100/22 4,545**		**100/22 4,545**		**100/24 4,166**	

As it can be seen in the table each letters of the rate scale are assigned to a numeric value in order to put numeric rate into analysis.

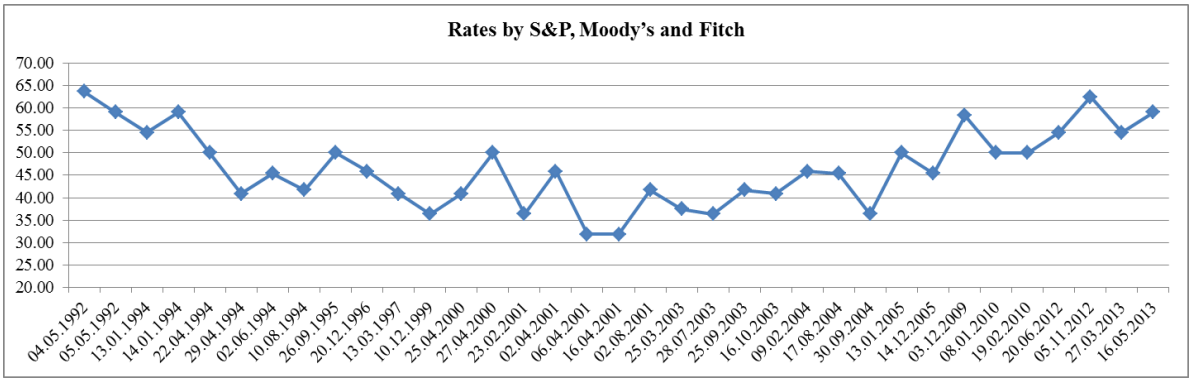
The sovereign credit rates of Turkey given by the global credit rating agencies are as follows.

Table 10: Credit Rates of Turkey by the Three Rating Agencies

DATE	LT	RATE	AGENCY
04.05.1992	BBB	63,64	S&P
05.05.1992	Baa3	59,09	Moody's
13.01.1994	Ba1	54,55	Moody's
14.01.1994	BBB-	59,09	S&P
22.04.1994	BB	50.00	S&P
29.04.1994	B+	40,91	S&P
02.06.1994	Ba3	45,45	Moody's
10.08.1994	B	41,67	Fitch
26.09.1995	BB-	50,00	Fitch
20.12.1996	B+	45,83	Fitch
13.03.1997	B1	40,91	Moody's
10.12.1999	B	36.36	S&P
25.04.2000	B+	40,91	S&P
27.04.2000	BB-	50.00	Fitch
23.02.2001	B	36.36	S&P
02.04.2001	B+	45.83	Fitch
06.04.2001	B3	31.82	Moody's
16.04.2001	B-	31.82	S&P
02.08.2001	B	41.67	Fitch
25.03.2003	B-	37.50	Fitch
28.07.2003	B	36.36	S&P
25.09.2003	B	41.67	Fitch
16.10.2003	B+	40.91	S&P
09.02.2004	B+	45.83	Fitch
17.08.2004	BB-	45.45	S&P
30.09.2004	B2	36.36	Moody's
13.01.2005	BB-	50.00	Fitch
14.12.2005	Ba3	45.45	Moody's
03.12.2009	BB+	58.33	Fitch
08.01.2010	Ba2	50.00	Moody's
19.02.2010	BB	50.00	S&P
20.06.2012	Ba1	54.55	Moody's
05.11.2012	BBB-	62.50	Fitch
27.03.2013	BB+	54.55	S&P
16.05.2013	Baa3	59.09	Moody's

Source: Web sites of the three big rating agencies; S&P, Moody's and Fitch.

Figure 8: Numeric Rates of Turkey by S&P, Moody's and Fitch

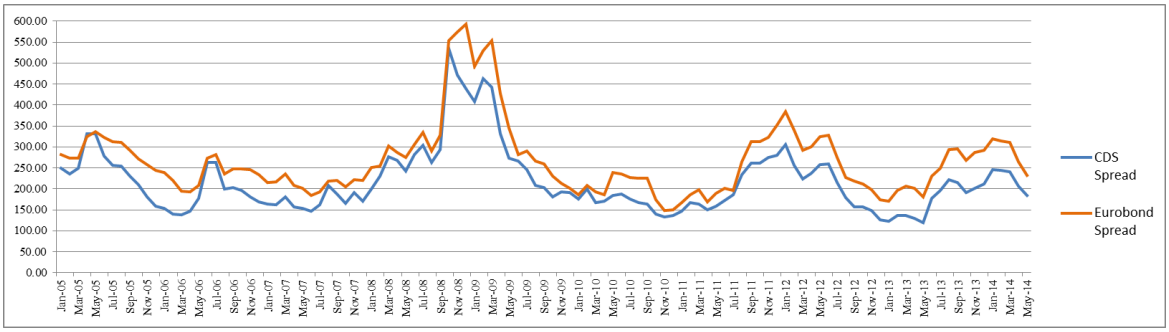


2.1.5.2. Eurobond Spreads

Eurobonds are such bonds which are denominated in U.S. Dollars or other currencies and sold to investors outside the country whose currency is used for denomination. Eurobonds are usually issued by large underwriting groups composed of banks and issuing houses from many countries. Eurobond market serves as an important source of capital for multinational companies and foreign governments and they are attractive borrowing tools. Because, Eurobonds give issuers the flexibility to choose the country in which to offer their bond and in which currency they prefer. Eurobonds are also attractive to investors as they have small par values and high liquidity.

In this study Eurobond with ISIN Number US900123AW05, 13.01.2005 issued date and 05.02.2025 maturity date considered as a proxy variable of the sovereign credit rates of Turkey. Yield spread of this bond is calculated using US Treasury bill of 15.02.2025 maturity as benchmark.

Figure 9: CDS and Eurobond Spreads



2.1.6. Series Statistics

2.1.6.1. Economic Factor Variables

Figure 10: Nominal GDP (GDP) Graph and Histogram

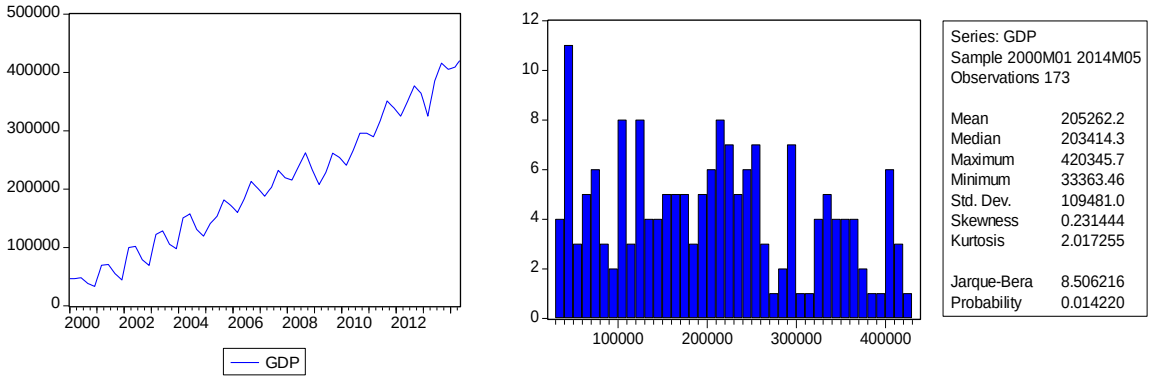


Figure 11: Consumer Price Index (CPI) Graph and Histogram

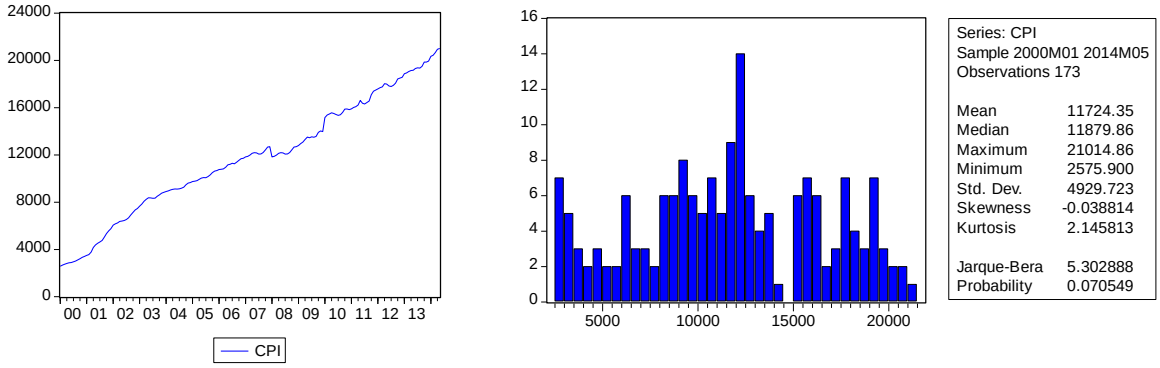


Figure 12: Unemployment Rate (UR) Graph and Histogram

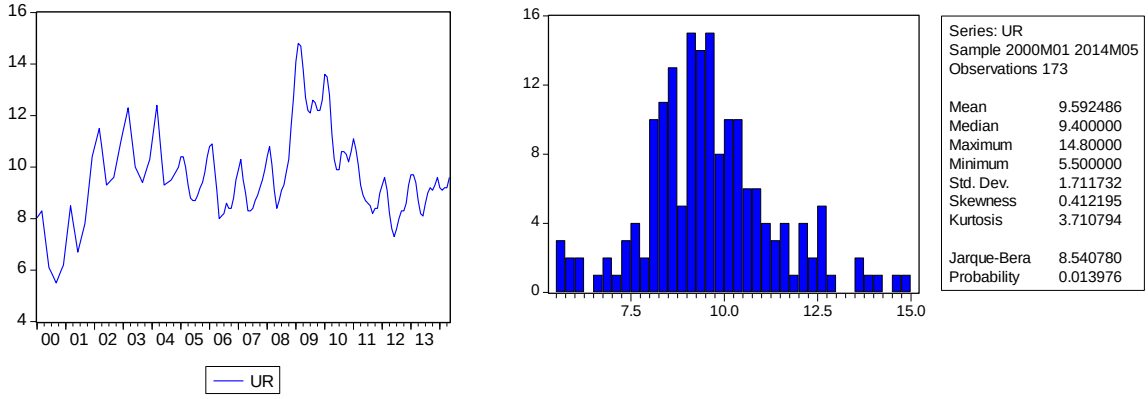


Figure 13: Export (EXPO) Graph and Histogram

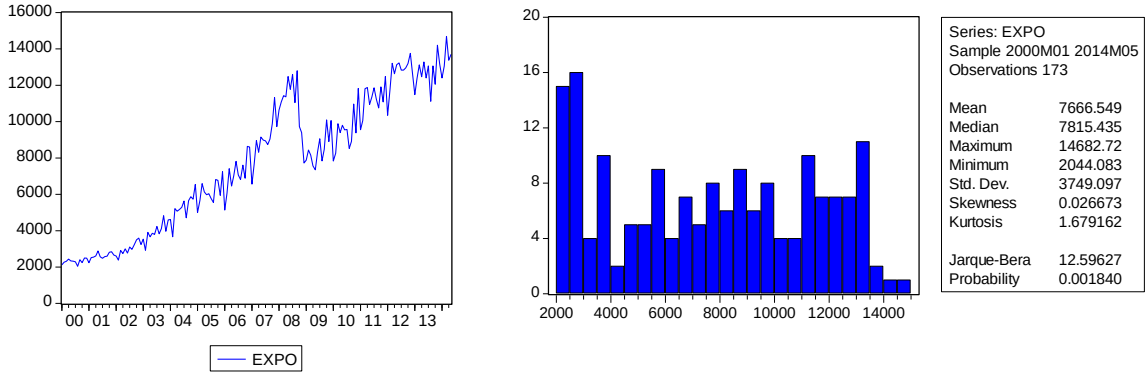


Figure 14: Import (IMP) Graph and Histogram

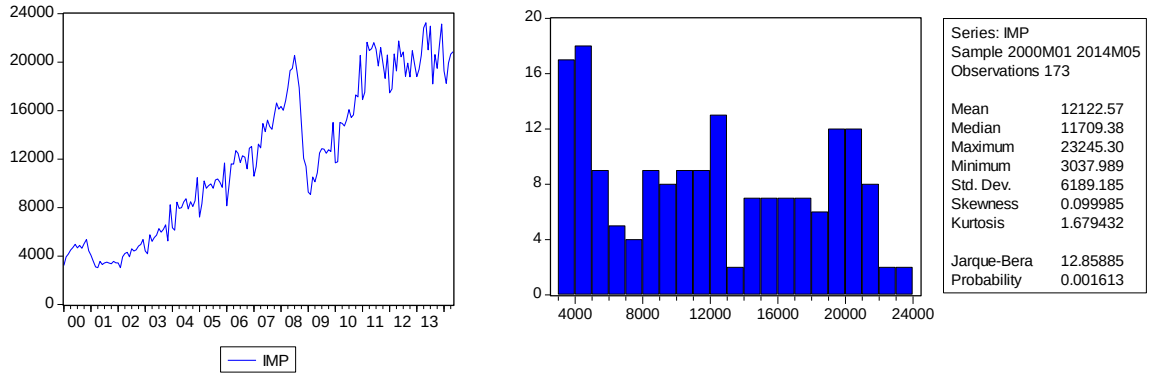


Figure 15: Trade Balance (TB) Graph and Histogram

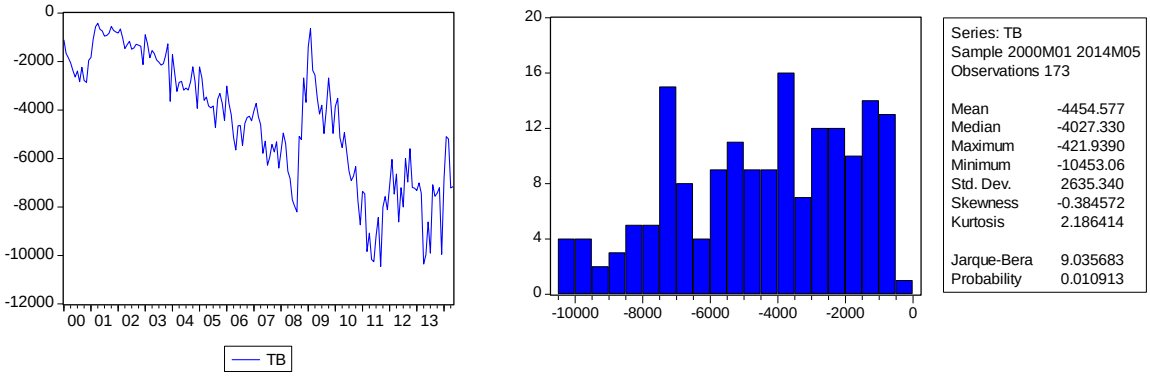
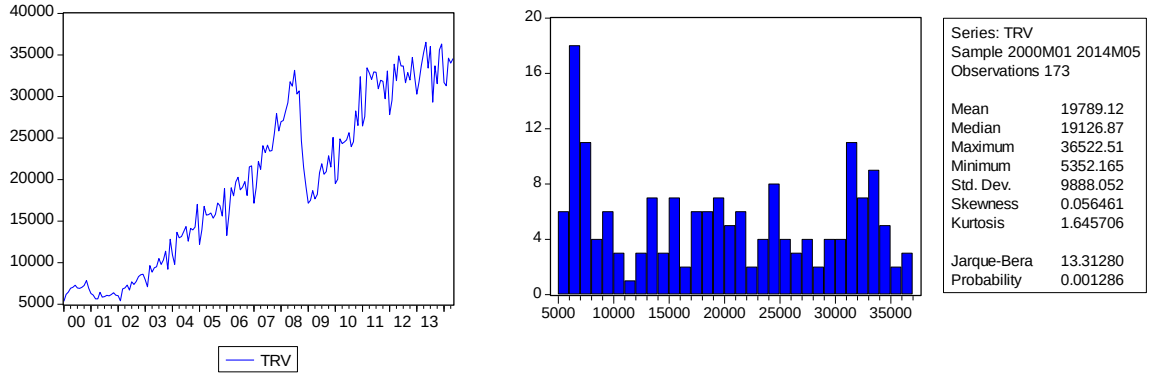


Figure 16: Foreign Trade Volume (TRV) Graph and Histogram



2.1.6.2.Fiscal Variables

Figure 17: General Government Debt (GGD) Graph and Histogram

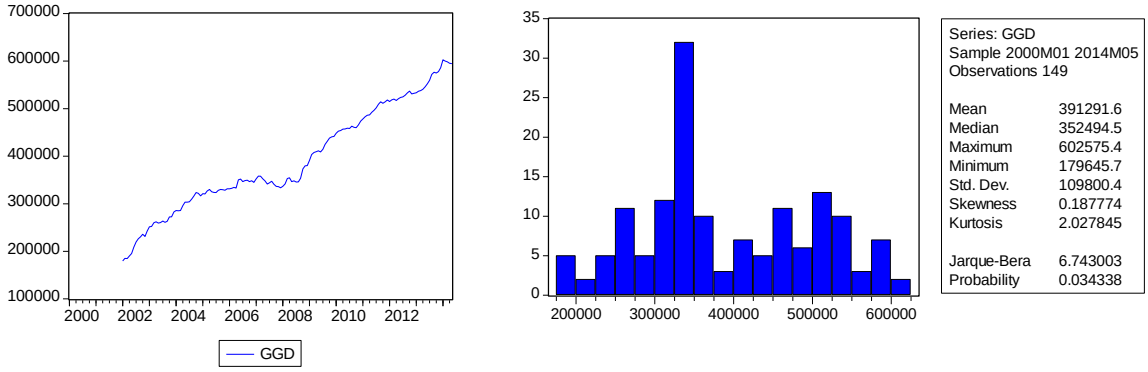


Figure 18: External Debt (ED) Graph and Histogram

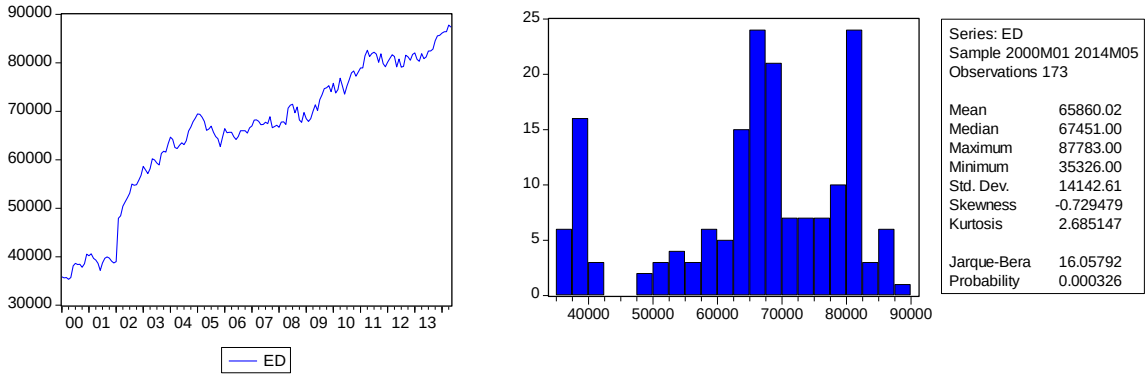


Figure 19: International Reserves (RES) Graph and Histogram

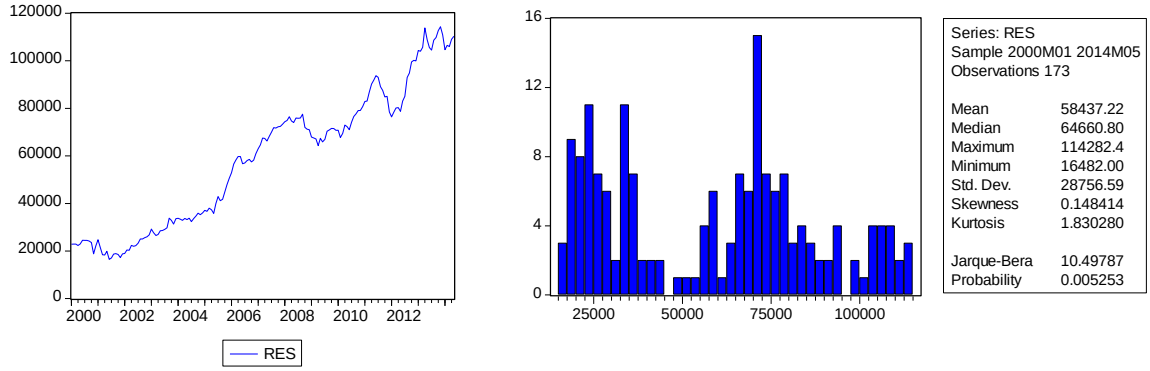


Figure 20: Balance of Payments (BP) Graph and Histogram

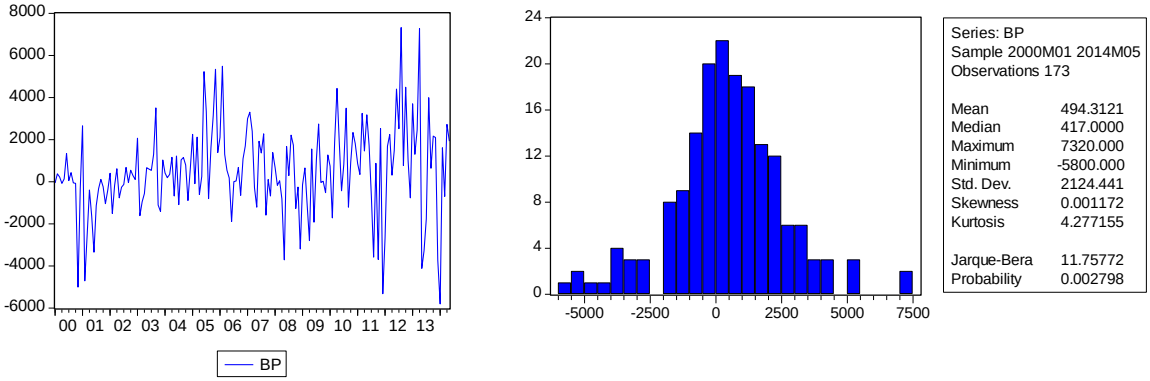


Figure 21: Current Account (CUA) Graph and Histogram

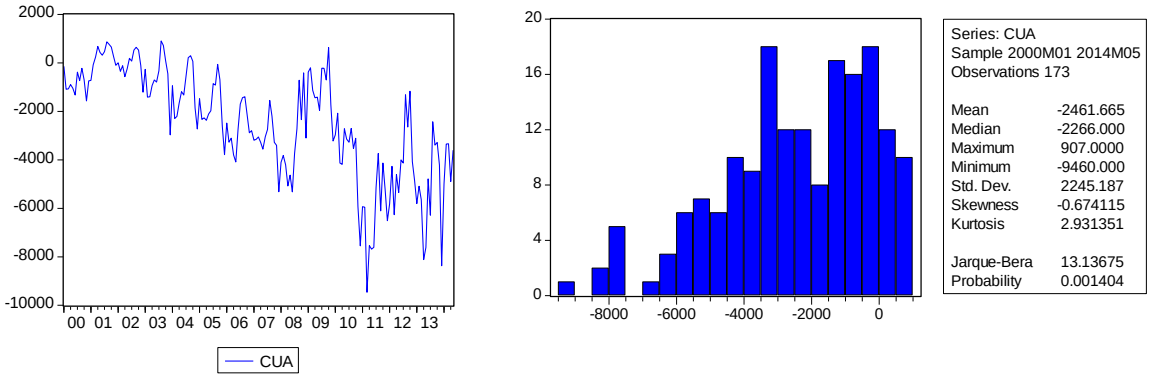


Figure 22: General Government Consolidated Budget Balance (CBB) Graph and Histogram

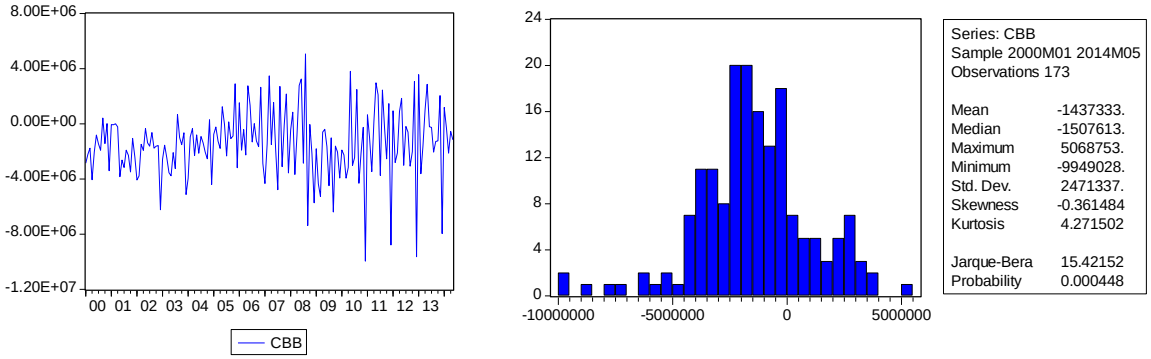
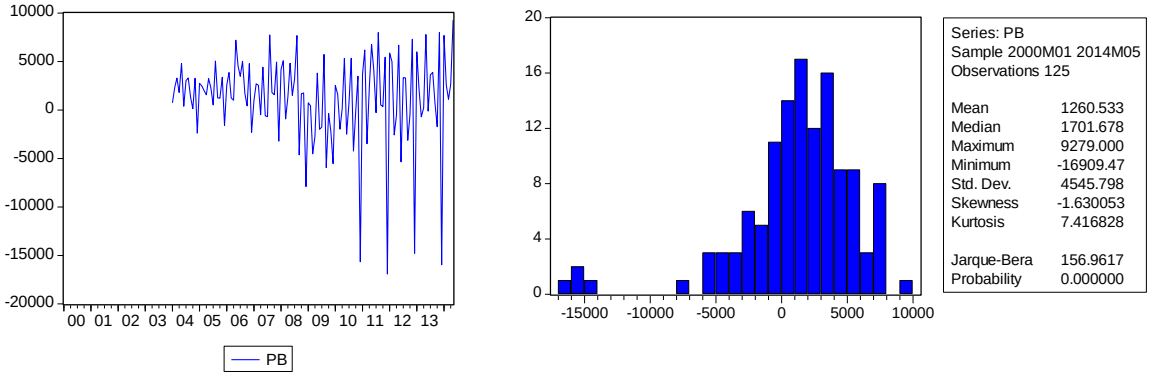


Figure 23: Primary Balance (PB) Graph and Histogram



2.1.6.3. Money Market Factor Variables

Figure 24: Stock Market Return (SMR) Graph and Histogram

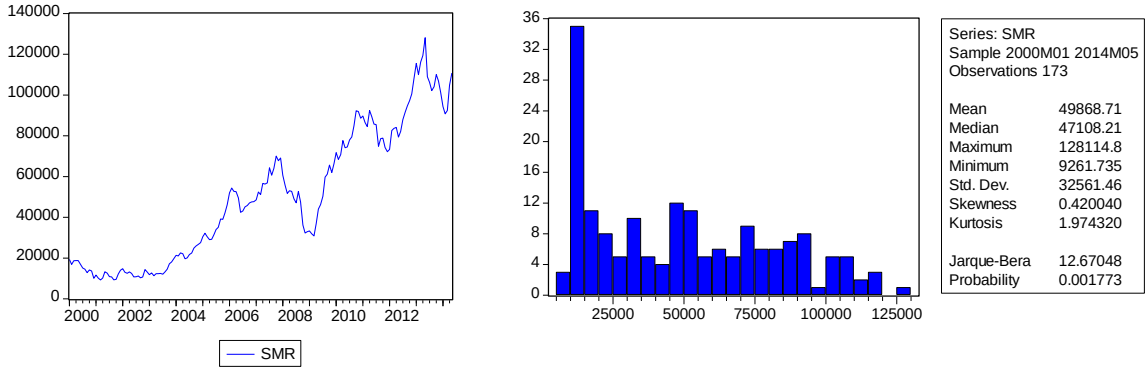
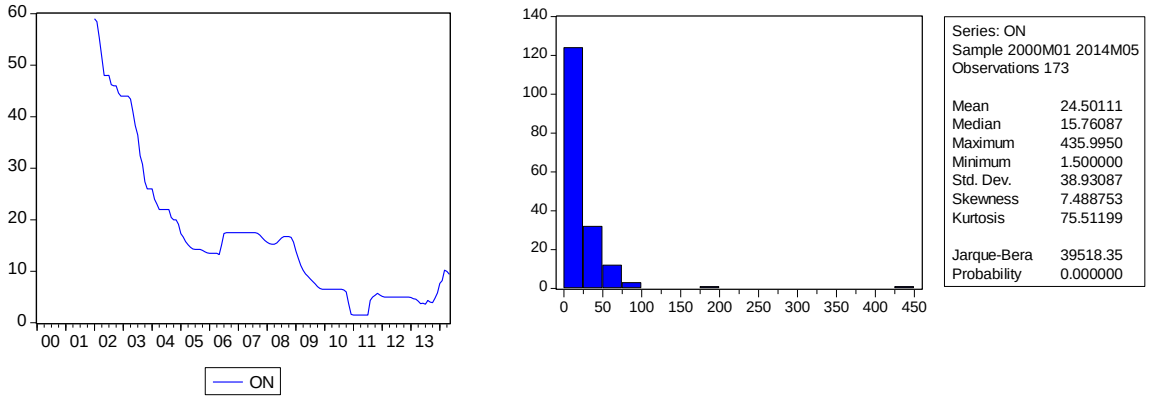
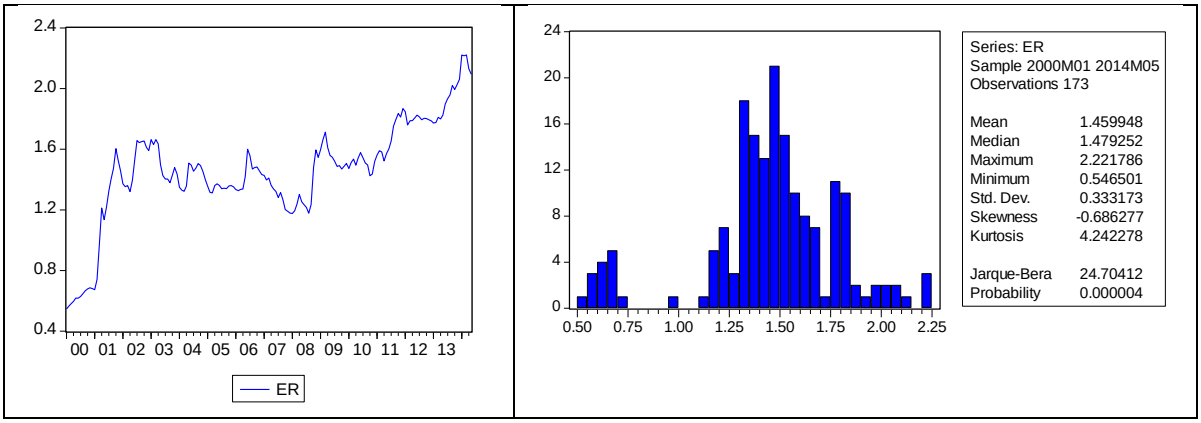


Figure 25: Overnight Interest Rate (ON) Graph and Histogram



**Outlier values such as 435 percent overnight interest rate in 2001 Febuary excluded in the line graph but included in the histogram and statistics.*

Figure 26: USD/TRL Monthly Average (ER) Graph and Histogram



2.1.6.4. Event Risk Factor Variables

Figure 27: CDS Premium Rates for Five Year of Tenure (CDS)

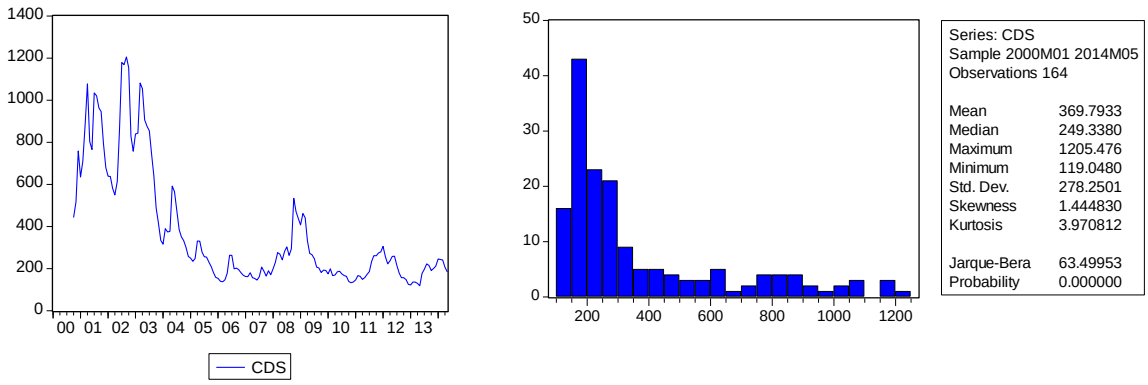


Figure 28: BIST Volatility (BISTVO) Graph and Histogram

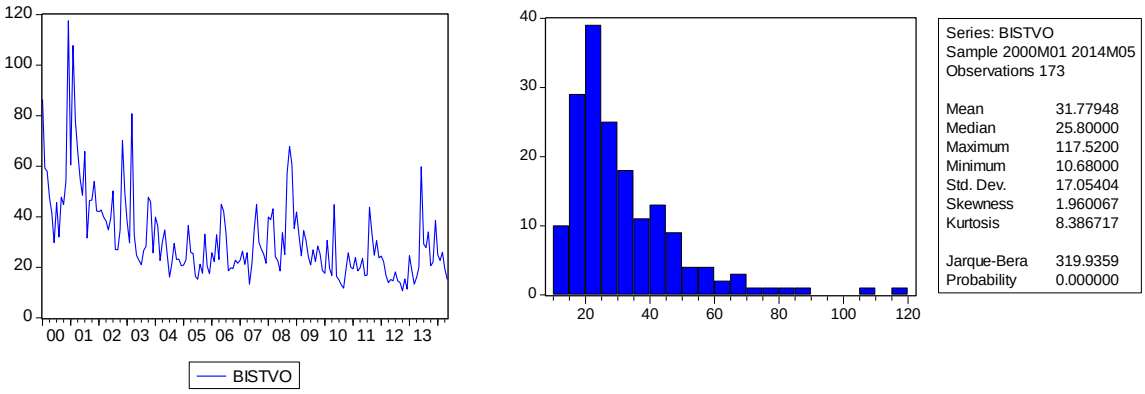


Figure 29: Monthly CBOE Volatility Index (MVIX) Graph and Histogram

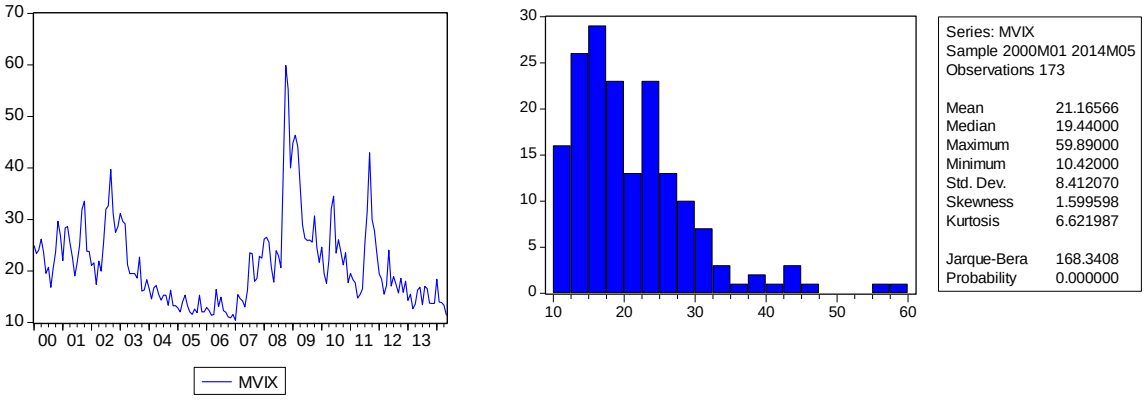


Figure 30: Monthly S&P 500 Total Return (MSPTR) Graph and Histogram

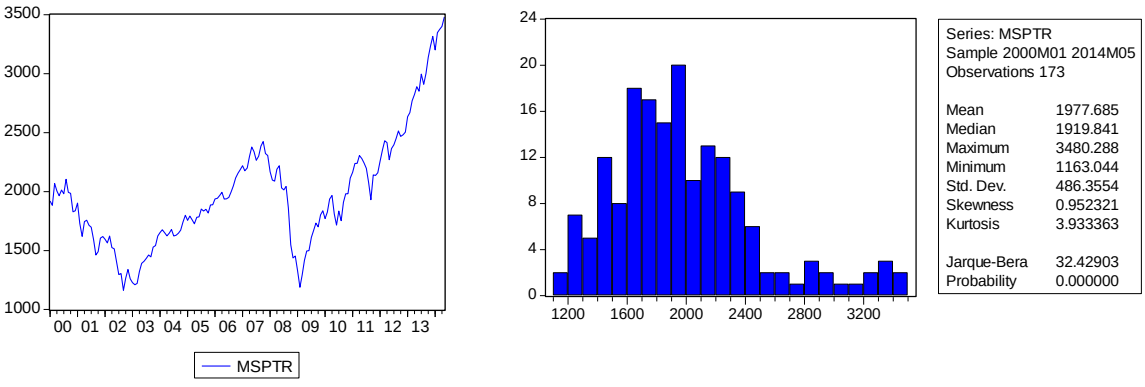


Figure 31: Total Domestic Bank Assets (DBA) Graph and Histogram

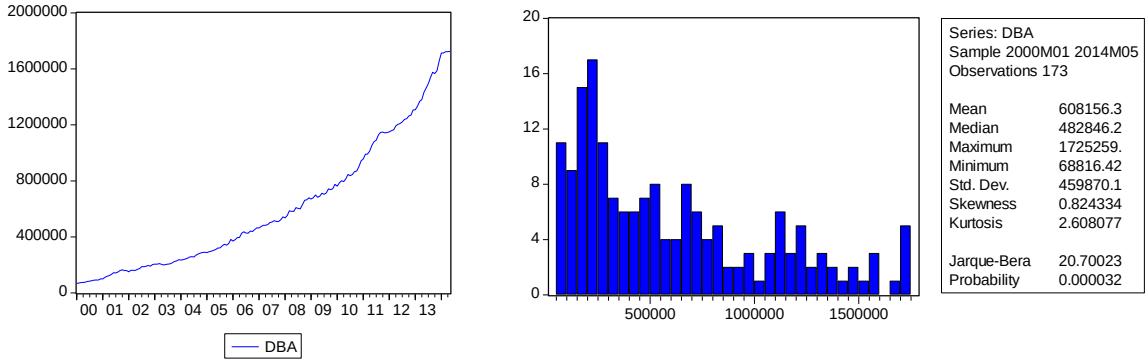


Figure 32: Domestic Banking Loans (DBL) Graph and Histogram

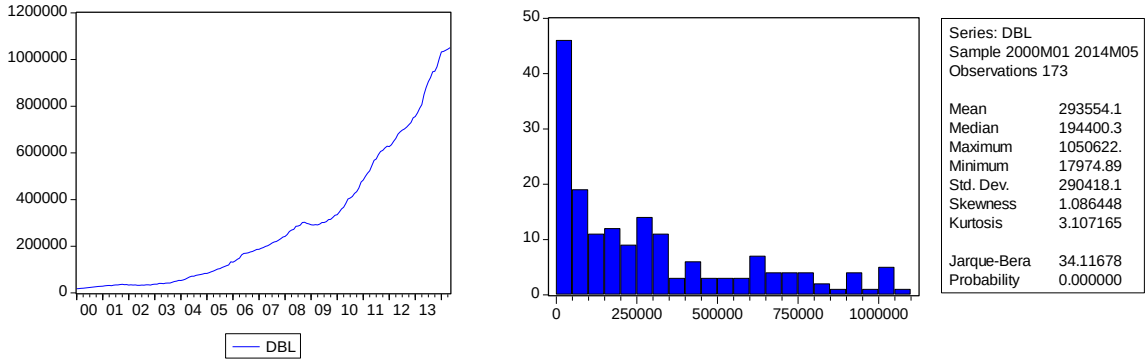


Figure 33: Domestic Banking Deposits (DBD) Graph and Histogram

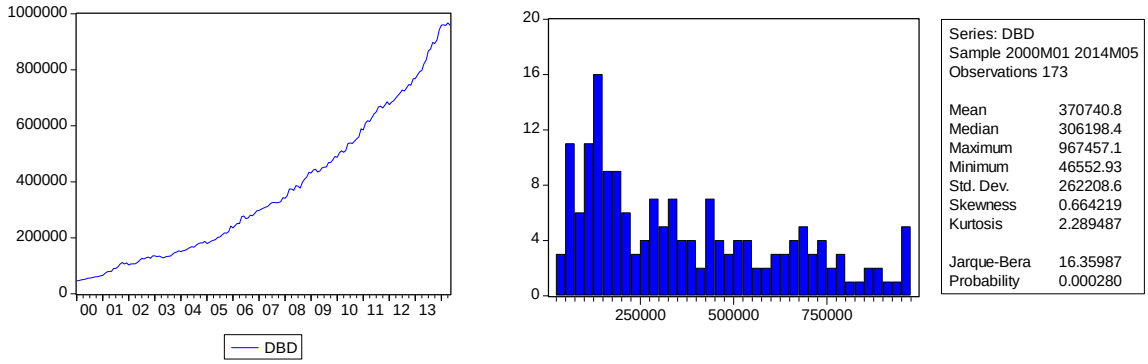


Figure 34: Capital Adequacy of the Banks (CAB) Graph and Histogram

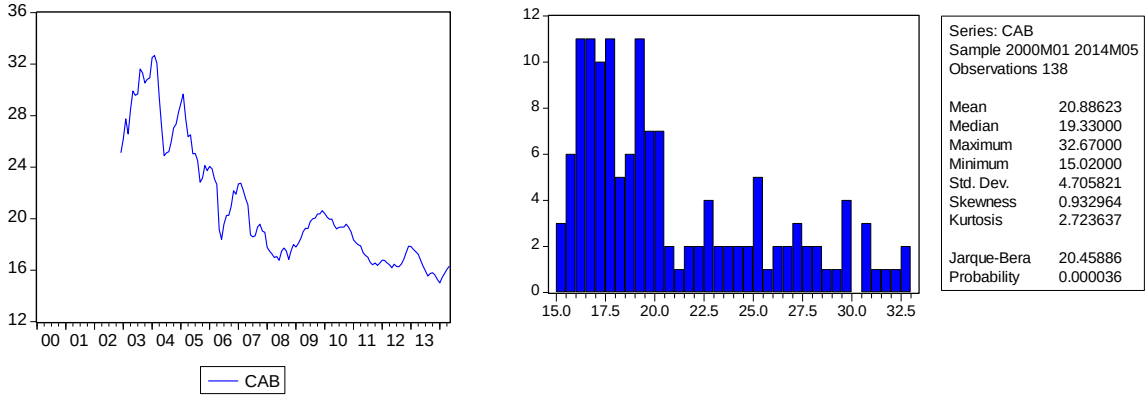


Figure 35: Non-Performing Loans to Total Loans (LTL) Graph and Histogram

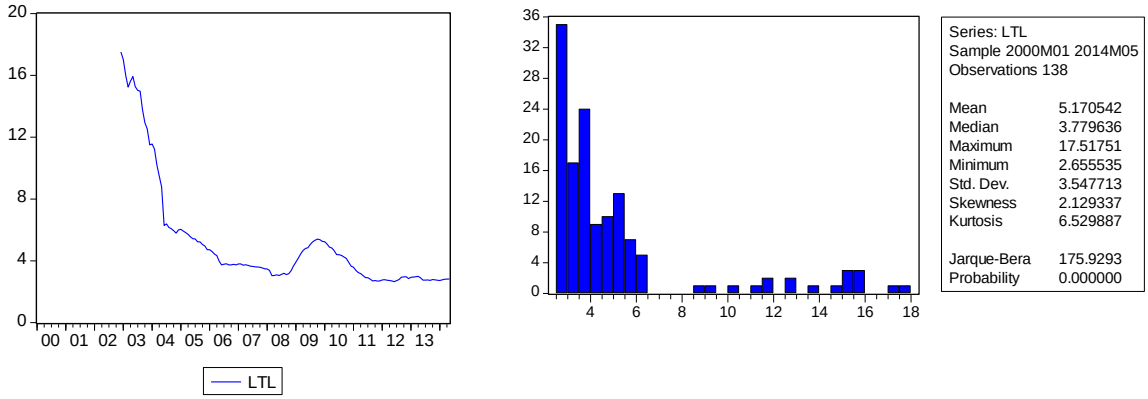
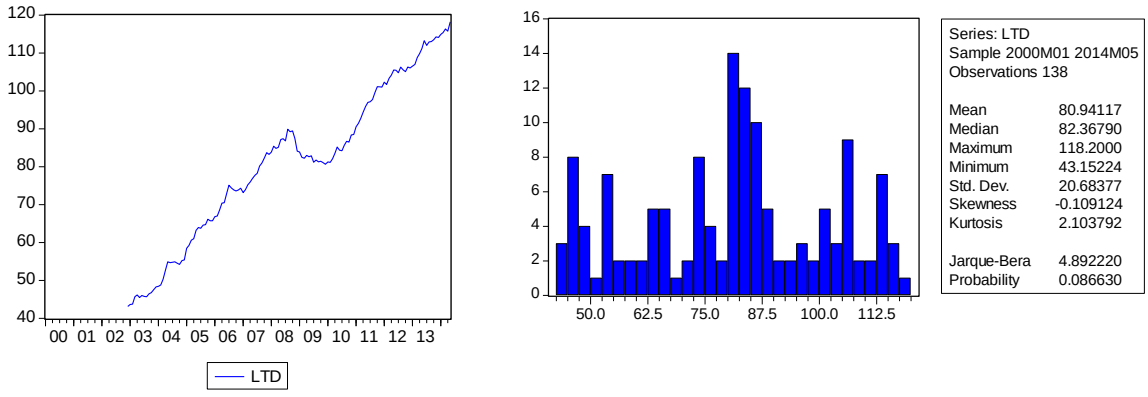


Figure 36: Banking System Loan to Deposits (LTD) Graph and Histogram



2.1.6.5. Pearson Correlation Analysis

The Correlation Matrix is based on the correlation coefficient, a number between 1.0 and -1.0. If there is perfect positive linear relationship between two holdings, the correlation will be 1.0. If there is a perfect negative linear relationship between the two holdings, the correlation coefficient is -1.0. A correlation coefficient of zero means that there is no linear relationship between the items.

Correlation analysis of the variables at their original form indicates that the sovereign credit rates of Turkey given by the three big credit rating agencies, namely Standard & Poors, Moody's and Fitch, are in linear relationship with correlation coefficient rates ranging 0,96 to 0,99. This correlation is an expected result when it is assumed that credit rating agencies are successful at reflecting sovereign risk of Turkey. This correlation may also occur because of interaction among the credit rating agencies. However, this correlation result is not an enough evidence to assert accuracy of both of these assumptions.

Table 11 shows the variables which are correlated with a correlation coefficient value of more/less than +/-0,50. Detailed result of the correlation analysis of the variables at their original form (2001:01 – 2014:05) is available as a table at the appendices of this study.

Table 11: Pearson Correlations among the Three Big Credit Rating Agency's Sovereign Rates and other Variables

S&P		MOOODY'S		FITCH	
NUMMO	0,96	**NUMSP**	0,96	**NUMSP**	0,99
NUMFIT	0,99	**NUMFIT**	0,97	**NUMMO**	0,97
CAB	-0,75	**CAB**	-0,85	**CAB**	-0,78
CPI	0,99	**CPI**	0,95	**CPI**	0,97
CUA	-0,47	**CUA**	-0,45	**DBA**	0,98
DBL	0,99	**DBA**	0,95	**DBD**	0,99
ED	0,93	**DBD**	0,96	**DBL**	0,96
ER	0,78	**DBL**	0,94	**ED**	0,91
EXPO	0,80	**ED**	0,84	**ER**	0,73
GDP	0,98	**ER**	0,72	**EXPO**	0,79
GGD	0,97	**EXPO**	0,80	**GDP**	0,96
IMP	0,78	**GDP**	0,95	**GGD**	0,95
LTD	0,95	**GGD**	0,91	**IMP**	0,76
LTL	-0,59	**IMP**	0,78	**LTD**	0,94
ON	-0,85	**LTD**	0,95	**LTL**	-0,55
RES	0,87	**LTL**	-0,66	**ON**	-0,84
SMR	0,83	**ON**	-0,78	**RES**	0,89
TB	-0,64	**RES**	0,92	**SMR**	0,82
TRV	0,80	**SMR**	0,83	**TB**	-0,60
		TB	-0,62	TRV	0,78
		TRV	0,80		

Pearson correlation results indicate that credit rates of Turkey given by the three big CRAs are highly correlated. This situation can be interpreted as a consistency between the CRAs regarding creditworthiness of Turkey. However, in the advancing parts of the analysis it has been correlation analysis applied to the proportional change time series variables[2]. Results of this correlation analysis indicate that CDS variable is in correlation with the Exchange Rate, General Government Debt, S&P 500 Total Return, Stock Market Return, and the Eurobond Spreads variables. On the other side, Eurobond Spread variable is in correlation with CDS, Exchange Rate, S&P 500 Total Return, Stock Market Return

[2] In the advanced parts of the study it is realized that regression with interpolated credit rates and differentiated variables are not suitable for estimation equation. Therefore, month by month proportional changes of the variables were calculated and used for the analysis.

variables. Detailed result of the correlation analysis of the proportional change time series variables (2001:01 – 2014:05) is available as a table at the appendices of this study.

2.2. Time Series Analysis and Ordinary Least Squares Equation Estimation

As Phillip E. Enns stated in this book named Business Statistics, "A time series is a set of data values for a variable that is measured at a successive points in time" (Enn, 1985) In compliance with nature of time series analysis and literature related with this subject, measurements are made equally spaced time intervals, which are monthly and cover the period between January 2000 and May 2014. From this aspect, type of the data used for this study is called time series data. Time series data analysis let us both to understand and explain the past and to predict and plan for the future.

2.2.1. Choosing a Trend Equation: The Method of Least Squares

Understanding cause-and-effect relations is important in decision making and regression analysis, because regression analysis provides useful insights into how one variable influence another. It tries to determine relations between the variables. Variables are generally denominated as X and Y. But there must be and appropriate type of X-Y relation. This is expressed as a mathematical function which assigns a specific Y value to every value of X. But the analysis made through these functioning should prove how well the method describes the relation between X and Y, and the other variables if they exist.

In the light of this information and considering the time series analysis nature of the financial analysis, method of least squares is deemed to be appropriate for this study. Least squares method is appropriate for achieving a good fit of the equations through selection of the "best" trend curve (Enns 1985, Hill et al. 2008, Gujarati et al. 2009, Agung 2009).

The simplest kind of relation between X and Y is the linear function. A linear function is characterized by two quantities, the slope and Y intercept. These quantities are

identified by the coefficients in the equation that describes the linear relation between X and Y:

$$Y = a + bX$$

Because of its simple form, the linear function is a good starting point for describing the relation between two variables. But exact linear relation between two variables is not common among real variables. A more objective approach is provided by the method of least squares. In this technique, residuals of the equations are minimized. To this aim a single measure which summarizes the closeness of the fitted line to all individual points is needed. This measure is defined as sum of squared residuals in the literature. It is formulized as follows (Enns 1985, Hill et al. 2008, Gujarati et al. 2009, Agung 2009).

$$\sum (Y - \hat{Y})^2$$

Squaring converts negative residuals to positive numbers, so that negative and positive values do not cancel each other. The resulting total $\sum (Y - \hat{Y})^2$ depends on the Y intercept a and slope b, since $\hat{Y} = a + bX$. We choose a and b to minimize the sum of squared residuals.

The notation $\hat{Y}$ is used to make distinction between the actual point (X, Y) and (X, $\hat{Y}$) point which is on a fitted line. So, the difference between the actual point and the fitted value $\bar{Y}$ is called the residual about the line:

Residual = Actual – Fitted

Least Squared Criterion : Choose a and b so that

$$\sum [Y - (a + bX)]^2$$

is minimized (Enns 1985, Hill et al. 2008, Gujarati et al. 2009, Agung 2009).

The actual values of a and b depend on the set of data points (X,Y). Formulas for a and b are obtained using calculus.

Least squares Coefficients;

$$b = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sum(X - \bar{X})}$$

$$a = Y - b\bar{X}$$

where $\bar{X}$ and $\bar{Y}$ are the means of the X and Y samples, respectively (Enns 1985).

Besides, there is another term which represents standard deviation of the dependent variable Y, given X. This term is called standard error of estimate and calculated through the following formulation:

$$Se = \sqrt{\frac{\sum(Y - \bar{Y})^2}{(n-2)}}$$

2.2.1.1. Estimation Using Linear Model

Least squares coefficients *a* and *b* are unbiased estimators for α and β, respectively and S_e^2 is an unbiased estimator for σ_e^2 (Enns 1985, Hill et al. 2008, Gujarati et al. 2009, Agung 2009).

$$b = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sum(Y - \bar{Y})^2}$$

$$a = \bar{Y} - b\,\bar{X}$$

$$S_e = \sqrt{\frac{\sum(Y - \bar{Y})^2}{(n-2)}}$$

Instead of n, (n-2) is used to compute Se for unbiased computation.

With the assumption that ε is normally distributed, it is possible to develop methods of statistical inference regarding the parameters of the linear model. In the linear model, the slope parameter β describes the average change in Y relative to X in a bivariate population. Decisions about β are important. First, if β is zero, the conclusion is that X and Y are not linearly related. Second, a reliable estimate of β is needed to understand how Y responds to change in X. The least squares slope estimator b is the basis for these decisions (Enns 1985, Hill et al. 2008, Gujarati et al. 2009, Agung 2009).

Hypothesis tests concerning β are performed in the usual way. In most regression problems, initially research hypothesis that β is not equal to zero is constructed. For example, a two sided test is

$H0 : \beta = 0$

$H1 : \beta \neq 0$

If the null hypothesis true the conclusion is to be drawn that X and Y are not linearly related.

Multiple Regressions: Regression analysis can include more than two variables and the financial models can be formulated accordingly. These kinds of regressions are called multiple regressions. In multiple regressions, the linear model of bivariate regression is extended to include two or more independent variables. This general linear model expressed the response variable Y as:

$Y = \beta 0 + B1X1 \ldots\ldots + \beta PXP + \varepsilon$

In this equitation,

The coefficients β0, B1, ... , βP are fixed parameters.

The independent variables X1 . . . . . XP are known constants.

ε .is a random variable with ε is a random variable with mean 0 (zero) and standard deviation σe.

ε is normally distributed: $\varepsilon \sim N(0, \sigma e)$

(Phillip G. Enns, p. 471)

2.2.1.2. Preconditions and Assumptions of the Ordinary Least Squares Method

The estimators created through linear regression depict a relationship between the variables. However, performing a regression does not automatically provide a reliable relationship between the variables. In order to create reliable relationships the properties of the estimators are must be known and it must be depicted some basic assumptions about the data are true. These assumptions should support the model in two dimensions which are unbiasedness and efficiency (Enns 1985, Hill et al. 2008, Gujarati et al. 2009, Agung 2009).

Unbiasedness

First of the model should provide the condition of unbiasedness. But unbiasedness has some other preconditions which are linearity, sample variation, random sampling, zero conditional mean.

Linearity or linear model means useful mathematical description of relation between two or more variables; expresses variable Y as a linear function of variable X plus random error (Enns 1985, p. 738). In other words the model must be linear in the parameters. The parameters are the coefficients on the independent variables, like α and β.

Sample variation refers to the condition of variation that occurs between samples of the one population. It means the X is cannot all have the same value.

Random sampling refers to the condition when the Xi values are randomly selected. That is, there is no correlation between two different x values.

Zero Conditional Mean refers to the condition when the mean of the error terms, given a specific value of the independent variable xi, is zero. $E(\varepsilon i \mid Xi) = 0$.

Efficiency

Efficiency of the model is provided when there is no heteroskedasticity, no serial correlation and when the errors are distributed normally.

No heteroskedasticity (homoscedasticity) refers to the condition when ε has the same variance at all values of X. This means that the variance of the error term ε does not depend on the value of X. This kind of the situation is called homoskedasticity and it is desired for efficiency of the model. This is not always the case in economic data, for example the variation in a person's wage will vary with their level of education -- someone who is a high-school dropout will not have much variation in their wage, where people with Ph.D.s may see very different wages (Ben 2005).

Serial Correlation refers to the situation when the error terms are not independently distributed so that their covariance is not zero. This situation means values of ε are independent of one another.

But there is alsı discussion about another problem regarding efficiency of ordinary least square model. It is called multicollinearity.

Multicollinearity

Adding new variables to a multiple regression equation usually changes the values of the existing slope coefficients. This kind of changes may cause multicollinearity problem. Multicollinearity is a statistical phenomenon defining the situation when two or more predictor variables in a multiple regression model are highly correlated. In this situation the coefficient estimates may change in response to small changes in the model or

the data. Multicollinearity does not reduce the predictive power or reliability of the model as a whole; it only affects calculations regarding individual predictors (Enns 1985, Hill et al. 2008, Gujarati et al. 2009, Agung 2009).

Multicollinearity is almost always present when the independent variables are not controlled by the decision maker. Therefore, the estimated marginal effect βi of a variable Xi is not fixed, but depends on the other variables included in the model. Moreover, the degree of correlation between two independent variables is generally a factor in determining the reliability of a given slope coefficient (Enns 1985, Hill et al. 2008, Gujarati et al. 2009, Agung 2009). This situation is also very common for the variables which are derived from economic data.

2.2.1.3. Stationary Test – Unit Root Test

To acquire valid conclusion from time series data models, variable series should have stationary characteristic. Hence, before making a conclusion regarding the relation between dependent variable and independent variables stationary characteristics of variables are investigated within time series unit root tests. This test bases on Augmented Dickey – Fuller, ADF, principles and detects whether all cross-sections in panel contain unit root, or contrary all cross-sections are stationary (Sevüktekin and Nargeleçekenler 2010, Agung 2009).

Ordinary least squares method requires stochastic process to be stationary. When the stochastic process is non-stationary, the use of least squares can produce invalid estimates. Null hypothesis of unit root test is "unit root is present". OLS can be used when this hypothesis is rejected. However, if the presence of a unit root is not rejected, then difference operator can be applied to the series.

There are many tests for determining whether a series is stationary or nonstationary. The most popular one, and the one applied to this analysis is the Augmented Dickey-Fuller, ADF, test. There are three variations of the Dickey-Fuller test designed to

take account of the role of the constant term and the trend (Sevüktekin and Nargeleçekenler 2010, Agung 2009).

As simple Auto Regression model is like yt=pyt-i + εt, where yt is the variable of interest, t is the time index, ρ is a coefficient, and εt is the error term, unit root is present if ρ = 1. The model would be non-stationary in this case (Sevüktekin and Nargeleçekenler 2010, Agung 2009).

The regression model can be written as Δyt = (p-1)yt-1 + εt = δyt-1 + εt where Δ is first difference operator.

There are three main versions of ADF test;

1. Test for a unit root

$$\Delta y_t = \delta y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta Y_{t-i} + \varepsilon_t$$

2. Test for a unit root with drift

$$\Delta y_t = a_0 + \delta y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta Y_{t-i} + \varepsilon_t$$

3. Test for a unit root with drift and deterministic time trend

$$\Delta y_t = a_0 + a_0 t + \sum_{i=1}^{k} \beta_i \Delta Y_{t-i}\, \delta y_{t-1} + \varepsilon_t$$

In these tests, $\sum_{i=1}^{k} \beta_i \Delta Y_{t-i}$ represents dependent variable lags in order to eliminate correlation problem, k is the most proper lag length to have white noise error terms, δ = ρ – 1 and the null hypothesis is that there is a unit root, δ = 0 (Sevüktekin and Nargeleçekenler 2010, Agung 2009).

The logic behind these tests is examination of existence of constant mean. Namely, the level of the series at (T_n) may be a significant predictor of next period's (T_{n+1}) change,

and may have a negative coefficient. Consequently, the level of the series will be a significant predictor of next period's change, and will have a negative coefficient. In absence of this situation when the series are not stationary, then series is integrated and positive changes and negative changes will occur with probabilities that do not depend on the current level of the series, which is called ‘random walk’ (Vogelvang 2005, Sevüktekin and Nargeleçekenler 2010, Agung 2009).

2.2.2. Equation Estimation with the Credit Rates

Different regression variations were tried in the empirical part of this study. Initially, having interpolated monthly credit rates of Turkey as variable explained (dependent variable), those explanatory (independent) variables which are stationary at different levels were put into equation estimation in order to determine which variables are effective on credit ratings. Equation estimation is made separately for each group of factor variables which are ‘Economic Factor Variable’, ‘Fiscal Variables’, ‘Money Market Factor Variables’ and ‘Event Risk Factor’ variables.

According to the equation estimation results, interpolated credit rates of Standard and Poors to Turkey as dependent variable, Non-Performing Loans to Total Loans and Overnight Interest Rate variables are significantly effective on credit rates (see Table 12). Same analysis was also conducted for the sovereign rates of Moody’s and Fitch for Turkey as dependent variables separately. In Moody’s case, overnight interest rates, Non-Performing Loans to Total Loans, CDS Premiums variables found significantly effective on the sovereign rates with less than 0,05 probability value, and Unemployment Rate and Stock Market Return with 0,08 of probability value can also be considered as significant independent variables. Analysis results for the sovereign rates of Fitch to Turkey is, Overnight Interest Rates, Non-Performing Loans to Total Loans are effective with less than 0,05 of probability value while probability value of CDS premiums is 0,09.

Table 12: Probability Values of the Variables Effective on Sovereign Rates of Turkey

	S&P	Moody's	Fitch
Overnight Interest Rates (ON)	0,0000	0,0000	0,0000
Non-Performing Loans/Total Loans (LTL)	0,0000	0,0000	0,0000
CDS		0,0050	0,0925
Loan to Deposits (LTD)			0,0847
Unemployment Rate (UR)		0,0822	
Stock Market Return (SMR)		0,0812	

Analysis results indicates that Overnight Interest Rates and Non-Performing Loans to Total Loans variables are significant for all the three rating agency.

However, R squares of the equation estimations are weak for every combination, but F statistic is meaningful. These models do not meet all of the econometrical conditions because regressions are serially correlated and the series have heteroscedasticity. Econometrical correction methods cannot be applied because of interpolated format of the credit rates.

As a result of this regression it has been concluded that differentiated variables are not suitable for estimation equation. Therefore, month by month proportional changes of the variables were put into unit root test. In this case, most of the variables were found stationary at their levels except the interpolated credit rate variables of the three rating agencies to Turkey.

Consequently, the model had to be changed because of the irregular characteristic of the credit ratings by the rating agencies which are announced in non-serial times and impossibility of converting them to the stationary data series. Therefore spreads of Eurobond with ISIN Number US900123AW05, 13.01.2005 issued date and 05.02.2025 maturity date considered as a proxy of the sovereign credit rates of Turkey.

2.2.3. Equation Estimation with the Eurobond Spreads

Unit root test of proportional change variables indicate that only the 'Unemployment Rate' variable is not stationary, rest of the variables are stationary at their levels. Consequently, equation estimations were conducted for each factor variables having Eurobond Spreads as dependent variable. According to the results following variables have significant p values, which are less than 0,05 confidence level.

Economic Factor Variable

There is no significant variable in this factor group.

Fiscal Variables

- International reserves (RES)
- General Government Debt (GGD)

Money Market Factor Variables

- Stock Market Return (SMR)
- Overnight Interest Rate (ON)
- USD/TRL Monthly Average (ER)

Event Risk Factor' variables

- Credit Default Swap Premiums (CDS)

When the equation estimation conducted with these variables;

Table 13: Equation Estimation Output, (Eurobond Spreads)

Dependent Variable: PSPRD
Method: Least Squares
Date: 01/19/15 Time: 15:41
Sample (adjusted): 2005M02 2014M05
Included observations: 112 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001230	0.006650	0.185011	0.8536
PRES	0.164262	0.183968	0.892884	0.3740
PGGD	-0.488775	0.554873	-0.880877	0.3804
PSMR	-0.130429	0.129238	-1.009210	0.3152
PON	0.086704	0.027768	3.122488	0.0023
PER	0.505095	0.277767	1.818412	0.0719
PCDS	0.622082	0.063039	9.868139	0.0000

R-squared	0.811194	Mean dependent var	0.005606
Adjusted R-squared	0.800406	S.D. dependent var	0.127698
S.E. of regression	0.057050	Akaike info criterion	-2.829304
Sum squared resid	0.341748	Schwarz criterion	-2.659398
Log likelihood	165.4410	F-statistic	75.18793
Durbin-Watson stat	1.913672	Prob(F-statistic)	0.000000

*PSPRD = 0.001230357099 + 0.1642623673*PRES - 0.488775384*PGGD - 0.1304285999*PSMR + 0.08670408786*PON + 0.5050949991*PER + 0.6220819661*PCDS*

As it can be observed from the equation estimation results, estimation capacity of the equation is quite high with the R-Square value of 0,81 and the probability (F-statistic) value is the most desirable.

Residual test are also in compliance with the expectations of the econometrics. There is no serial correlation according to the Q statistics and LM Test results. There is no heterocedasticity according to the White Heterocedasticity Test and residuals are normally distributed.

Equation estimation results indicate that CDS are highly effective on Eurobond Spreads. In order to understand which variables are effective on CDS spreads, equation estimation repeated having CDS Spreads dependent variable. Results indicate that mostly the event risk factor variables, which are 'Total Domestic Bank Assets (DBA)', 'Capital Adequacy of the Banks (CAB)', 'Domestic Banking Loans (DBL)', 'Non-Performing Loans to Total Loans (LTL)', 'Monthly S&P 500 Total Return (MSPTR)', 'BIST Volatility (BISTVO), significantly effective on the CDS Spreads. Besides event risk factor variables those fiscal factor variables, which are 'International reserves (RES)', 'General Government Debt (GGD)' and those money market factor variables 'Stock Market Return (SMR)', 'USD/TRL Monthly Average (ER)' were found significantly effective on the CDS Spreads.

2.2.4. Stability Test

Stabilities of the regressions in the study are also tested by using the residual stability tests of cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residual (CUSUM of Squares). Brown, Durbin and Evans (1975) formulates the tests as follows;

$$CUSUM_t = \sum_{j=k+1}^{t} \frac{\hat{w}_j}{\hat{\sigma}_w}$$

$$\hat{\sigma}_w^2 = \frac{1}{n-k}\sum_{t=1}^{n}(w_t - \bar{w})^2$$

$$CUSUMSQ_t = \frac{\sum_{j=k+1}^{t} \hat{w}_j^2}{\sum_{j=k+1}^{n} \hat{w}_j^2}$$

Following figures shows the test results acquired using the Eviews modules.

Figure 37: CUSUM Test of Eurobond Spreads

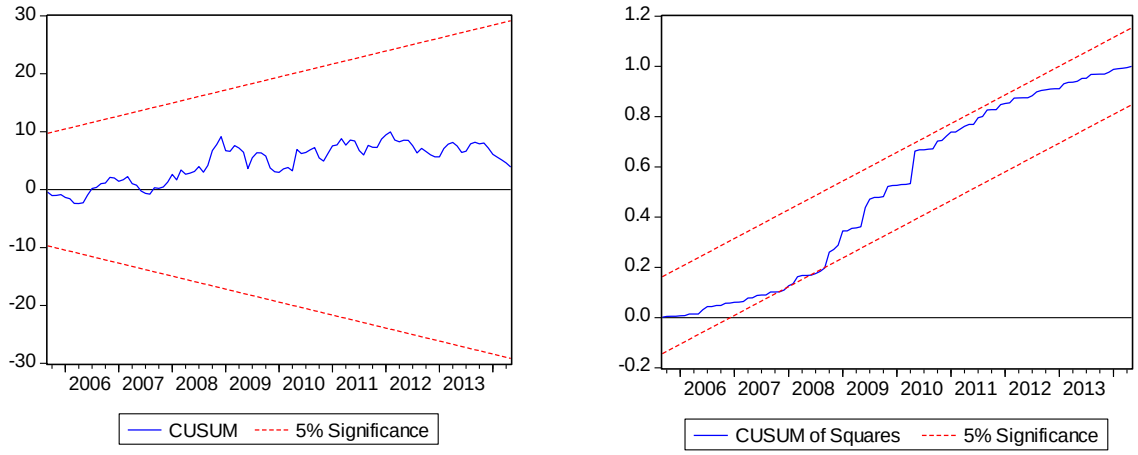
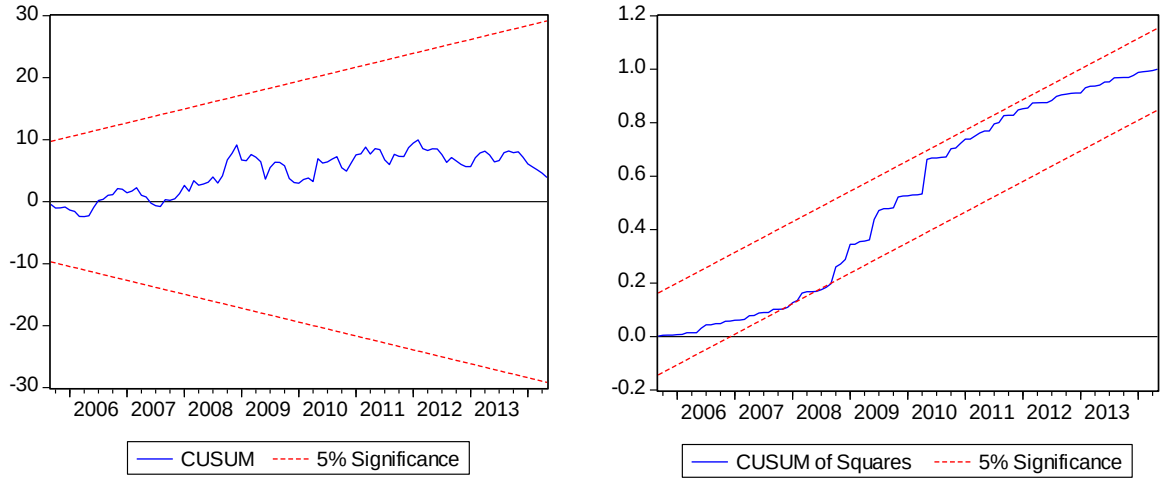


Figure 38: CUSUM Test of the Eurobond Spreads without CDS as Independent Variable



Test results indicate that between the -0,05 and +0,05 significance thresholds there is no structural break during the period observed.

2.3. Interpretation of the Findings

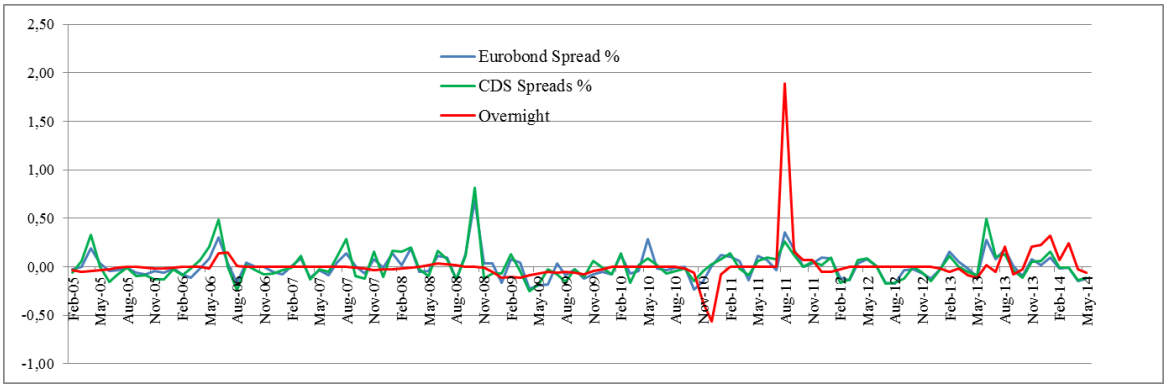
As the analysis result indicates, CDS spreads, overnight interest rates and international reserves variables are significantly effective on the Eurobond spreads. Results also present strong association between Eurobond spreads and CDS spreads. This is meaningful when the critiques regarding weak early warning capacity CRAs and dependency of the financial markets to the credit rates are considered. It has been argued that CRAs don't reflect the risks in the market appropriately and indicators in the markets such as CDS spreads and bond yields are suggested as risk measurement tools to be used to reveal the credit risk effectively and appropriately (Partnoy 2006, FSB 2010, SEC 2013, The Financial Crisis Inquiry Report 2011). It is also argued that the cited indicators through which the country risk is priced instantly show more appropriate evaluation with reference to the efficient market hypothesis (Partnoy 2006, Fama 1970). Empirical results of this study which indicated event risk factor variables of Turkey significantly affect its sovereign CDS spreads support this claim.

On the other side, the empirical result which indicates that overnight interest rate is effective on Eurobond spreads is an important and meaningful result. Overnight interest rate is the rate that Central Bank of the Republic of Turkey, CBRT, uses it to borrow and lend from the overnight market. At the end of each working day, a bank may have a surplus or shortage of funds. Banks that have surplus funds may lend them to or deposit them with other banks, who borrow from them. The overnight rate is the amount paid to the bank lending these funds.

Like other central banks, the CBRT generally announces the overnight rate once a month, which becomes main measure of the liquidity prevailing in the economy. In tight liquidity conditions, overnight rates increase. Overnight rates may also increase due to lack of confidence in the banking system, as it was observed in the liquidity crisis of Turkey in 2001. It is also used by the CBRT as an instrument to influence monetary policy taking advantage of the situation where the banks transfer money to each other, to foreign banks, to large clients, and other counterparties on behalf of clients or on their own account.

CBRT may want to calibrate overnight interest rate as an instrument to make adjustments on interest rates in line with monetary policies of the governments. But this calibration is made through the overnight borrowing rate. In this study overnight lending rate is used for the better reflection of the market conditions. Figure 39 shows the strong interaction between Eurobond spreads, CDS spreads and overnight interest rates.

Figure 39: Change in Eurobond Spreads, CDS Spreads and Overnight Int. Rates

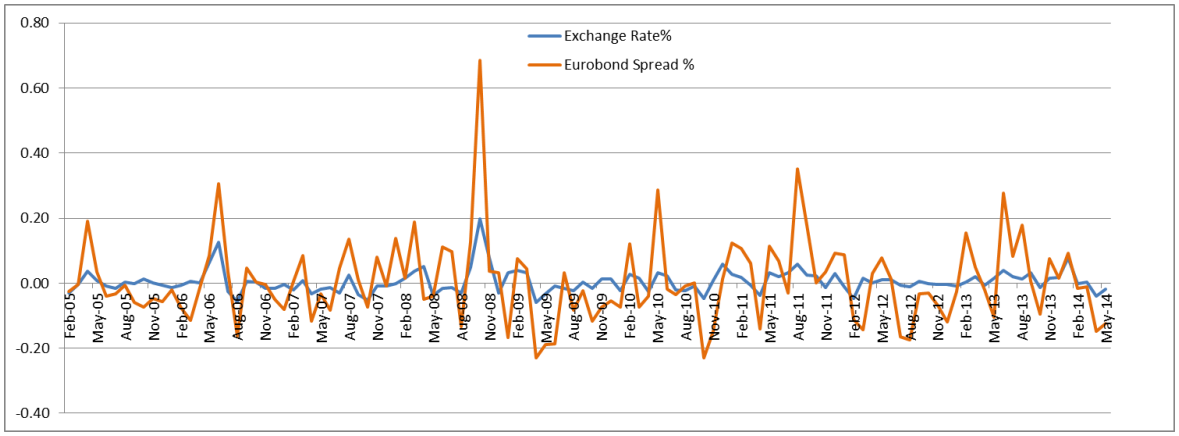


Analysis results also indicate a considerable interaction between that USD/TL Exchange Rate (PER) and CDS spreads, and Eurobond Spreads, with 0,07 of significance level. USD/TL Exchange Rate variable represent currency risk of Turkey and this result is in consistence with the foreign currency sovereign rating classification of the credit rating agencies. As it is known, credit ratings by the agencies are declared separately for local currency and foreign currency. This is because of the situation that local currency and foreign currency liabilities of sovereigns are subject to different conditions. In this study, foreign currency ratings of the agencies are considered and analyzed. This consistence is also meaningful both for the promotion of the cohesion of this study with the credit rating system and the literature.

Blaise Gadanecz, Ken Miyajima, Chang Shu in their study paper, “Exchange rate risk and local currency sovereign bond yields in emerging markets” consider the role of exchange rate risk in influencing local currency sovereign bond yields in emerging market economies (EMEs). They account for exchange rate expectations and uncertainty around them, as measured by exchange rate volatility. They assert that when exchange rate

volatility increases, investors require a larger yield compensation for holding EME local currency sovereign bonds (Gadanecz et al. 2014). Same relation is valid between the exchange rate risk and foreign currency sovereign bond spread in the case of Turkey, according to the results reached with this study. Figure 40 shows the strong interaction between Eurobond spreads and USD/TL exchange rate.

Figure 40: Proportional Change in Eurobond Spreads and USD/TL Exchange Rate

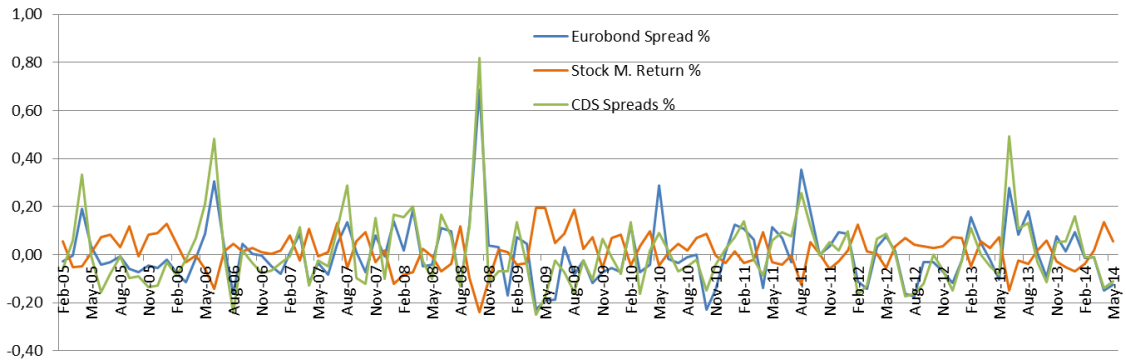


In the literature there are related studies concentrate on foreign currency denominated bonds of emerging market economies. Longstaff et al (2007) stated that the exchange rate is likewise important in explaining variation in sovereign credit risk.

Stock Market Return (PSMR) variable is another important variable which have considerable effect on the sovereign risk perception of Turkey according to the analysis results, which was conducted having CDS spreads a dependent variable. Market professionals and scholars discuss that changes in sovereign ratings and outlooks contribute to the instability of emerging financial markets. Graciela Kaminsky and Sergio L. Schmukler, in their study titled Emerging Markets Instability: Do Sovereign Ratings Affect Country Risk and Stock Returns?, state that rating and outlook changes significantly affect bond spreads and stock markets returns; and rating changes contribute to contagion or spillover effects (Kaminsky and Schmukler 2002).

"Risk, Return and Equilibrium: Empirical Tests, by Eugene F. Fama and James D. MacBeth proves existence of positive tradeoff between return and risk (Fama and MacBeth 2001). The work of Chen et al., titled Economic Forces and Stock Market, 1986, states existence of strong relationship between the market returns and the macro variables, such as industrial production, changes in the risk premium and the expected and unexpected inflation in United States. Rjoub et al., in a study conducted for the Istanbul Stock Market, support this phenomenon that their research results also indicates existence of significant pricing relationship between the stock return and the macroeconomic variables; namely, unanticipated inflation, term structure of interest rate, risk premium and money supply (Rjoub et al. 2009). As it can be observed in the figure 41, there is a negative correlation between the stock market return (XU100) and the Eurobond and CDS Spreads.

Figure 41: Change in Eurobond Spreads, Stock Returns and CDS Spreads

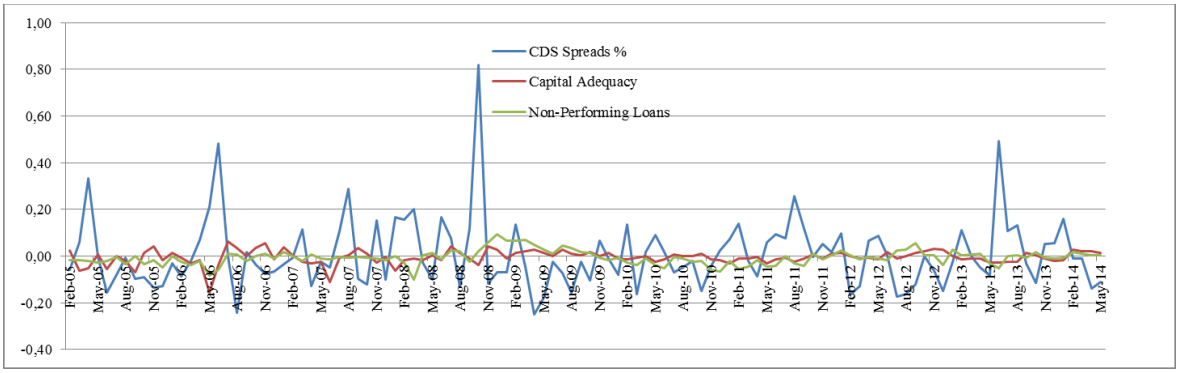


Non-Performing Loans to Total Loans (LTL) and Capital Adequacy of the Banks (CAB) variables are also considerably effective on the sovereign credit risk perception of Turkey as being event risk factor variables in this study. These two variables represent strength of the banking system in an economy. Non-Performing Loans to Total Loans is the rate calculated by using the value of NPLs as the numerator and the total value of the loan portfolio as the denominator. This variable may be treated as a proxy for asset quality and is intended to identify problems with asset quality in the loan portfolio. Capital Adequacy of the Banks variable in this study is the ratio of total capital of the banks to their total assets. It is also calculated separately for each bank. It indicates the extent to which assets are funded by other than own funds and is a measure of capital adequacy of the deposit-

taking sector. Also, it measures financial leverage and is sometimes called the leverage ratio.

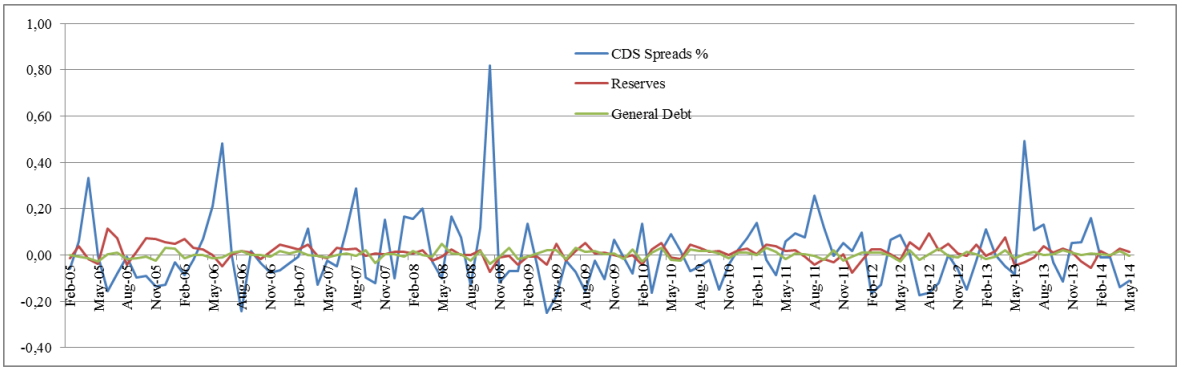
Michael Davies and Tim Ng in their study, "The rise of sovereign credit risk: implications for financial stability" states that the financial crisis and global recession, and policymakers' responses to these events, have had significant, and probably long-lasting, effects on the global economy and financial markets. Markedly reduced growth prospects and sharply increased public debt in several advanced countries have heightened concerns about sovereign credit and liquidity risk, posing a considerable challenge to banking systems and financial stability (Davies and Ng, 2011).

Figure 42: Change in CDS Spreads, Capital Adequacy and Non-Performing Loans



CBRT International Reserves (PRES), General Government Debt (PGGD), Primary Balance (PPB) and General Government Consolidated Budget Balance (CBB) variables should also be considered while assessing the sovereign risk perception of Turkey when their interaction with CDS spreads variable is considered. There is a consensus in the literature that main objective for the sovereign to hold financial assets in foreign currency is to help meet balance of payments and intervention needs. In this role, such types of sovereign financial assets need to be sufficiently liquid in order to redistribute the burden of random shocks throughout time. Sovereign assets can also be used to buy back external debt and reduce the size of the government balance sheet (Das et al. 2012).

Figure 43: Change in CDS Spreads, Reserves and General Debt



Although many studies in the literature concluded that GDP and debt repayment performance of a country in the previous years has significant importance on the credit rating of a country (Feder and Uy 1985, and Lee 1993, Haque et al. 1996, Cantor and Packer 1996, Hu et al. 2002), analysis of this study stated no significant relation between credit risk perception of Turkey and its GDP, and the other economic factor variables analyzed, which are Consumer Price Index (CPI), Unemployment Rate (UR), Export (EXPO), Import (IMP), Trade Balance (TB), Foreign Trade Volume (TRV). Different reasons may be attributed with this situation. For instance GDP variable is a quarterly variable and interpolated monthly variable might not be suitable for this kind of analysis and the precondition of being stationary could not be achieved for the Unemployment variable. Regarding the international trade related variables, there is very strong correlation between these variables. This situation might cause autocorrelation problem and the result in case of autocorrelation problem would be insignificant. This situation might also be inevitable because of the situation that most of the variables analyzed are short term market variable and the intense interaction between these variables might keep macroeconomic variables out of the assessment.

CONCLUSION

Liberalization of financial markets and global integration caused capital movements among countries to reach significant levels. Credit ratings became an important indicator for the markets in terms of managing risk and enhancing the market discipline. Credit rating agencies (CRA) are the important actors in the market as the source of objective criteria for portfolio and other financial decisions. However, CRAs and their rating approaches are widely criticized especially after the 2008 financial crisis, as not being able to reflect the forthcoming adversities in the economies as well as the specific asset evaluations which turned out to be erroneous.

In this study, sovereign credit rates together with sovereign risk indicators of Turkey are analyzed observing the relations among economic, fiscal, money market, event risk factor variables. Short term variables which are in association with sovereign risk of Turkey are determined through time series analysis modeling. There is no prominent study in the literature which analyses the interaction between short term sovereign risk indicators using times series analysis in Turkey. Therefore this study is a pioneer study within this perspective. Besides, after the recent financial crisis, legal authorities and scholars have been assessing availability of CDS and bond spreads with respect to their capacity of reflecting riskiness and creditworthiness of the sovereigns. In this manner, this study presents a valuable evidence for the determination of short term sovereign risk of a country, Turkey.

Empirical results indicate that 'Eurobond Spreads', 'CDS Spreads', 'Overnight Interest Rates', and 'USD/TL Exchange Rate' are the most significant determinants of the short term sovereign risk of Turkey. Beside these variables, International reserves (RES), general government debt (GGD), stock market return (SMR), overnight interest rate (ON), USD/TRL monthly average (ER), credit default swap premiums (CDS), total domestic bank assets (DBA), domestic banking loans (DBL), capital adequacy of the banks (CAB), non-performing loans to total loans (LTL), monthly S&P 500 total return (MSPTR), BIST volatility (BISTVO) are associated with sovereign risk and creditworthiness of Turkey.

In the literature, there are many studies conducted on CRAs and the credit ratings. Mainly, those studies have emphasized on the reliability of the credit rates. Cantor and Packer (1996), Feder and Uy (1985), Alexe et al. (2003) and Lee (1993) developed different models such as ordered probit model, ordinal rankings and panel data modeling on estimation of the credit ratings, other than time series modelling. According to the results obtained through these studies, it was concluded that GDP and debt repayment performance of a country in the previous years have significant importance on the credit rating of a country (Feder and Uy 1985, Lee 1993, Haque et al. 1996, Cantor and Packer 1996, Hu et al. 2002, Alexe et al. 2003).

Although there is an argument that CRAs don't reflect the risk appropriately and risk indicators in the markets such as CDS spread, bond yields, and share process may reveal the credit risk effectively and appropriately; analysis test credit ratings with the market indicators such as CDS are very limited in number and scope. Partnoy (2006) argued that CDS premiums and bond yields indicators through which the country risk is priced instantly may show more appropriate evaluation. Pan, J. and K. J. Singleton (2008), Jaramillo and Tejada (2011), Haugh et al. (2009) investigate the relation between the sovereign risk and spreads, namely CDS spreads and credit (bond) spreads. David Haugh, Patrice Ollivaud and David Turner look at the relation between yield spreads and fiscal performance in euro area and found that incremental deteriorations in fiscal performance lead to ever larger increases in the spread.

In these studies credit ratings were analyzed with the market indicators including bond yields and CDS spreads, where the credit ratings are independent variable, it was focused on how the market indicators such as CDS spreads are affected in various conditions. However, there is not a prominent study in which Eurobond and CDS spreads are used as a proxy of sovereign risk perception of a country. This study presents this situation as an opportunity in order to find the most relevant indicators in the market which can be considered as evaluation and adjustment factor of the sovereign credit rates. The indicators determined through this study may facilitate evaluation of short term riskiness of the sovereigns.

Findings of this study may be tested and the model can be used for other developing countries' data in order to reveal its validity across different countries. Also, a further study can be performed with a perspective of re-formation of alphanumerical credit rating presentations of the CRAs. As it is already discussed in the study, alphanumerical formation of the credit rating is criticized due to its risk rate intervals. It may be useful to establish the intervals narrower so that the risk may be expressed more fairly and up to date.

APPENDICES

Correlation analysis of the variables at their original form (2001:01 – 2014:05)

	NUMSP	NUMMO	NUMFIT	BISTVO	BP	CAB	CBB	CDS	CPI	CUA	DBA	DBD	DBL	ED	ER	EXPO	GDP	GGD	IMP	LTD	LTL	MSPTR	MVIX	ON	PB	RES	SMR	SPRD	TB	TRV	UR
NUMSP	1.00	0.96	0.99	-0.23	-0.01	-0.75	-0.12	-0.06	0.99	-0.47	1.00	1.00	0.99	0.93	0.78	0.80	0.98	0.97	0.78	0.95	-0.59	0.34	0.28	-0.85	-0.17	0.87	0.83	-0.03	-0.64	0.80	-0.07
NUMMO	0.96	1.00	0.97	-0.17	-0.03	-0.85	-0.12	-0.10	0.95	-0.45	0.95	0.96	0.94	0.84	0.72	0.80	0.95	0.91	0.78	0.95	-0.66	0.34	0.32	-0.78	-0.17	0.92	0.83	-0.05	-0.62	0.80	-0.02
NUMFIT	0.99	0.97	1.00	-0.18	-0.05	-0.78	-0.15	-0.03	0.97	-0.44	0.98	0.99	0.96	0.91	0.73	0.79	0.96	0.95	0.76	0.94	-0.55	0.25	0.36	-0.84	-0.19	0.89	0.82	-0.02	-0.60	0.78	0.05
BISTVO	-0.23	-0.17	-0.18	1.00	-0.28	-0.13	0.05	0.53	-0.28	0.23	-0.22	-0.22	-0.24	-0.31	-0.18	-0.07	-0.19	-0.29	-0.16	-0.08	-0.08	-0.36	0.59	0.35	0.15	-0.07	-0.39	0.45	0.23	-0.13	0.17
BP	-0.01	-0.03	-0.05	-0.28	1.00	0.21	0.13	-0.35	0.01	0.02	-0.01	-0.02	0.01	0.02	-0.08	-0.05	-0.02	0.02	-0.02	-0.08	0.11	0.19	-0.32	-0.07	0.18	-0.03	0.16	-0.31	-0.01	-0.03	-0.13
CAB	-0.75	-0.85	-0.78	-0.13	0.21	1.00	0.05	-0.15	-0.71	0.38	-0.74	-0.75	-0.74	-0.56	-0.48	-0.82	-0.79	-0.62	-0.77	-0.89	0.81	-0.30	-0.47	0.44	0.08	-0.88	-0.57	-0.15	0.59	-0.80	0.10
CBB	-0.12	-0.12	-0.15	0.05	0.13	0.05	1.00	-0.09	-0.11	-0.06	-0.11	-0.14	-0.09	-0.11	-0.14	-0.08	-0.10	-0.13	0.02	-0.06	-0.08	0.17	-0.18	0.13	0.83	-0.07	-0.03	-0.12	-0.12	-0.01	-0.33
CDS	-0.06	-0.10	-0.03	0.53	-0.35	-0.15	-0.09	1.00	-0.14	0.30	-0.04	-0.04	-0.05	-0.16	0.18	-0.04	-0.07	-0.10	-0.18	0.05	-0.04	-0.58	0.68	0.23	-0.07	-0.14	-0.54	0.96	0.31	-0.13	0.28
CPI	0.99	0.95	0.97	-0.28	0.01	-0.71	-0.11	-0.14	1.00	-0.49	0.98	0.99	0.98	0.93	0.79	0.75	0.96	0.98	0.75	0.91	-0.55	0.37	0.21	-0.86	-0.16	0.84	0.87	-0.11	-0.63	0.77	-0.07
CUA	-0.47	-0.45	-0.44	0.23	0.02	0.38	-0.06	0.30	-0.49	1.00	-0.48	-0.47	-0.50	-0.53	-0.20	-0.51	-0.44	-0.44	-0.71	-0.48	0.55	-0.54	0.17	0.49	0.08	-0.51	-0.60	0.32	0.81	-0.65	0.32
DBA	1.00	0.95	0.98	-0.22	-0.01	-0.74	-0.11	-0.04	0.98	-0.48	1.00	1.00	0.99	0.94	0.81	0.79	0.97	0.98	0.78	0.94	-0.60	0.34	0.27	-0.85	-0.16	0.86	0.82	-0.02	-0.65	0.80	-0.09
DBD	1.00	0.96	0.99	-0.22	-0.02	-0.75	-0.14	-0.04	0.99	-0.47	1.00	1.00	0.99	0.94	0.79	0.79	0.97	0.98	0.77	0.94	-0.58	0.31	0.30	-0.86	-0.18	0.87	0.82	-0.02	-0.64	0.79	-0.04
DBL	0.99	0.94	0.96	-0.24	0.01	-0.74	-0.09	-0.05	0.98	-0.50	0.99	0.99	1.00	0.93	0.80	0.81	0.98	0.96	0.81	0.95	-0.65	0.40	0.23	-0.82	-0.14	0.85	0.82	-0.03	-0.68	0.82	-0.17
ED	0.93	0.84	0.91	-0.31	0.02	-0.56	-0.11	-0.16	0.93	-0.53	0.94	0.94	0.93	1.00	0.71	0.70	0.90	0.95	0.74	0.82	-0.43	0.33	0.14	-0.90	-0.15	0.77	0.83	-0.16	-0.67	0.74	-0.08
ER	0.78	0.72	0.73	-0.18	-0.08	-0.48	-0.14	0.18	0.79	-0.20	0.81	0.79	0.80	0.71	1.00	0.40	0.73	0.85	0.38	0.68	-0.38	0.06	0.24	-0.70	-0.18	0.49	0.47	0.24	-0.30	0.40	-0.03
EXPO	0.80	0.80	0.79	-0.07	-0.05	-0.82	-0.08	-0.04	0.75	-0.51	0.79	0.79	0.81	0.70	0.40	1.00	0.83	0.66	0.93	0.90	-0.77	0.53	0.23	-0.51	-0.16	0.86	0.70	-0.06	-0.70	0.97	-0.28
GDP	0.98	0.95	0.96	-0.19	-0.02	-0.79	-0.10	-0.07	0.96	-0.44	0.97	0.97	0.98	0.90	0.73	0.83	1.00	0.93	0.83	0.96	-0.67	0.41	0.27	-0.78	-0.14	0.89	0.84	-0.05	-0.70	0.85	-0.18
GGD	0.97	0.91	0.95	-0.29	0.02	-0.62	-0.13	-0.10	0.98	-0.44	0.98	0.98	0.96	0.95	0.85	0.66	0.93	1.00	0.67	0.85	-0.44	0.25	0.22	-0.92	-0.17	0.77	0.81	-0.07	-0.58	0.68	-0.02
IMP	0.78	0.78	0.76	-0.16	-0.02	-0.77	0.02	-0.18	0.75	-0.71	0.78	0.77	0.81	0.74	0.38	0.93	0.83	0.67	1.00	0.86	-0.79	0.62	0.09	-0.57	-0.07	0.85	0.78	-0.22	-0.92	0.99	-0.44
LTD	0.95	0.95	0.94	-0.08	-0.08	-0.89	-0.06	0.05	0.91	-0.48	0.94	0.94	0.95	0.82	0.68	0.90	0.96	0.85	0.86	1.00	-0.78	0.42	0.35	-0.67	-0.11	0.92	0.76	0.07	-0.68	0.89	-0.17
LTL	-0.59	-0.66	-0.55	-0.08	0.11	0.81	-0.08	-0.04	-0.55	0.55	-0.60	-0.58	-0.65	-0.43	-0.38	-0.77	-0.67	-0.44	-0.79	-0.78	1.00	-0.62	-0.17	0.21	-0.03	-0.75	-0.51	-0.06	0.69	-0.80	0.50
MSPTR	0.34	0.34	0.25	-0.36	0.19	-0.30	0.17	-0.58	0.37	-0.54	0.34	0.31	0.40	0.33	0.06	0.53	0.41	0.25	0.62	0.42	-0.62	1.00	-0.54	-0.14	0.12	0.44	0.61	-0.57	-0.62	0.60	-0.72
MVIX	0.28	0.32	0.36	0.59	-0.32	-0.47	-0.18	0.68	0.21	0.17	0.27	0.30	0.23	0.14	0.24	0.23	0.27	0.22	0.09	0.35	-0.17	-0.54	1.00	-0.10	-0.15	0.33	-0.07	0.66	0.08	0.14	0.47
ON	-0.85	-0.78	-0.84	0.35	-0.07	0.44	0.13	0.23	-0.86	0.49	-0.85	-0.86	-0.82	-0.90	-0.70	-0.51	-0.78	-0.92	-0.57	-0.67	0.21	-0.14	-0.10	1.00	0.17	-0.64	-0.79	0.22	0.55	-0.56	-0.10
PB	-0.17	-0.17	-0.19	0.15	0.18	0.08	0.83	-0.07	-0.16	0.08	-0.16	-0.18	-0.14	-0.15	-0.18	-0.16	-0.14	-0.17	-0.07	-0.11	-0.03	0.12	-0.15	0.17	1.00	-0.10	-0.07	-0.12	-0.03	-0.11	-0.25
RES	0.87	0.92	0.89	-0.07	-0.03	-0.88	-0.07	-0.14	0.84	-0.51	0.86	0.87	0.85	0.77	0.49	0.86	0.89	0.77	0.85	0.92	-0.75	0.44	0.33	-0.64	-0.10	1.00	0.81	-0.14	-0.70	0.87	-0.09
SMR	0.83	0.83	0.82	-0.39	0.16	-0.57	-0.03	-0.54	0.87	-0.60	0.82	0.82	0.82	0.83	0.47	0.70	0.84	0.81	0.78	0.76	-0.51	0.61	-0.07	-0.79	-0.07	0.81	1.00	-0.53	-0.74	0.76	-0.23
SPRD	-0.03	-0.05	-0.02	0.45	-0.31	-0.15	-0.12	0.96	-0.11	0.32	-0.02	-0.02	-0.03	-0.16	0.24	-0.06	-0.05	-0.07	-0.22	0.07	-0.06	-0.57	0.66	0.22	-0.12	-0.14	-0.53	1.00	0.35	-0.16	0.31
TB	-0.64	-0.62	-0.60	0.23	-0.01	0.59	-0.12	0.31	-0.63	0.81	-0.65	-0.64	-0.68	-0.67	-0.30	-0.70	-0.70	-0.58	-0.92	-0.68	0.69	-0.62	0.08	0.55	-0.03	-0.70	-0.74	0.35	1.00	-0.85	0.54
TRV	0.80	0.80	0.78	-0.13	-0.03	-0.80	-0.01	-0.13	0.77	-0.65	0.80	0.79	0.82	0.74	0.40	0.97	0.85	0.68	0.99	0.89	-0.80	0.60	0.14	-0.56	-0.11	0.87	0.76	-0.16	-0.85	1.00	-0.39
UR	-0.07	-0.02	0.05	0.17	-0.13	0.10	-0.33	0.28	-0.07	0.32	-0.09	-0.04	-0.17	-0.08	-0.03	-0.28	-0.18	-0.02	-0.44	-0.17	0.50	-0.72	0.47	-0.10	-0.25	-0.09	-0.23	0.31	0.54	-0.39	1.00

Correlation Matrix of the Proportional Variables

	PNUMSP	PNUMMO	PNUMFIT	PBISTVO	PBP	PCAB	PCBB	PCDS	PCPI	PCUA	PDBA	PDBD	PDBL	PED	PER	PEXPO	PGDP	PGGD	PIMP	PLTD	PLTL	PMSPTR	PMVIX	PON	PPB	PRES	PSMR	PSPRD	PTB	PTRV	PUR
PNUMSP	1.00	-0.11	-0.89	0.02	0.09	-0.03	0.09	-0.01	-0.06	-0.09	-0.01	-0.07	0.04	0.01	0.06	0.03	0.03	-0.02	0.04	0.11	-0.27	0.11	-0.04	0.10	0.00	0.01	-0.05	0.05	-0.05	0.04	-0.20
PNUMMO	-0.11	1.00	0.35	0.00	-0.03	-0.14	0.10	-0.07	0.05	0.20	0.06	0.09	0.24	-0.23	-0.03	0.02	0.27	-0.09	0.06	0.16	-0.15	0.03	-0.04	-0.03	0.07	0.17	0.09	-0.03	0.01	0.05	-0.05
PNUMFIT	-0.89	0.35	1.00	0.03	-0.06	-0.07	-0.11	0.03	-0.04	0.11	0.08	0.14	0.15	-0.07	-0.06	0.03	0.08	-0.06	0.04	0.04	0.06	-0.07	0.03	-0.08	0.05	0.09	0.02	-0.01	0.04	0.03	0.09
PBISTVO	0.02	0.00	0.03	1.00	-0.05	-0.27	-0.05	0.24	-0.10	-0.01	0.07	0.09	0.16	-0.16	0.14	0.05	0.08	0.23	-0.12	0.11	-0.19	-0.31	0.49	0.35	0.17	-0.09	-0.24	0.27	-0.19	-0.05	-0.04
PBP	0.09	-0.03	-0.06	-0.05	1.00	0.12	-0.25	-0.20	-0.06	0.21	0.05	0.03	-0.09	0.15	-0.21	-0.11	0.02	-0.10	-0.12	-0.07	0.04	-0.05	0.03	0.08	-0.11	0.26	0.18	-0.04	-0.07	-0.12	0.05
PCAB	-0.03	-0.14	-0.07	-0.27	0.12	1.00	0.05	-0.37	0.10	0.13	-0.46	-0.45	-0.54	0.25	-0.33	-0.14	-0.17	-0.27	-0.13	-0.24	0.47	0.30	-0.34	-0.04	-0.03	0.00	0.30	-0.24	0.03	-0.14	0.31
PCBB	0.09	0.10	-0.11	-0.05	-0.25	0.05	1.00	-0.07	-0.03	-0.01	-0.08	-0.05	-0.03	0.03	0.12	-0.08	-0.09	0.09	-0.02	-0.05	0.08	0.00	-0.08	-0.09	-0.03	0.06	-0.06	-0.03	0.02	-0.04	0.11
PCDS	-0.01	-0.07	0.03	0.24	-0.20	-0.37	-0.07	1.00	-0.07	-0.05	0.33	0.20	0.17	-0.33	0.75	-0.11	-0.01	0.45	-0.16	0.16	-0.29	-0.53	0.39	0.21	-0.03	-0.41	-0.75	0.88	-0.10	-0.15	-0.08
PCPI	-0.06	0.05	-0.04	-0.10	-0.06	0.10	-0.03	-0.07	1.00	0.05	-0.05	-0.04	-0.07	0.02	0.04	-0.15	-0.19	0.09	-0.25	0.01	0.05	0.06	-0.02	0.03	0.03	-0.12	0.13	-0.07	-0.11	-0.22	0.00
PCUA	-0.09	0.20	0.11	-0.01	0.21	0.13	-0.01	-0.05	0.05	1.00	0.03	0.04	0.02	-0.02	0.06	-0.12	-0.24	-0.03	0.07	-0.08	0.09	0.02	0.01	-0.06	-0.11	0.09	-0.03	0.05	0.35	-0.02	0.09
PDBA	-0.01	0.06	0.08	0.07	0.05	-0.46	-0.08	0.33	-0.05	0.03	1.00	0.87	0.74	-0.21	0.40	0.26	-0.01	0.36	0.31	-0.11	-0.49	-0.23	0.20	0.02	-0.02	0.01	-0.31	0.31	0.16	0.31	-0.07
PDBD	-0.07	0.09	0.14	0.09	0.03	-0.45	-0.05	0.20	-0.04	0.04	0.87	1.00	0.73	-0.16	0.30	0.35	-0.06	0.39	0.36	-0.37	-0.45	-0.23	0.16	-0.02	0.03	0.05	-0.28	0.20	0.08	0.38	-0.02
PDBL	0.04	0.24	0.15	0.16	-0.09	-0.54	-0.03	0.17	-0.07	0.02	0.74	0.73	1.00	-0.16	0.17	0.35	0.20	0.13	0.48	0.23	-0.78	-0.09	0.19	0.01	0.11	0.16	-0.15	0.12	0.14	0.46	-0.31
PED	0.01	-0.23	-0.07	-0.16	0.15	0.25	0.03	-0.33	0.02	-0.02	-0.21	-0.16	-0.16	1.00	-0.40	0.02	0.06	-0.16	-0.02	-0.11	0.20	0.38	-0.19	-0.05	-0.10	0.35	0.30	-0.25	0.02	-0.01	0.06
PER	0.06	-0.03	-0.06	0.14	-0.21	-0.33	0.12	0.75	0.04	0.06	0.40	0.30	0.17	-0.40	1.00	-0.04	-0.18	0.57	-0.13	-0.02	-0.22	-0.44	0.25	0.13	-0.05	-0.40	-0.73	0.72	-0.05	-0.10	0.03
PEXPO	0.03	0.02	0.03	0.05	-0.11	-0.14	-0.08	-0.11	-0.15	-0.12	0.26	0.35	0.35	0.02	-0.04	1.00	0.00	-0.03	0.73	0.01	-0.24	0.09	-0.03	-0.09	0.10	0.05	-0.04	-0.13	-0.03	0.91	-0.14
PGDP	0.03	0.27	0.08	0.08	0.02	-0.17	-0.09	-0.01	-0.19	-0.24	-0.01	-0.06	0.20	0.06	-0.18	0.00	1.00	-0.16	0.08	0.26	-0.17	0.11	0.09	0.14	0.05	0.03	0.19	-0.03	-0.04	0.05	-0.37
PGGD	-0.02	-0.09	-0.06	0.23	-0.10	-0.27	0.09	0.45	0.09	-0.03	0.36	0.39	0.13	-0.16	0.57	-0.03	-0.16	1.00	-0.10	-0.29	-0.05	-0.45	0.37	0.00	-0.06	-0.13	-0.34	0.37	-0.07	-0.08	0.13
PIMP	0.04	0.06	0.04	-0.12	-0.12	-0.13	-0.02	-0.16	-0.25	0.07	0.31	0.36	0.48	-0.02	-0.13	0.73	0.08	-0.10	1.00	0.08	-0.31	0.21	-0.13	-0.12	-0.01	0.08	0.04	-0.16	0.49	0.95	-0.36
PLTD	0.11	0.16	0.04	0.11	-0.07	-0.24	-0.05	0.16	0.01	-0.08	-0.11	-0.37	0.23	-0.11	-0.02	0.01	0.26	-0.29	0.08	1.00	-0.40	0.03	0.11	0.06	0.06	0.00	-0.04	0.07	0.00	0.06	-0.34
PLTL	-0.27	-0.15	0.06	-0.19	0.04	0.47	0.08	-0.29	0.05	0.09	-0.49	-0.45	-0.78	0.20	-0.22	-0.24	-0.17	-0.05	-0.31	-0.40	1.00	0.07	-0.16	-0.07	-0.07	-0.10	0.25	-0.23	0.05	-0.30	0.40
PMSPTR	0.11	0.03	-0.07	-0.31	-0.05	0.30	0.00	-0.53	0.06	0.02	-0.23	-0.23	-0.09	0.38	-0.44	0.09	0.11	-0.45	0.21	0.03	0.07	1.00	-0.71	-0.18	-0.12	0.18	0.52	-0.51	0.31	0.16	-0.20
PMVIX	-0.04	-0.04	0.03	0.49	0.03	-0.34	-0.08	0.39	-0.02	0.01	0.20	0.16	0.19	-0.19	0.25	-0.03	0.09	0.37	-0.13	0.11	-0.16	-0.71	1.00	0.15	0.10	-0.03	-0.27	0.37	-0.14	-0.09	0.00
PON	0.10	-0.03	-0.08	0.35	0.08	-0.04	-0.09	0.21	0.03	-0.06	0.02	-0.02	0.01	-0.05	0.13	-0.09	0.14	0.00	-0.12	0.06	-0.07	-0.18	0.15	1.00	-0.26	-0.16	-0.20	0.33	-0.08	-0.12	-0.05
PPB	0.00	0.07	0.05	0.17	-0.11	-0.03	-0.03	-0.03	0.03	-0.11	-0.02	0.03	0.11	-0.10	-0.05	0.10	0.05	-0.06	-0.01	0.06	-0.07	-0.12	0.10	-0.26	1.00	0.04	0.03	0.07	-0.17	0.04	-0.07
PRES	0.01	0.17	0.09	-0.09	0.26	0.00	0.06	-0.41	-0.12	0.09	0.01	0.05	0.16	0.35	-0.40	0.05	0.03	-0.13	0.08	0.00	-0.10	0.18	-0.03	-0.16	0.04	1.00	0.37	-0.38	0.00	0.08	0.00
PSMR	-0.05	0.09	0.02	-0.24	0.18	0.30	-0.06	-0.75	0.13	-0.03	-0.31	-0.28	-0.15	0.30	-0.73	-0.04	0.19	-0.34	0.04	-0.04	0.25	0.52	-0.27	-0.20	0.03	0.37	1.00	-0.72	0.03	0.01	-0.04
PSPRD	0.05	-0.03	-0.01	0.27	-0.04	-0.24	-0.03	0.88	-0.07	0.05	0.31	0.20	0.12	-0.25	0.72	-0.13	-0.03	0.37	-0.16	0.07	-0.23	-0.51	0.37	0.33	0.07	-0.38	-0.72	1.00	-0.04	-0.16	0.02
PTB	-0.05	0.01	0.04	-0.19	-0.07	0.03	0.02	-0.10	-0.11	0.35	0.16	0.08	0.14	0.02	-0.05	-0.03	-0.04	-0.07	0.49	0.00	0.05	0.31	-0.14	-0.08	-0.17	0.00	0.03	-0.04	1.00	0.28	-0.22
PTRV	0.04	0.05	0.03	-0.05	-0.12	-0.14	-0.04	-0.15	-0.22	-0.02	0.31	0.38	0.46	-0.01	-0.10	0.91	0.05	-0.08	0.95	0.06	-0.30	0.16	-0.09	-0.12	0.04	0.08	0.01	-0.16	0.28	1.00	-0.29
PUR	-0.20	-0.05	0.09	-0.04	0.05	0.31	0.11	-0.08	0.00	0.09	-0.07	-0.02	-0.31	0.06	0.03	-0.14	-0.37	0.13	-0.36	-0.34	0.40	-0.20	0.00	-0.05	-0.07	0.00	-0.04	0.02	-0.22	-0.29	1.00

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