

**T.C.
MARMARA ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İŞLETME ANABİLİM DALI
MUHASEBE-FİNANSMAN (İNG.) BİLİM DALI**

**TURKISH TREASURY AUCTIONS
AND
ESTIMATION OF AVERAGE COMPOUNDED INTEREST
RATE OF DISCOUNTED TL DENOMINATED TREASURY
AUCTIONS**

YÜKSEK LİSANS TEZİ

OSMAN ALTAY

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İSTANBUL 2011

Marmara Üniversitesi
Sosyal Bilimler Enstitüsü Müdürlüğü

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ABBREVIATIONS

ACR	: Average Compound Interest Rates of the Discounted Treasury Bonds
CBL	: Monthly General Budget Cash Balance of the Government
CBRT	: Central Bank of the Republic of Turkey
CDS	: Monthly Average of One Year Maturity Credit Default Swap Spreads of Turkey
CPI	: Consumer Price Index
DACR	: First Level Difference of Average Compound Interest Rates of the Discounted Treasury Bonds
DCBL	: First Level Difference of Monthly General Budget Cash Balance of the Government
DCDS	: First Level Difference of Monthly Average of One Year Maturity Credit Default Swap Spreads of Turkey
DCPI	: First Level Difference of Consumer Price Index
DDEP	: First Level Difference of Weighted Monthly Average of Interest Rate of One Year TL Time Deposits in Turkish Banks
DEP	: Weighted Monthly Average of Interest Rate of One Year TL Time Deposits In Turkish Banks
DGB	: Domestic Government Bonds
DGBB	: First Level Difference of Monthly General Budget Balance of the Government
DMTR	: First Level Difference of Average of Maturity of the Related Bonds Auctioned Within Each Month
DONI	: First Level Difference of Monthly Average of Overnight Interest Rates
DSTC	: First Level Difference of Monthly Average of Istanbul Stock Exchange's IMKB100 Index
DTLIB	: First Level Difference of Turkish Lira Reference Interest Rate (TRLIBOR)
DUSD	: First Level Difference of Monthly Average of TL/USD Exchange Rates
EMKT	: Electronic Securities Transfer System
F/X	: Foreign Exchange
GBB	: Monthly General Budget Balance of the Government
IMKB	: Istanbul Stock Exchange
ISE	: Istanbul Stock Exchange
LS	: Least Squares
MMs	: Market Makers
MTR	: Average of Maturity of the Related Bonds Auctioned Within Each Month
MTS	: Electronic Bond Network
OLS	: Ordinary Least Squares
ONI	: Monthly Average of Overnight Interest Rates
STC	: Monthly Average of Istanbul Stock Exchange's IMKB100 Index
TAP	: Tapping System
TETS	: Settlement Bank Electronic Transfer System

TL : Turkish Lira
TLIB : Turkish Lira Reference Interest Rate (TRLIBOR)
TRLIBOR : Turkish Lira Interbank Offered Rate
TÜFE : Consumer Price Index
UK : United Kingdom
US : United States
USD : Monthly Average of TL/USD Exchange Rates

ABSTRACT

Financial assets, especially government bonds, are mainly issued through auctions by treasury authorities of countries. Therefore treasury auctions are the most important of all auctions in terms of their impact on the economy. Treasury of Turkey also raises huge amounts of money through sales of the debt securities. This is mainly required to finance the income gap of the state. On the other side, the debt securities issued through the auctions are among the most important financial instruments for the investors, especially the commercial banks who trade these instruments both on their own and their customer behalves. Therefore, while buying these instruments on a suitable price is very important for the investors, estimation of the price, namely the interest rates of the debt securities that auctioned by the Turkish Treasury is also important for investors as they participate in the Treasury Auctions to bid for the largest possible amount of bonds in the best price.

Taking into consideration of these situations, in first parts of this study, the phenomena of the Turkish Treasury Auctions was analyzed considering economic social and political ground, debt securities, public finance and auctioning securities with its practices in Turkey.

In the last section of the study average compounded interest rate of discounted TL denominated treasury auctions were observed and an econometric model which best suits for estimation of the average interest rate was tried to be developed. Ordinary least squares method was applied to the model due to its appropriateness for time series analysis. Alternative investment instruments for the treasury bond and the reference variables were emphasized in the model, as well.

ÖZET

Devlet tahvilleri başta olmak üzere finansal enstrümanlar genellikle hazine otoriteleri tarafından düzenlenen ihalelerle ihraç edilirler. Bu nedenle hazine ihaleleri, ekonomi üzerindeki etkileri açısından bütün ihale türlerinin en önemlisidir. Türkiye Hazinesi de borç senedi satışıyla yüksek miktarlarda para toplamaktadır. Bu genellikle devletin gelir açıklarının finansmanı için gerekli olmaktadır. Diğer taraftan, ihale yöntemiyle ihraç edilen borçlanma senetleri yatırımcılar, özellikle de kendi adlarına veya müşterilerinin adlarına işlem yapan ticari bankalar, açısından en önemli finansal enstrümanlar arasında yer almaktadır. Hazine tarafından ihraç edilen bu enstrümanları uygun bir fiyattan satın almanın yanı sıra, fiyatlarının, yani faiz oranlarının, tahmin edilmesi, Hazine İhalelerinde mümkün olan en yüksek miktarda borçlanma senedini en uygun fiyattan satın almak isteyen yatırımcılar için büyük önem teşkil etmektedir.

Bu koşulların dikkate alınması sonrasında, ekonomik sosyal ve politik temelleri ile Türk Hazine İhaleleri olgusu, borçlanma senetleri, kamu finansmanı, menkul kıymet ihalelerinin Türkiye'deki uygulamaları çalışmanın ilk bölümlerinde analiz edilmektedir.

Çalışmanın son bölümünde, Türk Lirası iskontolu hazine ihalelerinin ortalama bileşik faiz oranları incelenmekte ve ortalama faiz oranının tahminine en iyi uyan bir ekonometrik modelin kurulmasına çalışılmaktadır. Zaman serisi analizlerine uygunluğu açısından en küçük kareler yöntemi modele uygulanmıştır. Ayrıca, modelde devlet borçlanma senetlerine alternatif teşkil eden yatırım araçları ve referans değişkenler üzerinde durulmaktadır.

SECTION I

1. INTRODUCTION

Governments are in need of financing public expenditures. Taxes, capital revenues, special revenues such as donations and aids and revenues of administrative organizations are the main public fund resources or governmental resources. Public borrowing is an alternative source to these. This source requires public debt management which concerns with funding collective or government activities. Main purpose of this management field is to determine what the government or collective organizations should do with respect to priorities of these activities and public fund resources and it is in interaction with monetary and fiscal policy. This integrated financial management of the government is closely linked to budget execution and treasury operations.

Operations of fiscal authorities of governments to satisfy liquidity needs of the governments using government debt instruments and markets affect 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.

Fiscal authorities of the governments are aware of the impact of government financing requirements and debt levels on borrowing costs. Furthermore, the maturity structure, and interest rate and currency composition of the government's debt are mutually affected from monetary and economic situation of countries.

Among these fiscal authorities, Treasury is focused on liquidity management. Therefore treasury management or treasury operations include management of financial assets of an enterprise through trading government and corporate bonds, currencies, financial futures, options and derivatives etc. Treasury management requires positive cash flow to stay in business and this is achieved through taking sound investment and borrowing decisions. Every government, non-profit organization, and university needs professionals prepared to forecast and manage the organization's cash flow.

Bond markets meet these requirements and there is no uniform system for classification of bond market of a country. But, in general bond market of a country may be classified into two, internal bond market and external bond market. The internal bond market of a country which is also called the national bond market has 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. Those markets are foreign bond markets where the bonds issued by a foreign government or company are traded. The foreign bond market trades in the domestic currency and is regulated by domestic regulators.

Bonds vary in type and function. But the most generic bonds are Domestic Government Bonds (DGB), Foreign Exchange Bonds and Eurobonds. In this study, Turkish Domestic Government Bonds are observed in more detail because of their attribute of reflecting domestic capital market conditions, borrowing arrangements and treasury auctions in Turkey.

As being subject of this study, auction is an organized price mechanism which is conducted according to open and identifiable rules and where distribution of the sources and prices are determined by the bids of the auction participants. Transparency, equality of opportunity, and effectiveness advantages of the auctions make them the most widely used financing method.

On the other side, the debt securities issued through the auctions are among the most important financial instruments for the investors, especially the commercial banks who trade these instruments both on their own and their customer behalves. Therefore, as well as buying these instruments on a suitable price is very important for the investors, estimation of the price, namely the interest rates of the debt securities that auctioned by the Turkish Treasury arises is also an important problem of the investors. Because, in the Treasury Auctions, investors wants to bid for the largest possible amount of bonds in the best price.

Therefore estimation of the interest rate to be applied to the debt instruments auctioned in the Treasury Auctions becomes an important problem for investors before deciding on a bid rate. As the Turkish Treasury organizes different auctions for many different kind of borrowing instruments with varied conditions, estimation of interest rates for each auction becomes heavily complex. As a result of this precondition, average interest rate of discounted TL denominated treasury auctions is observed and an econometric model which best suits for estimation of the average interest rate is tried to be developed. Ordinary least squares method is applied to the model due to its appropriateness for time series analysis. Alternative investment instruments for the Treasury bond and the reference variables are emphasized in the model.

2. ECONOMIC, POLITICAL and SOCIAL GROUND

2.1.Basic Terms

2.1.1. Market

Literally, market is place where things are bought and sold. But in the modern industrial system, however, the concept of market is not restricted as a place. It is also

geographical area in which sellers compete with each other for customers. This competition and trading activity also determine the price in the market. The market gets more perfect as the tendency of paying same price for the same thing at the same time in all parts of market gets stronger. (Business Encyclopedia, 1997, pp 388-397)

Historically, markets were physical meeting places where buyers and sellers meet to trade. Beside physical markets, there are virtual market places supported by IT networks such as the internet through which the market become the largest and most liquid.

The number of buyers and sellers involved are effective on the price of the good or service to be sold. Where there are more sellers than buyers, the availability of supply will push down prices. If there are more buyers than sellers, the increased demand will push up prices. This situation is known as the law of supply and demand. (Business Encyclopedia, 1997, pp 530-531)

Markets can appear spontaneously when there are goods or services to be exchanged, or they can be planned and regulated.

2.1.2.Free Markets

Free markets operate or close to operate under the conditions of 'laissez-faire'. In those conditions, the government does not intervene in how the market operates. Intervention of government or trade bodies is often due to elimination of malfunctioning of free market. (Business Encyclopedia, 1997, pp 388-397)

2.1.3.Currency Markets

The currency markets are the largest continuously traded markets in the world. In every bit of time, governments, banks, investors and consumers are buying and selling every currency, leading to massive money flows which constantly changing hands.

2.1.4. Stock Markets

Stock markets have become highly complex markets that allow investors to buy shares in companies or in funds that aggregate companies or industries together. Most stock markets today are primarily electronic networks, although they often maintain a physical location for buyers, sellers and market makers to interact directly.

2.1.5. Commodity Markets

Commodity markets attract increasing attention due to the fluctuation in prices, especially the oil and food prices. Conventionally, commodities underpin economic activity. Commodity markets include: energy (oil, gas, coal and increasingly renewable energy sources such as biodiesel), soft commodities and grains (wheat, oat, corn, rice, soya beans, coffee, cocoa, sugar, cotton, etc.), meat, and financial commodities such as bonds.

2.1.5.1. Capital Goods & Industrial Markets

Capital goods markets help businesses to buy durable goods to be used in industrial and manufacturing processes. A number of services can also be associated with these goods. Transactions tend to be wholesale with large quantities of goods being transacted at low prices.

2.1.5.2. Effective Market

It is a theory that all market participants receive relevant information as soon as it becomes available and act accordingly. The theory assumes everyone has the same information about a stock, and consequently price of a stock reflect knowledge and expectations of all investors. (Samuelson and Nordhaus, 1992, pp 286-298), (Business Encyclopedia, 1997, p 226)

In this context literature deals with information asymmetry that is the condition where one party has more or better information than the other. This creates conclusion of transactions in an undesired adverse way.

2.1.5.3. Capital Markets

While money market is the market for short-term, less than one year, borrowing and lending, capital market is the market for securities (debt or equity) where business enterprises and governments can raise longer term funds. The capital market includes the stock market (equity securities) and the bond market (debt). (Business Encyclopedia, 1997, p 123)

2.1.5.4. Primary and Secondary Market

The primary market as a part of the capital markets is the market where new securities are issued and offered first time. Business enterprises, governments or public sector institutions, such as municipalities, use this market to obtain funding through the sale of a new stock or bond issue.

The secondary market, also known as the aftermarket, is the financial market where previously issued securities and financial instruments such as stock, bonds, options, and futures are bought and sold.

Markets are also classified according to their level of trading volume. Those markets in which a large number shares can be transacted without affecting the price are called deep markets and those markets in which trading volume is low, and consequently bid and asked quotes are wide and the instrument traded is not very liquid are called thin market. Moreover, markets are also classified according to the price ranges within their trading volume; wide markets and close markets. Wide market has large spread while close markets has narrow spread. (Samuelson and Nordhaus, 1992, pp 286-298)

USA is known as the World's largest and most effective market for public securities. Most of the countries over the globe are affected by the practices in this market. This market meets huge amount of borrowing requirement of United States Government and interest rates emerged over these transactions cannot be easily manipulated. Consequently firmness of these rates makes them important for global economy and economies of countries specifically.

Capital markets may also classified into two as stock exchanges and non-stock exchange markets, according to their way of organizations. In comparison to non-stock exchange markets, stock exchange markets are organized in detail and have more restrictions. Non-stock exchange markets are called over the counter markets.

SECTION II

3. DEBT SECURITIES AND PUBLIC FINANCE

3.1. Debt Securities

3.1.1. 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 (“Security”, n.d., para. 1). As clearly understood from this explanation, 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.

3.1.2. Debt Securities

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, 2002, pp. 3- 42)

Debt securities accompanied by collateral called protected security and those are without collateral called unsecured. (Sundaresan, 2002, p. 8) 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".

Corporate bonds represent the debt of a business enterprise. Debentures have a long maturity, typically at least ten years, whereas notes have a shorter maturity. Commercial paper is a simple form of debt security that essentially represents a post-dated check with a maturity of not more than 270 days.

Money market instruments are short term debt instruments and their features are similar to deposit accounts, such as certificates of deposit, and certain bills of exchange. Because of their liquidity level they are referred to as "near cash". Commercial paper is also often highly liquid.

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, 2002, p. 357)

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.

3.1.2.1.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, p3)

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:

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, 2002, p. 9)

3.1.2.2.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 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, 2002, pp.3-42)

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, 2002, pp. 3-42)

3.1.2.3. 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, p.58-59) The price of the debt security, therefore, may be higher or lower than the original investment if it is sold before maturity.

3.1.2.4. 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, p.58-59) 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.

3.1.2.5. 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 ("Credit Rating", n.d., para. 1-10)

3.1.2.6. 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, pp. 65-70). 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

3.1.2.7. Overall Market Conditions

As with all investments, returns on a debt security are influenced by factors such as the rate of inflation, unemployment rate, economic growth, balance of payments data, retail sales, industrial production and political changes.

3.1.2.8. Exchange Rate Risk

Securities dominated in a currency other than the currency that the investor operates in general carry exchange rate risk for its investor. For instance, investors operates in Turkey may suffer losses due to changes in exchange rates provided that they have debt security denominated in a currency other than Turkish Lira.

3.1.2.9. Liquidity Risk

Those securities can be easily bought and sold are known as liquid asset. Therefore, liquidity is identified with the level of trading activity of that security.

3.1.3. Issuing Debt Security

Debt securities are issued by public authorities, credit institutions, companies and supranational institutions in the primary markets. (Sundaresan, 2002, p. 4) 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, 2002, p. 350) However, government bonds are conventionally auctioned.

In the United States, the history of the treasury auctions dates back to 1929. The US Treasury issued bills, notes and bonds to tackle the public finance demands that occurred during, and after, World War I. But, treasury auctioning in the United Kingdom goes back to earlier periods. The British Treasury had been issuing bills since about 1877. Treasury auctioning and emissions were relatively small and infrequent in US and UK before the World War I. But, issuance increased substantially during and following World War I in these two and other countries suffered from the war conditions. (Garbade, 2008, pp 31-32)

In his study Kenneth D. Garbade says that British bills were auctioned weekly—on Friday, for settlement the following week—and matured three months later. Bidders submitted tenders that specified a price and amount as well as a settlement day sometime during the following week. Treasury officials sorted the tenders by settlement day and accepted proposals for a given settlement day in order of decreasing price until they had accounted for all of the funds needed to be raised on that day. Successful bidders paid for their bills with drafts on the Bank of England, that is, with immediately available funds. (Garbade, 2008, pp 41-42)

In late April 1929, the US Treasury unveiled a proposal for improvement of its financing operations which arranges first time introduction of zero-coupon bills with maturities of up to one year at a discount from face value. The proposed legislation also

required trading the new securities on a competitive basis. Therefore officials of the US Treasury viewed auction offerings as a key provision. At that time Treasury Secretary Mellon stated that “Competitive bidding should enable the Treasury to get the lowest discount rates consistent with current market conditions.” (Garbade, 2008, pp 41-42)

3.2.Public Finance

3.2.1. Public Debt Management

Public debt management concerns with funding collective or governmental activities. Main purpose of this management field is to determine what the government or collective organizations should do with respect to priorities of these activities and public fund resources. (Samuealson and Nordhaus, 1992, p. 624) 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 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.

Public debt management is also effective on development of domestic financial markets of countries because 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.

“Guidelines for Public Debt Management” which was prepared by the Staffs of the International Monetary Fund and the World Bank on March 21, 2001, explains well what public debt management is and why it is important.

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. 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. 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).

3.2.2. Principles of Debt Policy

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

3.2.2.1. 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. (Developing Government Bond Markets, 2001, p. 235)

Liquidity means conversion of a security to cash in a considerably short time and with minimum or no losses 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.

In this framework, “Market Making System” which was established in Turkey first time in May 2000, and abandoned in 2001 due to the fluctuations in domestic markets and re-established in September 2002, add to the liquidity and depth of the market through primary dealers. (Konya, 2004, p.11) Primary dealers in this system takes short or long positions for a time and assume some risk in return for making a small profit. This system aimed both of increasing participations in primary markets and the creation of a strong secondary market which would serve to the success of the initial offering in the primary market. As of April 2010 market makers in this system are Akbank A.Ş., Deutsche Bank A.Ş., Fortis Bank A.Ş., Finansbank A.Ş., HSBC Bank A.Ş., ING Bank A.Ş., T. GarantiBankası A.Ş., T. İşBankası A.Ş., T. VakıflarBankası T.A.O., T. HalkBankası A.Ş., T.C. ZiraatBankası A.Ş., YapıveKrediBankası A.Ş. (Public Debt Report, 2009)

3.2.2.2. 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& Craig, 1998, pp 2-4)

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& Craig, 1998, pp 2-4)

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, p. 70)

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, p. 70)

In Turkey, borrowing program has been disclosed regularly to the public since July 1997, Domestic Debt Consultancy Committee was established within the context of the market making system and cash position and stock data are being published at internet site of Turkish Treasury. (Konya, 2004, p.12)

Borrowing programs include information about current term's expected revenue and loss amounts, domestic debt servicing, and maturity and amount information about the securities whose auctions will be held in the coming month.

3.2.2.3. 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.

3.2.2.4. Borrowing and Investment Strategies

Borrowing strategies can be summarized under two titles; Opportunistic borrowing strategy, and Benchmark Borrowing Strategy. (Doğruyol, 2010, p. 135)

Opportunistic borrowing strategy aims to minimize borrowing cost through pursuing optimum composition of maturity and interest rate at the considerably most intense time of demand. Although this strategy provides cost of borrowing to be held low in short term but it creates increase in cost in the long terms, and cannot provide extension of liquidity to every terms. (Doğruyol, 2010, p. 135)

In the benchmark borrowing strategy, debt management authority applies a borrowing policy through reopening relatively long term debt securities in shorter terms. As a result of decrease in number of long term issuances, investors are provided to intensify over the existing benchmark long term securities and liquidity of the existing securities are extended to every term. (Doğruyol, 2010, p. 135)

On the other side, investment strategies can be also summarized under two titles; Active Investment Strategy, Passive Investment Strategy.

Passive investment strategy does not require development of a specific method except “indexing” and “buy and hold”. Both of these methods are based on the assumption of effective market where prices reflect every kind of information regarding those securities in transaction. In such a situation buy and hold method would not provide any priority to the investor. Therefore pursuing a passive way of interaction without making continuous buying and selling would not bring a different result other than pursuing an active strategy.

Besides, indexing would eliminate security choosing problem for those investors who is in compliance with an average yield. (MenkulKıymetlereYatırım, n.d., pp.7-11)

Active investment strategies are established on specific targets and assumptions. These targets and assumptions prioritize three facts, which are maturity status, changes in interest rates and non-existence of effective market. (MenkulKıymetlereYatırım, n.d., pp.7-11)

Firstly, protection from interest rate risk can be possible through arrangement of portfolio duration in accordance. Recalculation and matching maturities would be necessary as the duration of portfolio and liabilities change. Easier way is allocation of portfolio equally to different maturities. (MenkulKıymetlereYatırım, n.d., pp.7-11)

Secondly, the strategy which prioritizes changes in interest rates is a speculative strategy because investor wants to reach a yield rate higher than the average yield rate in the market through estimating future changes in interest rates. (MenkulKıymetlereYatırım, n.d., pp.7-11)

Third assumption accepts investment in low quality securities and security exchanges. Because, it is believed that low quality securities in less value than they should be and they would provide higher yield. Investment in these securities is a good method for getting high yields.

3.2.2.5. Treasury Management

Treasury operations are focused on liquidity management. Therefore treasury management or treasury operations includes management of financial assets of an enterprise through trading government and corporate bonds, currencies, financial futures, options and derivatives etc. Besides, treasury management emphasize on risk management in association with those instruments traded.

Treasury management historically prioritizes working capital management. (Philips, 1997, p.1) In Turkey, as double-digit interest rates became common by the 1970s and 1980s, effective cash management reciprocally became more critical for business enterprises and the governments in those years. Because the cash kept idle carry a significant opportunity cost. It either loses its investment revenue or depreciates against increasing inflation rates.

As Philips (1997) listed, treasury operations includes following items.

- Establishing Daily Cash Position
- Executing Funds Movement Transactions
- Managing Bank Balances
- Designing & Maintaining Cash Management Systems
- Implementing/Setting Up Cash Management Services
- Reporting Cash Operations Activities
- Managing Transactions & Resolving Errors
- Preparing Cash Forecasts
- Executing Investment Transactions
- Monitoring Compliance with Investment Guidelines
- Establishing Investment Guidelines
- Developing Investment Strategies
- Providing Short-Term Investment Reports
- Managing Daily Corporate Liquidity

- Executing Borrowing Transactions
- Borrowing or Repaying Principal
- Monitoring Compliance with Borrowing Guidelines and Loan
- Covenants
- Reporting Short-Term Borrowing Activities
- Negotiating Prices and Operating Agreements for Financial Services
- Maintaining Relationships to Meet Credit and Operating Needs
- Establishing Relationship Strategies with Financial Institutions
- Conducting Periodic Reviews with Service Providers
- Implementing and Maintaining Treasury Systems
- Developing Specifications for Treasury Systems

“Treasury management, as a profession, transcends the boundary of for-profit publicly held corporations. Every firm needs positive cash flow to stay in business, but they do not all do capital budgeting. Every firm needs managers to project cash flows for purposes of making short-term investment and borrowing decisions, but all firms do not declare dividends. Every government, non-profit organization, and university needs professionals prepared to forecast and manage the organization's cash flow, but they do not have shareholders who are concerned about shareholder wealth maximization. Because of this importance, liquidity management is observed to be the most important financial management job responsibility reported by professionals in treasury departments.” (Aeron, 1997, p81)

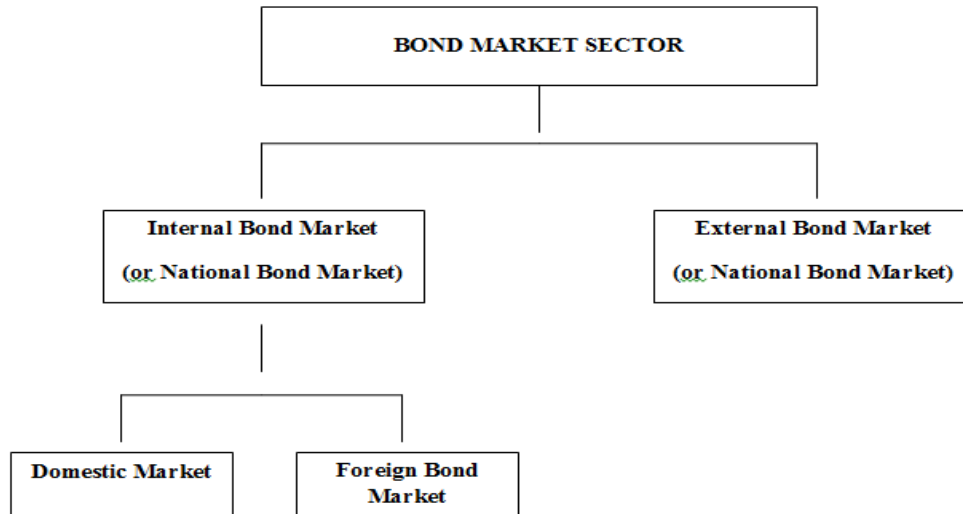
3.2.3. Bond Market in Turkey

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, pp. 37-38)

Table 2: Bond Market Sector



3.2.3.1. 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 this study, Turkish Domestic Government Bonds are observed in more detail because of their attribute of reflecting domestic capital market conditions, borrowing arrangements and treasury auctions in Turkey.

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. (“Eurobond, n.d., para. 1)

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. (“Foreign Bond, n.d., para. 1)

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.

State Domestic Borrowing Notes is a comprehensive definition of domestic borrowing tools of Turkish State named DİBS, “DevletİçBorçlanmaSenetleri” in Turkish. These kinds of borrowing tools are issued by Treasuries of countries and they are denominated in local currency and offered to investors in domestic market.

State Domestic Borrowing Notes includes Treasury Bills, Special Arrangement Treasury Bills, Government Bonds, and Special Arrangement Government Bonds such as Revenue Indexed Bonds. Treasury Bills differ from Government Bonds in terms of their maturity periods. Treasury Bills have maturity of less than one year, while Government Bonds have maturity of more than one year. Turkish Treasury applies fixed schedule on maturity differences, where six months is 182 days, nine months is 273 days and one year is 364 days. This schedule simplifies financial calculations, especially the conversions between ordinary interest and compound interest. (Konya, 2004, p. 28)

Besides, in practice, Turkish Treasury uses borrowing mechanism to issue special arrangement bonds to make loan to borrowers. These bonds set a loan agreement where Turkish Treasury becomes lender. In this agreement, Treasury makes payment to borrower until redemption of the special arrangement loan bond and borrower also agrees to make

repayments under the special schedule of the same contract based on the security issued on this purpose.

3.2.3.2. Prior Years of Domestic Borrowing in Turkey

Domestic borrowing was not a very common application of financing applied within the framework of private debt financing legislations, from early years of Republic until the late 1970s. In the early '80s, the way of financing through issuing finance bills which uses resources of the Central Bank was preferred. Financing budget deficit has been more attractive and advantageous, because, payment has been made to a public institution and interest rates were usually below the rates of the actual market. However, inflationist effect of this way of borrowing has not been considered properly. (Konya, 2004, p. 29)

As of late 1985, resources of the Central Bank were resorted less frequently by the commencement of borrowing through auctions. Regular auctions started by November 1986. (Konya, 2004, p. 29)

3.2.3.3. Classification of the State Domestic Borrowing Notes

State Domestic Borrowing Notes may be classified under different headings as a result of their consideration from different aspects. These aspects which lead classification of the securities also affect investment strategies of the investors. Investors determine their investment strategies preferring comparably less risky and more profitable securities as being vulnerable to interest rate risk, exchange rate risk, inflation risk and the risks arising from conditions of the economic environment where they operate. (Menkul Kıymetlere Yatırım, n.d. p. 3) In general, State Domestic Borrowing Notes are classified according to their maturities, issuance methods, denominated currencies, interest payment types and if they have coupon payment or not.

Although it is not stated in the relevant literature, State Domestic Borrowing Notes are subject to another important classification in practice, according to their status

of creating cash flow at their issuance. Therefore, State Domestic Borrowing Notes may be classified as cash and non-cash securities. However, regardless if they are cash or non-cash securities, issuance of State Domestic Borrowing Notes is only intended to finance the budget. (Konya, 2004, p. 35)

While issuance of cash notes provides cash flow to the Treasury, issuance of non-cash notes provides no cash flow to the Treasury but enables the Treasury not to make large amount of redemption at one time. As approaching the subject by this point of view, it can be said that issuance of non-cash notes has the same aim of budget financing. In fact, those liabilities deferred through issuing non-cash notes are the amounts to be redeemed as cash. But, within the limited budget conditions, settlement of those liabilities was preferred to be made through issuing new notes, instead of cash redemption. (Konya, 2004, p. 35)

Both of the cash and non-cash notes are subject to the dual classification of tradeable and non-tradeable securities. Criterion of this classification is the liquidity condition of the market. Notes accepted as tradeable by market participants can easily be exchanged as being subject to profit making transactions. But those notes which are accepted as non-tradeable cannot present qualification of being liquid.

Note issuance can also be made by denomination of TL and foreign currency. And, those foreign currency denominated notes are quoted within domestic debt stock as either foreign currency or foreign currency indexed notes. The main difference between foreign currency and foreign currency indexed notes is borrowing and redemption currency. Foreign currency notes are borrowed and redeemed over the denomination currency while foreign currency indexed notes are borrowed and redeemed in Turkish Lira over the exchange rate amount of the denominated foreign currency.

Turkish Lira, foreign exchange or foreign exchange indexed notes can be issued with coupon or without coupon. Interest of the discount notes without coupon, (zero-coupon bonds) is redeemed only at the end of the maturity. The difference between par value and selling price of this kind of note is the profit carried by the note and it will be

received by its investor. Consequently, a discount bond/note is a bond bought at a discount, or a price less than, its face value. The face value is the amount of money the holder of the bond receives at the end of the maturity period of the bond. Unlike coupon bonds, issuer only redeems the bearer once, when the bond expires.

Although discount bonds are fixed rate notes, the notes with coupon can be issued as fixed rate or floating rate notes. Interest rates and the amount of the interest redemption at the coupon dates or the redemption at the expiry dates are clear at the issuance date of the fixed rate notes. But, these rates are indexed to specific values when floating rate notes are issued. Floating rate coupon notes are bonds that have a variable coupon, equal to a money market reference rate, like LIBOR plus a spread. The spread is a rate that remains constant.

Fixed rate notes guarantee a specified yield if they are hold until the end of the maturity by their bearers and makes the yield visible at the beginning of the term of the notes. On the other side, floating rate interest rate redemption notes make long term borrowing preferable, as diminishing interest rate risk to be undertaken by investors against the excessive volatility to be occurred within the period between issuance and expiry date. (Fabozzi, 2007, p. 17)

Investors add foreign exchange bonds to their portfolios to avoid from currency risk. The Treasury increase its long term borrowing capacity through issuing coupon bonds and investors prefer to have these securities as aiming to provide regular and frequent cash flows. (Fabozzi, 2007, p 32)

Coupon bonds are bonds with interest coupons attached and must be presented to the issuer to receive interest payments. These bonds can be either sold at face value or can be sold at a price less than face value, discounted. (Fabozzi, 2007, p.3) However, not all bonds have coupons. Zero-coupon bonds are those which do not pay interest, but are sold at the initial offering to investors at a price less than the face value. When held to maturity, the bond is redeemed for face value.

As a summary, State Domestic Bonds are basically issued to the aim of budget financing. For the realization of this aim, cash notes provide cash flow to the Treasury, non-cash notes prevents large amount of cash outflows from the Treasury in short run.

Table 3: Classification of the State Domestic Government Bonds, DGB

CLASSIFICATION of the STATE DOMESTIC BORROWING NOTES			
CASH AND NON-CASH NOTES			
TRADEABLE SDBNs		NON-TRADEABLE SDBNs	
DOMESTIC CURRENCY	FOREIGN CURRENCY	DOMESTIC CURRENCY	FOREIGN CURRENCY
With Coupon	Type of Currency	With Coupon	Type of Currency
Fixed Interest Rate	With Coupon	Fixed Interest Rate	With Coupon
Discounted	Fixed Interest Rate	Discounted	Fixed Interest Rate
With Premium	Discounted	With Premium	Discounted
Face Value	With Premium	Face Value	With Premium
Floating Interest Rate	Face Value	Floating Interest Rate	Face Value
Discounted	Floating Interest Rate	Discounted	Floating Interest Rate
With Premium	Discounted	With Premium	Discounted
Face Value	With Premium	Face Value	With Premium
Without Coupon	Face Value	Without Coupon	Face Value
Fixed Interest Rate	Without Coupon	Fixed Interest Rate	Without Coupon
Discounted	Fixed Interest Rate	Discounted	Fixed Interest Rate
With Premium	Discounted	With Premium	Discounted
Face Value	With Premium	Face Value	With Premium
Floating Interest Rate	Face Value	Floating Interest Rate	Face Value
Discounted	Floating Interest Rate	Discounted	Floating Interest Rate
With Premium	Discounted	With Premium	Discounted
Face Value	With Premium	Face Value	With Premium
	Face Value		Face Value
	Foreign Currency Indexed		Foreign Currency Indexed
	With Coupon		With Coupon
	Fixed Interest Rate		Fixed Interest Rate
	Discounted		Discounted
	With Premium		With Premium
	Face Value		Face Value
	Floating Interest Rate		Floating Interest Rate
	Discounted		Discounted
	With Premium		With Premium
	Face Value		Face Value
	Without Coupon		Without Coupon
	Fixed Interest Rate		Fixed Interest Rate
	Discounted		Discounted
	With Premium		With Premium
	Face Value		Face Value
	Floating Interest Rate		Floating Interest Rate
	Discounted		Discounted
	With Premium		With Premium
	Face Value		Face Value

Source: Central Bank of the Republic of Turkey, <http://www.tcmb.gov.tr/yeni/eng/>

SECTION III

4. AUCTIONING of SECURITIES

4.1.Auction Theory in General

According to Biermann and Fernandez (1998) the auction method is the system in which the allocation of the goods or services subject to the auctioning is conducted pursuant to the price competition between the buyers or sellers.

In other words, auction method is an organized price mechanism which is conducted according to open and identifiable rules and where distribution of the sources and prices are determined by the bids of the auction participants.

According to Klemperer well designed auction means the distribution of the sources to those who will utilize them best. Klemperer also points out that a key feature of auction is the presence of asymmetric information. (With perfect information most auction models are relatively easy to solve. (Klemperer, p.12, 2004) Therefore, auctions contribute the formation process of the market price of an object.

Auctions allow goods and services to be purchased at the values other than a fixed price and standard values. Prices reflect the current demand and supply conditions accordingly the expectations. From the perspective of the auction organizer, the desired result is the formation of the most advantageous price for him (the highest price in sales, and the lowest price in purchase) at the current market conditions related to the goods or service subject to the auction. If the auction organizer knows the cited value, it will not be required to organize the auction; and for the good or service under the auction, the bidder

will try to agree with the potential seller giving the lowest price as he will try to agree with the potential buyer giving the highest buyer. However, the price of the objects is indefinite, and in this sense, the method is quite effective market mechanism (Vardar, 2007, p.62)

Referring to studies of John McMillian (Selling Spectrum Rights) and Peter Crampton (Spectrum Auctions. Handbook of Telecommunications Economics) Vardar, Ercüment states following items as the main advantages of the auction method.

- Auctions generate high revenues due to competitive structure.

(it insures low cost in the purchase auctions)

- Insures effectiveness in the distribution of the source

- It may prevent monopoly depending on the tender rules, and may extend the range of the participants

- Auctions provide broader information set about the price to the organizers

- More transparent and fair compare to other methods

- Tenders insure social effectiveness related to the issues (Vardar, 2007, p. 62)

In general, the views related to the auction concept may be considered in the above framework. However, the issue regarding whether the buyer of the object shall allow the resale of the object at the secondary markets is paid considerable importance by the market participants. The reason for this is that the object will be submitted to the hand of the party, who will use it most effectively, at the secondary market.

Regardless of the reasoning behind the preference, auctioning is the most preferred method by the developing and developed country governments for financing their deficits in our age. Transparency, equality of opportunity, and effectiveness advantages of the auctions make them the most widely used financing method.

As in the many cases used in Turkey, auction method has become the fundamental mean to issue the DGBs. The public deficits are regularly financed through the public borrowing tenders opened by the Treasury since November 1986. (Kona, 1996, p. 20)

4.1.1. Winner's Curse

As it is stated by Sundaresan, winner's curse refers to the possibility that the aggressive bidder in a discriminatory auction will end up paying too much relative to the market consensus. (Sundaresan, 2002, p. 88) Therefore participants of an auction, pay attention to this possibility and measure relativity of their bids with regard to true value of the security.

4.1.2. Auction Types

The auction method as the most widespread used one is classified in terms of the purpose as sales auctions, purchase auctions, exchange auctions, and in terms of the evaluation type multi price (traditional) and single price (final price) tenders .

Klemperer classifies standard auction types into four categories; the ascending bid auctions (also called the open, oral, or English Auction), the descending bid auction (used in the sale of flowers in the Netherlands and also called the Dutch auction by economists), the first-price sealed-bid auction, and the second- price sealed-bid auction (also called the Vickery auction by economists) (Klemperer, p. 11, 2004)

In ascending auction, the price is successively raised until only one bidder remains, and that bidder wins the object at the final price. The descending auction works in exactly the opposite way: the auctioneer starts at a very high price, and then lowers the price continuously. The first bidder who calls out that she will accept the current price wins the object at that price. In the first-price sealed-bid auction each bidder independently submits a single bid, without seeing others' bids, and the object is sold to the bidder who makes the highest bid. In the second-price sealed-bid auction each bidder independently submits a single bid, without seeing others' bids, and the object is sold to the bidder who

makes the highest bid. However, the price she pays is the second highest bidder's bid, or second price. (Klemperer, p. 12, 2004)

4.1.2.1. In terms of Purpose

In Turkey, the Treasury performs sales, repurchases, and exchanges of the DGBs usually through auction method (except the exchange transactions after the auctions for market making efforts).

Sales auctions are the auctions through which DGBs are offered to the public. In the cited auctions, the Treasury obtains its cash funding needs by selling DGBs. In repurchase auctions, the auctions are opened to repurchase of the DGBs previously offered to the public by the Treasury before their original term.

Vardar lists the differences of two auction types as listed below.

- In sales auctions the Treasury sells DGBs in return of cash money. However, in repurchase auctions, the Treasury purchases DGBs and pays cash in return of such repurchases.
- The Sales auctions are evaluated by sorting the prices from the highest priced bid to the lowest one. On the other hand, in repurchase auctions, the opposite sorting is valid.
- Sales auctions are made to meet the cash requirements of Treasury. On the other hand, repurchase auctions are prepared to organize the debt term structure and to decrease the repayment amount at the certain period of time.
- Sales auctions increase the domestic debt stock since the DGBs will be repaid on their due dates. However, in repurchase auctions, the domestic debt stock will be decreased since the existing GDBs will be decreased.

The fundamental difference between the repurchase auctions and the earlier repayment (redemption) is that the earlier redemption is an administrative transaction and the prices as the basis for the earlier redemption is determined by the Treasury. However, in the repurchase auctions the bidders shall contribute the formation of the auction prices. (Vardar, 2007, p. 64)

The exchange auctions are prepared to change the existing DGB with another DGB. In the exchange auctions, the instrument given as the replacement of the repurchased instrument may be another previously instrument or a brand new instrument to be offered.

In the exchange transactions, the price of the repurchased or sold instrument are declared by the Treasury, and for the DGB for which no price is declared the bid prices are collected. Upon the determination of the results of the Auction, new instrument is delivered to the winning bidders in the auction in return of the repurchased instruments in their possession. Exchange (replacement) auctions are made in order to re-organize the domestic repayment schedule of the Treasury, to extend the terms of some part of the domestic debt stocks, to change the currency or type of interest.

4.1.2.2. According to Evaluation Type

The generally used methods in the evaluation of auctions are single price and multi price (discriminatory) auctions.

In single price auctions, the bids are sorted from the most advantageous one to the least from the perspective of the organizer of the auction (in domestic borrowing auctions it is the Treasury), and the Organizer determines the limit price that is acceptable to him. And this price is used to all bidders who gave better prices than the limit price. In the multi-price auctions, each bid accepted will be evaluated from its bid price. (Vardar, 2007, pp. 66-67)

In order to see the basic differences between the cited two methods, in single price method there are bidders who will agree on a single final price level. Some part of such bidders may bid at high prices considering that it will not cost them high and to make their

chance to win higher. However, in the multi-price auctions this pricing strategy may not be used. In this sense, it may be stated that the auction method may be effective in the determination of the auction demand. It means that other circumstances as being equal, the conversion from single price method to multi price method shall increase the price elasticity of auction demand. (Vardar, 2007, p. 67)

The range of the bids collected in the single price auctions is wider than the range of the bids collected in the multi price auctions. The multi price auction bidders should use wider dataset. Therefore in the period of uncertainty, unexpected results may be seen. (Vardar, 2007, p. 67)

In Turkey, generally multi price method is used in the domestic borrowing auctions. On the other hand, upon the period of October 1993-January 1994 during which crisis was occurred and some auctions of the Treasury were cancelled, single price tenders were organized to facilitates the participation to the auctions until May 1994. In addition, after the Crisis in February 2001, single price auctions are started to be organized in March 2001 in order to meet the increasing borrowing requirement and to increase the participation, and with the stability provided in the domestic debt method, again multi price tenders were started in February 2004. (Vardar, 2007, p. 67-68)

4.1.2.3. Issuance Methods of New Government Securities

The methods used in the government domestic borrowing may differ according to the reason and source of borrowing. In Turkey, there are four general methods used in the issuance of the Domestic Government Bonds; Auction, TAP Sales (Tapping System), public offering, and special type instrument issuance (outright sales). However, issuance methods of new government securities may be diversified to numerous methods if the practices are considered in detail. Literature about this subject revolves around these four methods. Besides, auctions in its regular auction cycle has two general methods; Multiple Price Method, Single Price Method.

Fabozzi gives following descriptions about auctions methods in his book named Fixed Income Analysis.

“With the regular auction cycle/multiple price method, there is a regular auction cycle and winning bidders are allocated securities at the yield (price) they bid. For the regular auction cycle/single-price method, there is a regular auction cycle and all winning bidders are awarded securities at the highest yield accepted by the government. For example, if the highest yield for a single price auction is 7.14 % and someone bid 7.12 %, that bidder would be awarded the securities at 7.14 %. In contrast, with a multiple price auction that bidder would be awarded securities at 7.12. In the ad-hoc auction system, governments announce auctions when prevailing market conditions appear favorable. It is only at the time of the auction that the amount to be auctioned and the maturity of the security to be offered is announced. This is one of the methods used by the Bank of England in distributing British Government Bonds. In a tap system, additional bonds of a previously outstanding bond issue are auctioned. The government announces periodically that it is adding this new supply.” (Fabozzi, 2007, pp 39-40)

In Turkey, the Treasury realized first borrowing through auctioning in 1985. Subsequently, first time borrowing through TAP method was realized in 1988, first time borrowing through direct sale was realized in 1990, first time borrowing through public offering was realized in 1992. (Konya, 2004, p. 41)

Chronology

1985 - First Time Borrowing through Auctioning

1988 – First Time Borrowing through TAP Method

1990 – First Time Borrowing through Direct Sale

1992 – First Time Borrowing through Public Offering

4.1.2.4. Auctioning of Domestic Government Bonds in Turkey

The first phase of the auction is the announcement to the public after determining all properties related to the DGB and auction method to be conducted in order to meet the cash requirement of the Treasury.

Central Bank of the Republic of Turkey (CBRT), in the framework of the Central Bank of the Republic of Turkey Law Nr. 1211 and of Public Finance and Debt Management Law Nr. 4749, is in charge of realization of the DGB auctions on behalf of the Treasury and as being fiscal agent of the Treasury. Specifications and issuance conditions of the bonds are determined and announced by the Treasury, but bids are collected by the Central Bank. Central Bank informs the Treasury about the bid lists and after determination of the amount and prices of bonds to be sold by the Treasury, Central Bank announces auctions results. Collection of the collaterals and remitting them back to the unsuccessful bidders, and collection of the auctioned amounts on the issuance day, and transfer of the securities to the auction participants are realized by the Central Bank.

The Auction bids are sent by the member intermediary institutions of the Settlement bank Electronic Transfer System (TETS) operating before Takasbank and the banks and intermediary institutions as the members of the Electronic Fund transfer System (EFT) through faxes on the cited systems, and they are given to the CBRT directly with the application of the persons desiring to bid in the auction. (Vardar, 2007, p.68)

Those who want to bid should quote how much and on which price they bid over the TL 100.000 of quotation threshold. Quotations are usually entered to the system until 12:00 pm on the day of the tender bids are given. The bidders are also obligated to deposit cash advance as 1% of the total nominal bid amounts. Market makers are exempt from this collateral obligation. Auctions results are declared at around 14:00pm with information including the interest rate and amount sold. The bids of the bidders who fail to deposit the collateral for the auction shall be deemed as invalid. The security amounts of those bidders who fail to perform their obligations on the transaction day shall be retained by the

Treasury as revenue, and they shall only bid in the auctions by depositing security as 20% of the nominal bids. In the event of failure of the bidders to perform the obligations there under, the security amount will be increased to 100% for such bidders. The bidders subject to restrictions after their failures shall be relieved from the restrictions after their 4-participations in the tender by the CBRT. (Vardar, 2007, pp. 68-69)

The borrowing amount is determined by the Treasury considering the interest, quantity, and borrowing needs. The result of the auction is notified to the CBRT and the CBTR announces the result of the auction to the public.(Vardar, 2007, pp. 68-69)

Upon the formation of the auction results, the required administrative transactions are conducted by the CBRT. The CBRT follows the transfer of money of the auction bids to the accounts of the Treasury with the CBRT, and transfers the DGBs to the accounts of the bidders.

The coupons and principal payments of the fixed instruments after the auctions and the earlier redemption transactions if decided so by the Treasury are conducted by the CBRT.

But as it was already stated, government domestic bond auctions are organized either for the security issuance or for repurchase of the securities in circulation. But the thing for what auction is organized is not solely the government domestic bond. It is the price, amount and accompanying yields related with the securities.

In this context, if borrowing maturity and borrowing amount are determined and announced before the auction then the auction is to be held for determination of the interest rate and such an auction is called auction of price. When borrowing maturity and maximum interest rate are determined already then the auction is to be held determination of amount and it is called auction of amount. Auctions of price and amount are also held if maturity is already determined and announced. In some cases, all these issuance conditions are already determined and announced, and then the auction is held for determination

of accompanying gains of that note. Auction held in such a situation is called auction of accompanying yield.

If the practices in Turkey are considered, it can be observed that amounts and maturity to be borrowed are announced before the auctions and auctions of reference notes with 91 days of maturity constituted precedent for the auctions of price, between the dates from 1985 until mid-1991. In such a situation when the maturity and amount are already determined and determination of interest rate is left to the market, auctions are finalized when the amount planned to be borrowed is achieved. Those bids exceed the planned borrowing amount were cancelled. Eligible bids of the bidders are awarded in proportionally according to the amount and price they bidden. Such auctions enable application of both single price and multiple price auction methods. (Konya, 2004, p. 43)

Besides, the method of predetermination of amount was abandoned for a while within the year 1991; instead, determination of highest interest rate to be paid was preferred. Because, the method of auction of amount, when maturity and interest rate predetermined, bids were rewarded over that interest rate, was applied in Turkey but this system could not be permanent because of inability of achievement of the amount needed to be borrowed. (Konya, 2004, p. 43)

Issuance of consumer price index, (TÜFE) indexed real interest payment notes in 1997, 1998 and 1999 are examples of accompanying yield auctions. For these auctions, the information of consumer price index indexation of the notes was announced and bidders were requested to bid for the real interest rate as an accompanying gain. But, in general, investors are allowed to bid for both price and amount after July 1991. Presently, amount and price variables are not predetermined in most of the auctions. (Konya, 2004, p. 43)

Borrowing through auction is the most common way of borrowing in Turkey. Although, different methods were applied since 1995, the most important point of the auctions is the price and amount combination of the bids. Because, for instance, single price

auctions decrease significance of price variable of the auction if bids are sorted according to the bidden prices and bidders were rewarded according to this sort. (Konya, 2004, p. 44)

Initially 6 months and 1 year maturity of state domestic bonds auctions were realized by the auctioning method, which was applied first time in 1985. Besides, coupon notes were also issued through auction method. As of November 1986, auctions were held regularly almost in every week. In the period after November 1986, auctions of 1 year, 9 months, 6 months, 3 months notes issuance were held in rotation. Aim of this application is formation of a regular payment calendar and arrangement of repurchase auctions on the dates corresponding to payment dates of previously issued notes. (Konya, 2004, p. 44)

As of 01.01.1994, collateral amount rate of auctions was decreased to 1 percent for every participant. It was expected that participation in the domestic government bonds auction would increase considerably. (Konya, 2004, p. 46)

Meanwhile, application of 5 percent withholding over the interest gains from domestic government bonds as of 01.01. 1994 and deterioration in the economy adversely effected expectations of Treasury from application of single price auction method. (Konya, 2004, p. 46)

As of 11.03.1994, generally, auctions were started to be held in every Tuesday and selling procedures were carried out following day. (Konya, 2004, p. 46)

When the past practices are considered, we observe local currency denominated discounted notes and fixed or floating interest rate notes with coupon are issued by auction since 1985, foreign currency denominated discounted notes are issued by auction since 2001, fixed interest rate notes with coupon are issued by auction since 2003.

As it is stated in the preceding paragraphs, discounted notes were more frequently issued by auctions and these issuances were overwhelmingly in local currency. But, as of an initial auction of foreign currency denominated discounted note issuance in 2001, issuance of similar type notes increased in frequency since that date.

Discounted notes are preferred because of their ability of guaranteeing a definite yield at the end of the maturity, and their issuance is more severe to get benefit of this preference.

Auctioning of the notes with coupon cannot be observed in the period between 1989 and 1996. Because, for the sale of long term notes, the Treasury preferred application of different issuance methods other than auctioning. TAP method is one of those methods preferred within this period and banks paid interest in this method to be able to cover their own liquidity positions liabilities. (Konya, 2004, p. 50)

4.1.2.5.DGB Issuance Methods Other Than Auctioning

4.1.2.5.1. TAP Sales Method

The sale of the DGBs through the CBTR at the prices determined beforehand is called TAP Sales Method. This system is also named as “Offering to Sales Method” or “Tapping System” and it was introduced by the Treasury in 1988. Treasury view was lengthening the maturity of domestic borrowing and seeking a relief in interest payments. (Kona, 1996, p. 22)

According to this method, the Treasury announces all information (term, interest, type, price, and etc.) related to the instrument to be issued and places bonds (especially floating interest rate bonds) with the Central Bank to be sold to the investors on their demand. The bonds remain the property of the Treasury until the investors decide to “tap” these bonds from the Central Bank. TAP sales within the scope of the market making application is conducted to all real and legal persons who apply these banks or the CBRT branches through the market maker banks, and the sum of all instrument values are transferred to the TL or F/X accounts of the Treasury with the CBRT. (Aydin, 2010)

Once the tapping period has been authorized by the Treasury, investors are free to apply to the Central Bank to purchase the securities at any time, provided that the security concerned is still available and its sale is permitted by the Treasury. Depending on the

Treasury's cash management needs, the Treasury may alter the tapping limits or make transfers of limits between issues. (Kona, 1996, p. 22)

Due to the reasons such as the possibility of unfair determination of the price, lack of operational facilities required to reach the securities issued is relatively low in the domestic borrowing stock, this method is not applied frequently. (Konya, 2004, p. 54)

4.1.2.5.2. Public Offering Method

Public offering is another method used in the issuance of the DGBs. Public offering targets the savings held by the public. Bids from the banks and other financial institutions are desired to act as intermediary between the public and the government, in the public offerings. The auction protocol is signed with the institutions approved by the Treasury. In this way, the institutions acting as the intermediaries are entitled to a commission as the certain rate of the securities for the sales for which they acted as intermediary.

Only the Market Makers may act as the intermediaries for the DGB sales through public offering. Therefore, it is insured that only the market makers shall benefit from the commission fees and by this it is aimed that the public offering commissions will be one of the privileges of being a market maker.

This sales method making the physical issuance of the instruments before the operation of EMKT (Elektronik Menkul Kıymet Transferi, Electronic Transfer of Securities) was costlier than the other methods. With the EMKT System, it has become an important turning point in terms of the elimination of the cost problems. (Vardar, 2007, p.70)

In addition to this, the cited method may lead to conflict of interests between the Treasury and the banks since the borrowing source of the public offering method and the fund sources of the banks are the same, and due to the lack of the sufficient saving element except the banking system, it may increase the deposit interests and general interest level in the market. In this sense, sales through public offering is conducted in the

period in which the findings related to the highness of the saving elements known as the “under pillow savings” are high. (Vardar, 2007, p.71)

4.1.2.5.3. Special Type Instrument Sales

The domestic borrowing notes which is sold pursuant to the budget law and the applicable laws and do not provide any cash inflow in return are called special type securities. (Aydin, 2010)

Special type instrument sales may be conducted through the losses of the banks due to the transactions conducted on the public banks. In addition to this, special type instrument sales related to the deposits in the banks owned by the Bank may be conducted in order to meet the losses occurred due to the applications in the banking system, due to the payment guarantee in favor of the account holders. The determining feature in the issuance of the special type instruments is that these issuances do not bring any source to the vault of the Treasury. The detailed information related to the ratios of the special type securities in the stock making some part of the non-cash domestic government bond will be provided.

On the other hand, the treasury may sell DGBs directly to the institutions and organizations having idle funds at their possession and use such funds. The revenue obtained in the issuance of this type of instrument sales is classified in the section described as cash.

4.1.2.5.4. Consignment Transaction

The purchase and sales of the previously offered DGBs in the secondary market by the CBTR are called consignment transactions. The consignment transactions are conducted by the market makers in the market making system.

4.1.3. Sources used in the Domestic Financing

The sources to be used in the debt financing are generally, commercial banks and other financial institutions, households, public organizations, and central banks.

4.1.3.1. Commercial banks and Other Financial Institutions

The banking industry in which the savings in the economy are collected together is the top fund provider of the Government. In this sense, the success of the debt management is a deterministic element on the bank balance sheets. (Vardar, 2007, p.72)

The effect of the sources provided through borrowing from banking section on the economy varies depending on the conjuncture. If the banks are not able to distribute the funds collected by them to the clients as loans, and the loan demand may not reach the fund saving level, then public borrowing and spending of these sources to the efficient areas will lead positive expansion in the economy and prevents the inflation process to be led by the interest rate declines. On the other hand, if the savings are not idle, and fund demand and supply significantly match each other, then the current interest rates will be increased, and the investment decisions of the private sector will be affected in adverse manner. (Vardar, 2007, p.72)

The banks attempt to foresee the cash flows in the future and want to obtain the highest return from the sources without any problem on the fulfillment of the cash requirements in the future. Therefore, it is expected that the distribution of the terms of the assets of the banks should be in compliance with the distribution of the terms of the obligations. As a result of this, the term preference of the saving holders shall determine the bank portfolios. If long term foreseeing is possible for the economy, the preferences of the saving holders and the banks will be long term instruments. However, if the uncertainty level for the future is high, then the fund holders and the fund collecting banks will prefer relatively shorter terms. Another issue for consideration that the parameters leading fragility in economy and excessive fluctuations (e.g. inflation, currency exchange rates,

etc.) shall affect the decision of the fund holders and banks related to the portfolio variety. The fund holders will prefer to hold some of their savings in the foreign currency in an economy with high fluctuations. The increase in the foreign currency accounts shall lead the increase in the F/X obligations of the banks, and the banks will desire to increase the quantity of the investment instruments in F/X. (Aydin, 2010)

4.1.3.2. Household

The savings of the real persons in the society is another fund source for borrowing. Members of the household distribute the income that they generated through the individuals between their consumption and saving.

4.1.3.3. Public Sector

The surplus funds in the possession of the state banks, state institutions, funds, and social security institutions classified outside the central government within the public sector may be used through borrowing by the Government.

The state banks may be considered in the same manner with the commercial banks and financial institutions from the perspective of financing. The difference here is that the Government having the control on the state banks is entitled to conduct some of its operations through such institutions and these state banks which collect deposits and other funds under the same conditions with the commercial banks may be used by the discretion of the Treasury. (Vardar, 2007, p.76)

In order to use the public sector sources effectively, the funds in the possession of the public nature institutions which are established by special law and having special budget should be used in the financing of the budget deficits; it is possible to borrow from these institutions. In this scope, especially in the domestic borrowing auctions, the public institutions are entitled to purchase the instruments at a price realized in the auction. In addition to this, the cited sources are used through issuance of the special type

of instruments directly with the agreement of the public institution with the Treasury. The usage of such sources may have positive effects on the public debt management considering the cash flows of the public institutions due to their expenses and obligations. (Vardar, 2007, p.76)

The Social Security System may use the long term low risk instruments to meet the real value losses which may occur due to long term due to the system activity, in order to evaluate the cited accumulations. Therefore social security systems may be able to use the funds in longer terms as compared to fund providers such as the households and banks.

4.1.3.4. Central Bank

Central Banks have specific importance in the financing of the public deficits. Especially, in the developing countries in which the central banks do not operate independently from the Governments, the political consequences of taxation push the governments to use the sources of the Central Banks.

The borrowing from the Central Bank leads to expansion effects in the economy as in the case of borrowing through the banks. As the monetary expansion provides real disposable income to the public sector (seigneurage) in line with the low sensitivity to the monetary supply, it shall cause the real value loss in the current debt stocks (inflation tax) through the elimination of the real effects of the monetary supply increase. (Vardar, 2007, p. 78) With the increasing effects of inflation on the total demand and accordingly the production and employment in short-run, it is easy to understand the attractiveness of the Central Bank's sources.

4.1.4. Markets on which the DGBs are exchanged

The investor having the debt instruments in their portfolio that the governments sold may retain such instruments until their original term, or they may sell these instruments or lease them for a temporary period through repo transactions in order to meet their funding needs. Since the high liquidity of the cited instruments shall eliminate the liquidity risk of the investor, it shall provide a wide investor range for the issuer (the Government).

Following sub headings give outline about the structures of the markets of the DGBs and their operations.

4.1.4.1.Primary DGB Market

The market on which the DGBs are sold to the market for the first time is called as the Primary Market. As it is specified under the above headings, the Treasury is entitled to define any and all details related to the issuance of the DGBs, and all transactions related to the issuance are conducted by the CBRT.

In the Primary Market, as is specified under the above headings, the DGBs are sold to all domestic legal and real persons in the auctions, and to market maker banks in TAP Sales, and to the public through the banks in public offerings, and to the economic elements such as public banks, public institutions etc. in the special type instrument offerings.

The due DGBs are redeemed by the CBRT in the name and account of the Treasury and eliminated from the EMKT system.

4.1.4.2.Secondary Market

The markets where the DGBs which have been previously issued by the Treasury are sold are called the Secondary Markets. The organized secondary market on which the

DGBs are sold in the Bonds and Bills Market operating in the ISE (Istanbul Stock Exchange). The Bonds and Bills Market was commenced to operate on June 17, 1991, the Repo and Reverse Repo Market in the Market was commenced on February 17, 1993, and the Real Estate Certificate Market was commenced on June 3, 1996 (Istanbul Stock Exchange, the Bonds and Bills Market). (Vardar, 2007, p. 81)

In the Bonds and Bills Market, the DGBs, real estate certificates, the bonds issued by the Privatization Administration, and the private sector bonds listed with the Stock Exchange are purchased/ sold. The foundation purpose of the market may be summarized as to insure the transactions to be conducted in a transparent and competitive environment, increasing the liquidity, accelerating the information flow related to the cited instruments in the market, and existence of an effective secondary market. (Vardar, 2007, p.81)

The increased volume of the public debt stocks together with the sales of all instrument types in the Market caused that the DGBs are sold in the market intensively, and made the Bonds and Bills Market as the primary market in the financial markets. In the Bonds and Bills Market, the CBRT, the member banks of the Bonds and Bills Market and the ISE member intermediary institutions are entitled to conduct transactions. (Vardar, 2007, p.82)

The representatives of the institutions which are entitled to make transactions in the “Repo and reverse Repo market in the Bonds and Bills Market” and “the Outright Purchase-Sales Market” send their orders remotely in electronic environment. The bid orders are sorted from the highest price to the lowest one, and the offer (sales) orders are sorted from the lowest price to the highest one automatically by the System receiving such orders. The time priority is used in the same price orders. In this manner, if the bid price in the first row is higher or equals to the price of the offer price at the first row, then the transaction will be realized automatically. After the realization of the transaction, the confirmation form for the transaction is immediately sent to the transaction parties. (Vardar, 2007, p.82)

The bid orders with the lowest interest rate (the highest in repo orders) and the offer orders with the highest rate (the lowest in repo orders) as determined automatically by the computer are immediately informed to the members through the data distribution firms. As the transactions are conducted, the best orders in the current lines shall go up to the upper lines. (Vardar, 2007, p.82)

In the market it is possible to conduct the transactions to be effective on the same day of the transaction; also it is possible to make t+7 days transactions in the Repo-Reverse repo Market and T+90 days transactions in the Outright Purchase-Sales Market. The orders with smaller quantities are sold/ purchased in the Small Orders Market with the values less than the limits of the Repo-Reverse Repo Market and the Outright Purchase-Sales Market. (Vardar, 2007, p.82)

The custody and settlement transactions are conducted by IMKB Takas ve Saklama Bankası A.Ş. (Takasbank) as separate and independent company which was established by the members of the ISE. In the settlement transactions payment is effected at the delivery of the instrument.

4.1.4.3. International Trade Platforms on which the DGBs are Sold

The development of the technological infrastructure of the national and international financial markets insures the investors located in different regions in the World reach the same investment instruments at the same time and the capital moving between the markets to generate profits due to the different interest rates in the international markets. As a natural product of the process, international investors require decrease in the transaction costs and to reach wider range of instruments faster. As a result of this, some of the institutions serving in the financial markets in the world started to work on the systems allowing reaching the domestic markets of the countries on which the DGBs are sold from abroad as well. These studies were accelerated after the late 1990s and the transactions were commenced on the international electronic commerce platform. As an example for the

structure and the working principles of the cited systems, the Electronic Bond Network (MTS) in Europe is especially striking one in the Euro Zone. (Vardar, 2007, p.83)

4.1.5. Market Making System

This system assigns some rights and duties by the Treasury to the banks which are determined as market maker banks. Details of the system are determined in order to increase the effectiveness in the secondary market transactions of the bonds and the auctions.

In Turkey, there are 12 market maker banks which signed market making contracts with the Treasury. As of April 2010 market makers in this system are Akbank A.Ş., Deutsche Bank A.Ş., Fortis Bank A.Ş., Finansbank A.Ş., HSBC Bank A.Ş., ING Bank A.Ş., T. GarantiBankası A.Ş., T. İşBankası A.Ş., T. VakıflarBankası T.A.O., T. HalkBankası A.Ş., T.C. ZiraatBankası A.Ş., YapıveKrediBankası A.Ş. (Public Debt Report, 2009)

The Bank to be included in the market making system must sign “Market Making Contract” with the Treasury. The cited contract is legal text in which the rights and obligations of the market maker institution and the obligations of the Treasury to the market maker institution.

4.1.5.1. Rights granted to the Market Maker

Pursuant to the “Market Making Contract”, only the MMs are entitled to

- Use the title of “Turkish DGB Market Maker”
- Bid in the DGB auctions without any security amount
- Give Non Competitive Bid (ROT) in the auctions

- Bid after the conduct of the Auction
- Return the DGBs with earlier due dates for which the price and definition will be determined by the Treasury in their possession to the Treasury for exchange purposes, and they can purchase the newly issued instrument at the average price of the Auction
- Realize the cash transaction of the Treasury in money markets
- Utilize “TAP” sales
- Act as intermediary for the sales of the DGBs to be sold through Public Offering method
- Bid in re-purchase and exchange auctions
- Conduct consignment transactions with the CBRT,
- Be represented in the Market Making Advisory Board with two representatives
- Be party to the repo -reverse repo transactions in the Repo and Reverse repo (Aydın, 2005, p. 70)

Transactions Market established in the structure of the CBRT, the banks which are not market makers are only entitled to be a party to repo transactions.

The foregoing rights of the market makers separates them from the other real and legal persons conducting transactions related to the DGBs.

4.1.5.2.Obligations of the Market Makers

The Market Makers are obligated to conduct the following obligations in return of the exclusive rights granted to the market makers. The market makers are obligated to:

- Purchase a certain ratio of the net sum of the DGBs issued or planned to be sold through auction by the Treasury in the Primary Market in monthly and quarterly periods

- Insure the required liquidity in the secondary market. To this end, the MMs are obligated to quote bid and offer prices continuously for all measurements pursuant to the operation rules of the cited market in the ISE Bonds and Bills Market,

- Provide studies, reports, questionnaires, financial information and similar information to be requested by the Treasury about the general economy or the financial markets. (Aydın, 2005, 72)

4.1.5.3.Obligations of the Treasury

The Treasury also has some obligations in the system in which the foregoing rights and obligations are determined for the MMs. These obligations are:

- The privileged rights stipulated in the market making contract are only given to the MMs,

- The amount of the DGB to sold to one bidder may not exceed the certain upper limit value,

- To continue announce the cash management and borrowing programs,

- To exchange information with the MMs for the new debt instruments and sales policies (Aydın, 2005, p. 74)

4.1.5.4.General Evaluation on the Market Making System in Turkey

Based on the rights and obligations as determined in the market making system, continuous joining is provided for the DGB auctions. In this way, when the Treasury organizes an auction there will not be any instability. And on the other hand, the obligations of the MMs in the Primary Market are balanced with the additional rights through non-competitive bid, post auction sales, and post auction exchange opportunities to allow the MMs to organize their portfolio and lower the average price.

Another important element of the market making system is the imposition of some rights and obligations related to the secondary market to the MMs. In the economy, one of the most important reasons of the drastic fluctuations is the heterogeneous distribution of the liquidity, and accordingly the huge difference between the sales and purchase prices during such periods. (Aydin, 2005, p.112) Each market player has the tendency to sell the instruments in its portfolio at the highest prices and to buy the new instruments for the portfolio at the lowest prices at the high fluctuation periods. This phenomenon causes ceasing of operation of the markets during the crisis periods and increases the negative effects of the crisis.

Market Making System through the obligations towards prevention of such circumstances imposed the MMs to continuously quote bid and offer prices for certain periods for some instruments. And the difference between the bid prices and offer prices are limited with certain levels. Therefore, it is aimed at to continue the transactions in the market at each situation and to insure the effective distribution of the liquidity in the market.

In addition to this, since the MMs who are obligated to perform the cited obligations keep high amount of the DGBs in their portfolio and carry the interest and currency exchange rate risk relatively more, an auto controlling system is provided for any speculative fluctuations in the market. (Aydin, 2005, p.109)

SECTION IV

5. ESTIMATION OF AVERAGE COMPOUNDED INTEREST RATE OF DISCOUNTED TL DENOMINATED TREASURY AUCTIONS

Domestic Bonds are the most important financial investment instruments in Turkey and globally. Investors, mostly the banks, participate in the Treasury Auctions to bid for the largest possible amount of bonds in the best price. Later, those investors either resell the bonds in the secondary markets or keep them until maturity. In this circumstances, anticipation of the bid prices play crucial role for the tender participants. Variety of external factors, such as prices of other investment instruments, political shocks, global crisis, may be effective on the prices of the auctions. Therefore, anticipation of the auction prices becomes difficult.

In this section of the study average interest rate of discounted TL denominated treasury auctions are observed and an econometric model which best suits for anticipation of the average interest rate tried to be developed. Aside from the suitability of the period chosen, sufficiency of the examples, reliability of the model, forecasting method are crucially important for building an econometric model. Therefore ordinary least squares method is applied to the model due to its appropriateness for time series analysis.

The analysis is aimed to examine relation between average compounded interest rates of the discounted treasury bonds as dependent variable and possibly related independent variables which are, in this study, average of maturity of the related bonds auctioned within each month, consumer price index, monthly average of overnight interest rates, weighted monthly average of interest rate of one year time deposits in Turkish Banks, monthly average of TRLIBOR rates, monthly average of Istanbul Stock Exchange's IMKB100 index, monthly average of TL/USD exchange rates, covering the period,

monthly general budget cash balance of the government, monthly general budget balance of the government and one year maturity credit default swap spreads of Turkey.

Consumer price index and maturity of the bonds are included to the analysis due to their approved risk premium effects on interest rates. As it is well known, both inflation risk and maturity or duration risk increases bond prices. The longer maturity bonds have higher duration, the shorter-maturity bond would have a lower duration and less price risk, or vice versa.

IMKB 100 index and USD rates are included in the analysis as alternative investment instruments considering their possible effects on determination of the interest rates of the auctions. Therefore, effects of changes in alternative investment instruments on the auction interest rates are observed.

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. It is also used by the CBRT as an instrument to influence monetary policy. It is obvious that like most of other countries' central banks, the CBRT is also a participant on the overnight lending market, and lends or borrows money to/from some group of banks.

As usual, banks transfer money to each other, to foreign banks, to large clients, and other counterparties on behalf of clients or on their own account. 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 of the countries, the CBRT generally announces the overnight rate once a month. So this rate 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 amongst banks, as was observed in the liquidity crisis of Turkey in 2001. More importantly, as it is common for other central banks in the world, CBRT may also want to calibrate overnight interest rate as an instrument to make adjustments on interest rates in

line with monetary policies of the governments. This situation happened during preparation process of this thesis and the Central Bank of Turkey's Monetary Policy Committee decided to decrease short-term interest rates, dropping the overnight borrowing rate to 1,75 percent, from 5.75 percent on October 15, 2010. With this move the central bank has decided on a discount of 4 percentage points. On the other hand the Monetary Policy Committee did not change overnight lending at the same time. According to experts, with this strategy the central bank wants to discourage "hot money" and encourage investment in foreign currency. According to an explanation by the Central Bank, the Bank pursues a strategy of price stability as well as financial stability. (Dünya Times, 2010) As a result of overnight lending rates are included in the analysis instead of overnight borrowing rates, because borrowing rates are abruptly changed by the Monetary Policy Committee for the achievement of some intended results in the economy.

Weighted monthly average of interest rate of one year time deposits in Turkish bank are also an important financial indicator which shows actual interest rates of time deposits in the market. These figures are computed and published by the CBRT. Interest rates of one year term deposits are considered for this study. Meanwhile, in this study, an attention is paid to restrict maturities of series in one year due to having research series consistent.

TRLIBOR, Turkish Lira Interbank Offered Rate, which is fixed under the organization of Banking Association of Turkey, became an important indicator regarding the interest rates prospect of the financial markets. It is the average interest rate at which term deposits are offered between prime banks in the Turkish wholesale money market or interbank market. It serves as a reference interest rate which is to be used in the transactions conducted among the banks or by the banks in the name of their clients.

Monthly general budget cash balance of the government and monthly general budget balance of the government are included in the analysis due to their probable effect on borrowing requirement of the government. As the borrowing requirement of the

government become more imperative then increase in interest rate applied to borrowing instruments.

Credit Default Swap (CDS) Spreads of Turkey are included in the analysis due to its attribute of measuring risk perception of Turkey by the investors. CDS is a bilateral contract between the protection buyer and protection seller and refer to a "reference entity" or "reference obligor", which is usually a corporation or government. The reference entity is not a party to the contract. If the reference entity defaults, the protection seller pays the buyer the par value of the bond in exchange for physical delivery of the bond, although settlement may also be by cash or auction. Most CDSs are in the \$10–\$20 million range with maturities between one and 10 years. A holder of a bond may “buy protection” to hedge its risk of default. In this way, a CDS is similar to credit insurance.

Data series cover the period between January 2006 and December 2010.

5.1. Methodology

5.1.1. Time Series and Ordinary Least Squares Methods

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.”

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 2004 and October 2010. From this aspect, type of the data used for this study is called time series cross sectional data, in other words, panel data in the theory. Cross sectional data in itself refers to data collected by observing many subjects (such as individuals, firms or countries/regions) at the same point of time, or without regard to differences in time. But time series data which is also known as longitudinal data refers to subjects’ changes over a course of time. In summary, panel data

combines both and deals with multiple subjects and their pattern over the course of time. Panel analysis uses panel data to examine changes in variables over time and differences in variables between subjects.

Time series data analysis let us both to understand and explain the past and to predict and plan for the future. Consequently panel data analysis of the prices of the Turkish Lira domestic borrowings by the Turkish Treasury through auctioning is anticipated to provide a model for prediction of future prices, as studying historical time series data, patterns give insight into business and economic decision making performance. The knowledge gained from studying past data help us, in turn, to forecast the future for decision making.

5.1.1.1. Time series components

Phillip G. Enns stated that most business and economic time series share certain basic characteristics, or components. These are:

1. Trend
2. Cycle
3. Seasonal
4. Irregular

Trend: Trend in a time series is the long term pattern of movement. In business, long term usually means an interval of several years or more. In developing a model for a time series it is desirable to represent the trend in a simple mathematical way. (Phillip G. Enns, Business Statistics, p 628,)

Cycle: Many time series exhibit a clear pattern of rise and decline, a wave-like movement like those studied in trigonometry. In business and economics we often associate this cyclical behavior with alternating levels of business activity – the periodic prosperity

and recession that is regularly reported by the news media. (Phillip G. Enns, Business Statistics, p 629)

Seasonal: Seasonality is one of the cyclical behaviors that are regular and relatively predictable. The seasonal component of a time series accounts for patterns of fluctuation that are tied to the events of the calendar year.

Irregular: The actual value of a time series in a given period is finally determined by a fourth factor, the irregular component. This is viewed as an unpredictable element, similar in its effect to the error term in the regression model. The irregular component is viewed as the cumulative contribution of many factors, the effects of which cannot be anticipated. These may include weather conditions, political movements, labor difficulties and many other occurrences. Graphically, the irregular component appears as a sequence of random fluctuations. (Phillip G. Enns, Business Statistics, p 629)

5.1.1.2. Classical Time Series Model

Phillip G. Enns states that classical time series models consist of components of trend (YT), cycle (C), seasonal (S), and irregular (I). As an example Y is assumed as the value of the series in period t. Accordingly, an additive model may be drawn as below:

$$Y = YT + C + S + I$$

In practice, the values of the components in any period are never known. The basic problem of time series analysis is to estimate these values by “decomposing” the observed series. There is a variety of ways to achieve this decomposition. (Phillip G. Enns, Business Statistics, p. 631)

5.1.1.3. 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 an 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 appropriate for this study. Phillip G. Enns also states that selection of the “best” trend curve requires fitting the time series so he recommends method of least squares as an appropriate method for achieving a good fit of the equations.

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 :

$$Y = a + bX$$

The value a is the Y intercept; it measures the level of Y when X is zero. The coefficient b is the slope, which gives the change in Y for each unit of change in X .

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. Phillip G. Enns formulates his measurement as follows (Phillip G. Enns, p. 419)

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

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 $\hat{Y}$ is called the residual about the line:

$$\text{Residual} = \text{Actual} - \text{Fitted}$$

Least Squared Criterion: Choose a and b so that

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

is minimized. (Phillip G. Enns, p. 419)

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;

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

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

where $\bar{X}$ and $\bar{Y}$ are the means of the X and Y samples, respectively. (Phillip G. Enns, p. 419)

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:

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

Uses of Regression Analysis

Regression is used in description and model building, estimation and prediction purposes. Regression equation provides a useful description of the relation between two variables. The more general technique of multiple regressions enables us to describe how two or more independent variables are related to a dependent, or response, variable.

Besides, if the relation between variables such as X and Y is understood then it is natural to predict a future value of Y given the corresponding value of X . Literally, inference function of statistics have two forms: estimation and hypothesis testing. It is based on model of the relation among variables.

Philip G. Enns states the regression line is a line of averages and adds, “Consider two variables X and Y representing interval or ratio type data. Suppose that for each different value of X there corresponds a population of Y values. Like any population these values have a mean. It will be assumed that this mean is a linear function of X , which will be written in the form of a conditional expected value:

$$E(Y|X) = \alpha + \beta X$$

where α and β are population parameters.” (Philip G. Enns, p. 440)

But, as Phillip E. Enns states for a particular choice of X , the corresponding Y does not generally equal to $\alpha + \beta X$ function in itself. There must be an error term which represent remaining part of Y , which may not be explained by $\alpha + \beta X$ functioning. Therefore an error term which is generally denoted by ϵ (epsilon) is added to the function. Then the linear model takes the following form:

$$Y = \alpha + \beta X + \epsilon$$

Here followings are the assumptions of linear model.

- α and β are fixed parameters.
- The independent variable X is a known constant for each observation of Y .
- ε is a random variable with mean 0 (zero) and standard deviation σ_ε .
- ε is normally distributed: $\varepsilon \sim N(0, \sigma_\varepsilon)$

(Phillip G. Enns, p.440)

5.1.1.4. Estimation Using Linear Model

Phillip G. Enns states that least squares coefficients a and b are unbiased estimators for α and β , respectively and S_e^2 is an unbiased estimator for σ_ε^2 .

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

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

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

Instead of n , $(n-2)$ is used to compute S_e 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. (Phillip G. Enns, p. 444)

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

$$H_0 : \beta = 0$$

$$H_1 : \beta \neq 0$$

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:

$$Y = \beta_0 + \beta_1 X_1 + \dots + \beta_P X_P + \varepsilon$$

In this equation,

1. The coefficients $\beta_0, \beta_1, \dots, \beta_P$ are fixed parameters.
2. The independent variables $X_1, \dots, X_P$ are known constants.
3. ε is a random variable with ε is a random variable with mean 0 (zero) and standard deviation σ_ε .
4. ε is normally distributed: $\varepsilon \sim N(0, \sigma_\varepsilon)$

(Phillip G. Enns, p. 470)

5.1.1.5. 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 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.

5.1.1.5.1. 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. (Phillip G. Enns, p 738) In another word 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_i s cannot all have the same value.

Random Sampling refers to the condition when the X_i values are randomly selected. In other words, 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 x_i , is zero. $E(\epsilon_i | X_i) = 0$.

5.1.1.5.2. Efficiency

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

No heteroskedasticity 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. (Econometrics Theory, n.d., para. 1-12)

No Serial Correlation refers to the situation when the error terms are independently distributed so that their covariance is 0. This situation means values of ε are independent of one another.

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

5.1.1.5.3. 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.

Multicollinearity is almost always present when the independent variables are not controlled by the decision maker. Therefore, the estimated marginal effect β_{io} of a variable X_i 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. (Phillip G. Enns, p 479). This situation is also very common for the variables which are derived from economic data.

5.1.2. Principal Component Analysis

After deciding on using ordinary least squares method in the financial analysis and providing necessary information about preconditions of this method principal component analysis is undeniably succeeding part of a financial analysis.

Here below data of the financial analysis are present with their denominations and sources.

ACR: Average compound interest rates of the discounted treasury bonds, (Obtained from web site of the Turkish Treasury, www.treasury.gov.tr)

MTR: Average of maturity of the related bonds auctioned within each month, (Obtained from web site of the Turkish Treasury, www.treasury.gov.tr)

CPI: Consumer price index, (Obtained from web site of the Turkish Statistical Institute, www.turkstat.gov.tr)

ONI: Monthly average of overnight interest rates, (Obtained from web site of Central Bank of Republic of Turkey, <http://www.tcmb.gov.tr>)

DEP: Weighted monthly average of interest rate of one year TL time deposits in Turkish Banks (Obtained from web site of the Turkish Treasury, www.treasury.gov.tr)

TLIB: Turkish Lira Reference Interest Rate (TRLIBOR) (Obtained from the web site of the Banks Association of Turkey, Turkish Lira Reference Interest Rate, www.trlibor.org)

STC: Monthly average of Istanbul Stock Exchange's IMKB100 index. (Obtained from web site of the Istanbul Stock Exchange, www.imkb.gov.tr)

USD: Monthly average of TL/USD exchange rates, (Obtained from web site of Central Bank of Republic of Turkey, <http://www.tcmb.gov.tr>)

CBL: Monthly general budget cash balance of the government, (Obtained from web site of the Turkish Treasury, www.treasury.gov.tr)

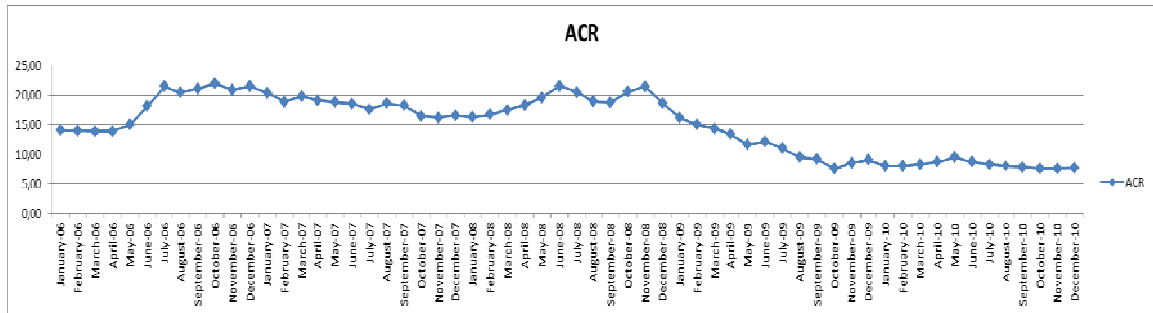
GBB: Monthly general budget balance of the government,(Obtained from web site of the Turkish Treasury, www.treasury.gov.tr)

CDS: Monthly average of one year maturity credit default swap spreads of Turkey.(Obtained from Reuters' data dissemination system)

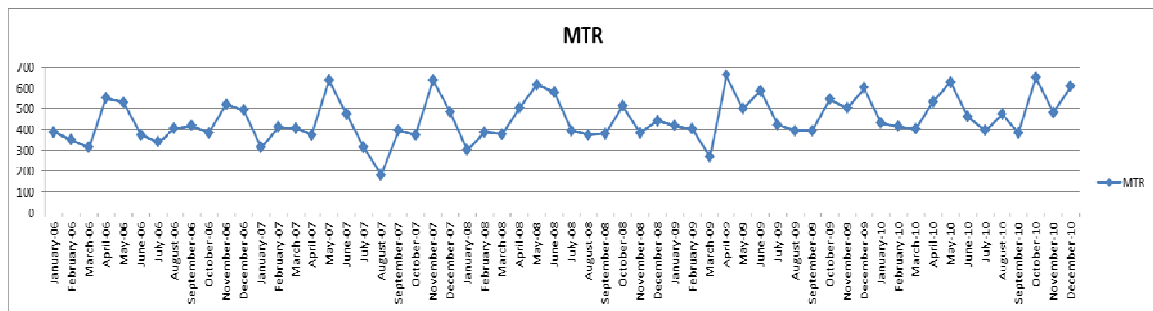
See Annex 1 for data series.

Here below there are graphics of each variable.

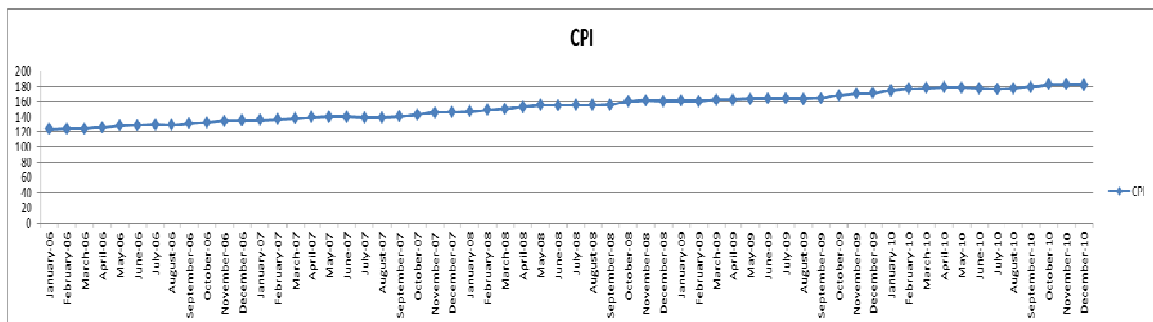
Graph 1: ACR Variable



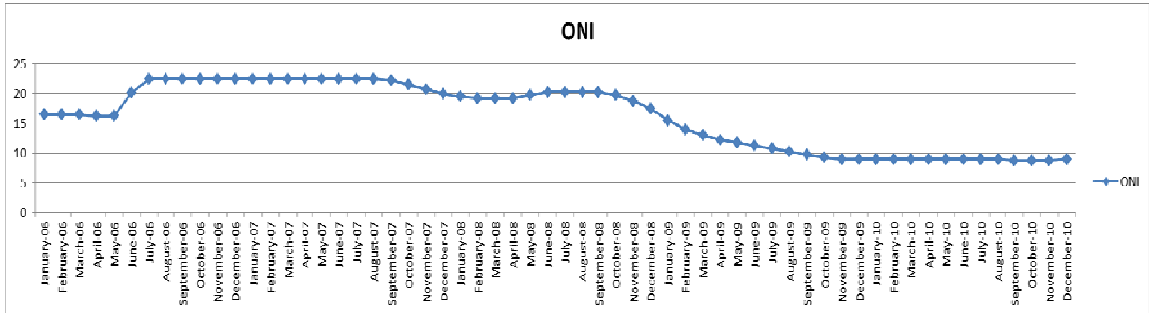
Graph 2: MTR Variable



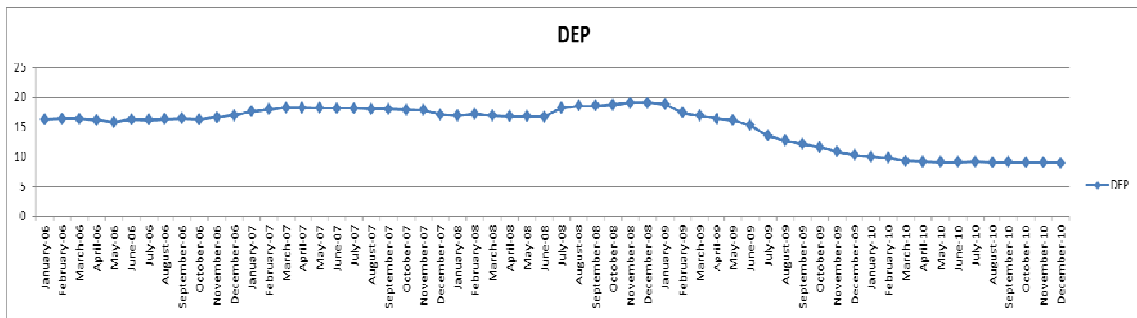
Graph 3: CPI Variable



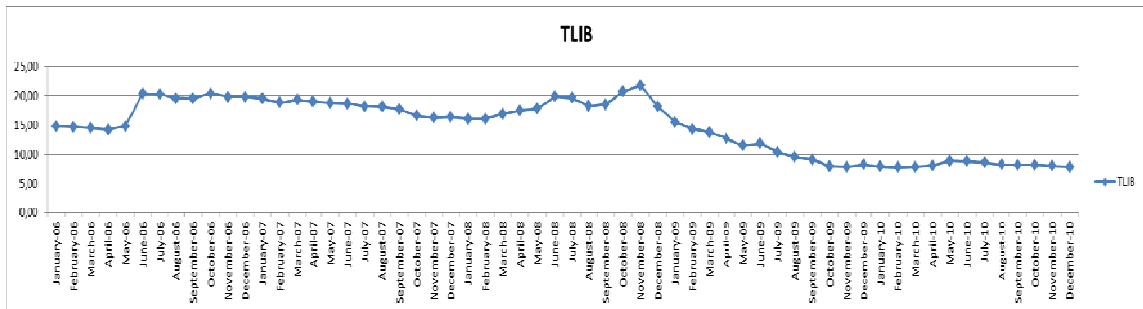
Graph 4: ONI Variable



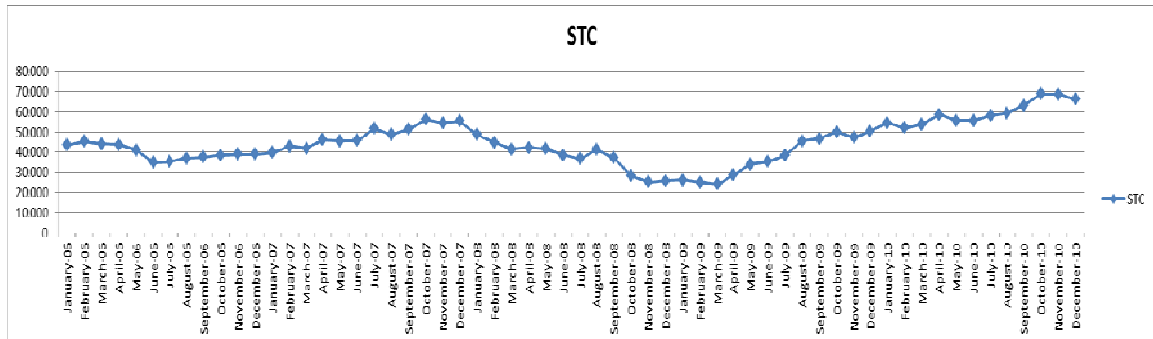
Graph 5: DEP Variable



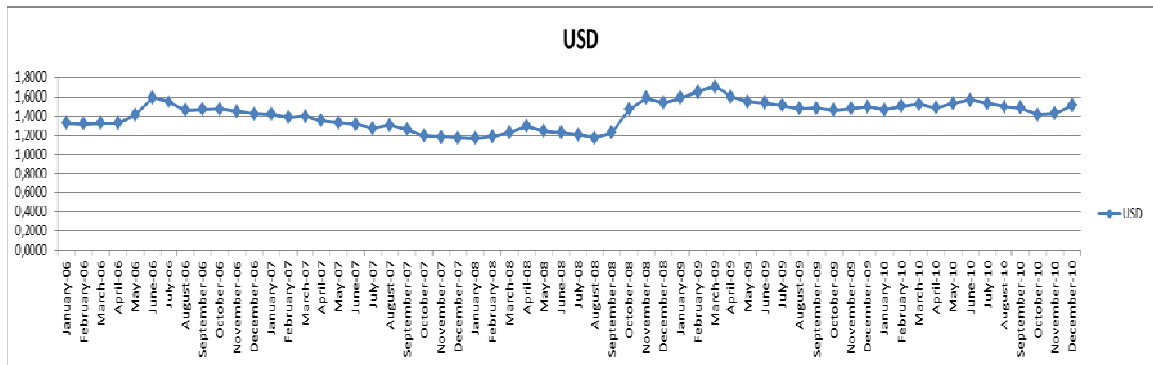
Graph 6: TLIB Variable



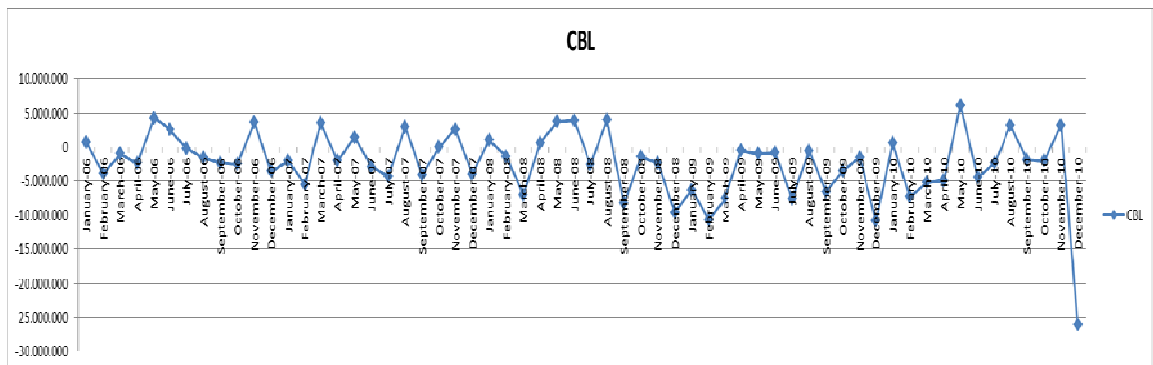
Graph 7: STC Variable



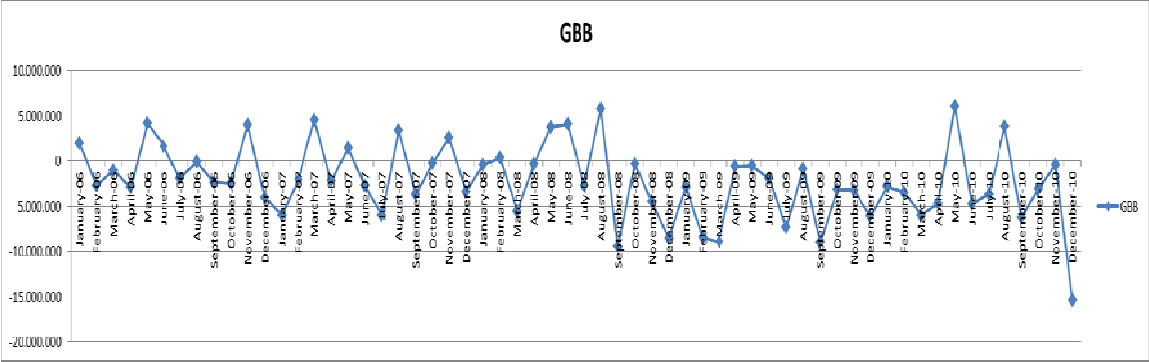
Graph 8: USD Variable



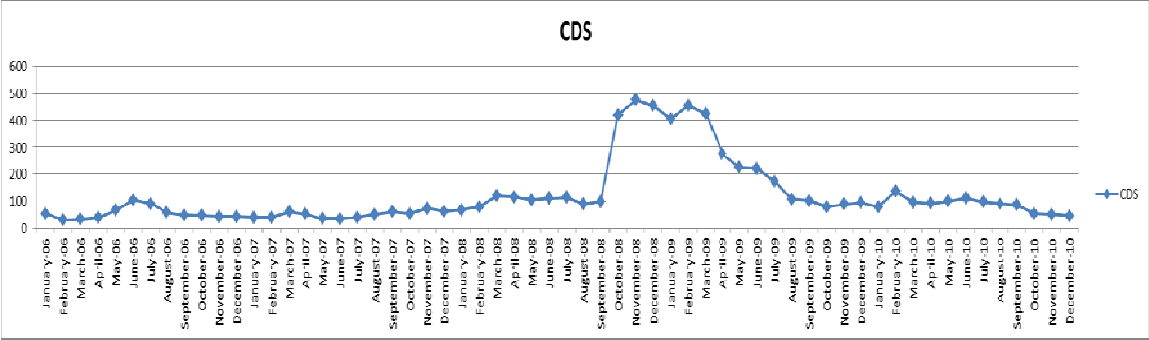
Graph 9: CBL Variable



Graph 10: GBB Variable



Graph 11: CDS Variable



5.1.2.1. Series Statistics

Here the table shows statistical values of the series.

Table 4: Series Statistics

	ACR	MTR	CPI	ONI	DEP	TLIB	STC	USD	CBL	GBB	CDS
Mean	14.98462	446.3319	153.2333	16.31100	15.17400	14.69450	44545.10	1.414761	-2,319,215	-2,199,317	119.3547
Median	16.22234	417.6667	155.0450	18.12500	16.47000	16.07500	43848.09	1.456580	-2,032,751	-2,574,038	86.21250
Maximum	21.96002	665.0000	182.4000	22.50000	19.12000	21.80000	68742.99	1.704536	6,160,698	5,991,466	477.2000
Minimum	75.32483	182.0000	123.5700	8.750000	8.970000	7.770000	24084.28	1.170436	-26,087,22	-15,363,28	28.95000
Std. Dev.	4.921302	101.0663	17.98187	5.486119	3.511079	4.692664	10785.88	0.137174	5,035,721	4,206,953	117.5893
Skewness	-0.278588	0.228302	-0.001922	-0.274492	-0.824800	-0.337804	0.152810	-0.251536	-1.751641	-0.292056	2.062849
Kurtosis	1.600750	2.812394	1.776870	1.413682	2.060167	1.575436	2708012	2.096405	9.531185	3.429338	6.030294
Jarque-Bera	5.670864	0.609207	3.740157	7.044466	9.011172	6.214570	0.446652	2.673913	137.3234	1.313797	65.51017
Probability	0.058693	0.737416	0.154112	0.029533	0.011047	0.044722	0.799854	0.262644	0.000000	0.518457	0.000000
Sum	899.0771	26779.92	9194.000	978.6600	910.4400	881.6700	2672706.	84.88564	-1.39E+08	-1.32E+08	7161.280
Sum Sq. Dev.	1428.934	602649.4	19077.51	1775.752	727.3328	1299.245	6.86E+09	1.110189	1.50E+15	1.04E+15	815807.2
Observations	60	60	60	60	60	60	60	60	60	60	60

5.1.2.2. Correlation Analysis

Here below there is correlation matrix of the variables. 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.

Table 5: Correlation Results

	ACR	MTR	CPI	ONI	DEP	TLIB	STC	USD	CBL	GBB	CDS
ACR	1	-0,21913	-0,72876	0,95178	0,88285	0,990201	-0,60506	-0,37092	0,230278	0,263975	0,070986
MTR	-0,21913	1	0,297787	-0,27287	-0,25173	-0,25214	0,133374	0,080169	0,03711	0,170455	-0,00278
CPI	-0,72876	0,297787	1	-0,81669	-0,72769	-0,75792	0,386351	0,394391	-0,2733	-0,31116	0,295916
ONI	0,95178	-0,27287	-0,81669	1	0,866329	0,959933	-0,40915	-0,53138	0,255285	0,297215	-0,15123
DEP	0,88285	-0,25173	-0,72769	0,866329	1	0,89866	-0,69169	-0,40292	0,157679	0,197332	0,227261
TLIB	0,990201	-0,25214	-0,75792	0,959933	0,89866	1	-0,58789	-0,38049	0,237983	0,26662	0,066929
STC	-0,60506	0,133374	0,386351	-0,40915	-0,69169	-0,58789	1	-0,24745	0,003572	-0,00434	-0,64956
USD	-0,37092	0,080169	0,394391	-0,53138	-0,40292	-0,38049	-0,24745	1	-0,27303	-0,3195	0,527515
CBL	0,230278	0,03711	-0,2733	0,255285	0,157679	0,237983	0,003572	-0,27303	1	0,899687	-0,24347
GBB	0,263975	0,170455	-0,31116	0,297215	0,197332	0,26662	-0,00434	-0,3195	0,899687	1	-0,2594
CDS	0,070986	-0,00278	0,295916	-0,15123	0,227261	0,066929	-0,64956	0,527515	-0,24347	-0,2594	1

As it can be seen from the table, correlation coefficient greater than 0,70 in absolute value are marked. According to these results there are strong correlations between ACR variables and CPI, ONI, DEP, TLIB, STC variables. Among these variables only the CPI variable is in negative correlation with ACR variable.

5.1.2.3. Stationary Test

To acquire valid conclusion from panel 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 is investigated within panel data 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.

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.

5.1.2.3.1. Unit Root Test

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.

As simple Auto Regression model is like $y_t = \rho y_{t-1} + \varepsilon_t$, where y_t is the variable of interest, t is the time index, ρ is a coefficient, and ε_t is the error term, unit root is present if $\rho = 1$. The model would be non-stationary in this case. (Sevüktekin&Nargeleçekenler, 2010, pp 65-70)

The regression model can be written as $\Delta y_t = (p-1)y_{t-1} + \varepsilon_t = \delta y_{t-1} + \varepsilon_t$ 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 elimination

of correlation problem, k is the most proper lag length to have white noise error terms,

$\delta = \rho - 1$ and the null hypothesis is that there is a unit root, $\delta = 0$.

(Sevüktekin&Nargeleçekenler, 2010, pp 65-70)

The logic behind these tests is examination of if the series is stationary or trend stationary which leads to a constant mean. This situation may be result of large values followed by smaller values (negative changes), and small values by larger values (positive changes). Accordingly, the level of the series will be a significant predictor of next period's change, and will 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. So, in a random walk, where you are now does not affect which way you will go next.

Following table shows unit root test results of the variables. The lag lengths in parenthesis are determined using Schwarz Information Criteria (SC). Except CBL and GBB variables, which are stationary in their levels, all conclusions in the table fail to reject the null hypothesis of the presence of the unit root. Thus it is decided to make first Level Difference Test for those variables with unit root.

Table 6: Unit Root Test Results*

Series	NONE	INTERCEPT	TREND&INTERCEPT
ACR	(-0.760985)(0)(0.3824)	(-0.320828)(0)(0.9150)	(-3.172437)(0)(0.1009)
MTR	(0.324297)(5)(0.7756)	(-1.976183)(5)(0.2962)	<i>(-7.802297)(2)(0.0000)</i>
CPI	(2.287619)(0)(0.9720)	(-0.699862)(1)(0.8384)	<i>(-3.838882)(1)(0.0213)</i>
ONI	(-0.804071)(2)(0.3633)	(-0.459619)(2)(0.8910)	(-3.060989)(1)(0.1254)
DEP	(-1.164659)(1)(0.2201)	(-0.071200)(1)(0.9473)	(-1.466419)(1)(0.8298)
TLIB	(-0.795684)(2)(0.3670)	(-0.411546)(2)(0.8998)	(-2.697448)(1)(0.2416)
STC	(0.810327)(0)(0.8845)	(-0.288362)(0)(0.9199)	(-0.892215)(0)(0.9498)
USD	(0.170629)(1)(0.7321)	(-2.218649)(1)(0.2021)	(-2.445656)(1)(0.3532)
CBL	(-1.760067)(2)(0.0745)	<i>(-6.834164)(0)(0.0000)</i>	<i>(-7.453002)(0)(0.0000)</i>
GBB	(-1.493595)(2)(0.1254)	<i>(-7.662312)(0)(0.0000)</i>	<i>(-8.547488)(0)(0.0000)</i>
CDS	(-1.202117)(0)(0.2075)	(-1.709478)(0)(0.4213)	(-1.583087)(0)(0.7879)

*Data is in order as t-statistic, Lag Length, Probability

Except the italic figures in the table above, series bear unit root, namely, these series does not have stationary characteristics. But the series to be included in the model should be in same characteristic. Due to this situation and for the elimination of the

imbalances, autoregressive series are to be gained stationary characteristic through first level difference application. Related results are shown below.

Table 7: Unit Root Test Results of Series' First Difference*

Series	NONE	INTERCEPT	TREND&INTERCEPT
D-ACR	(-3.469966)(5)(0.0008)	(-5.584508)(0)(0.0000)	(-5.736920)(0)(0.0001)
D-MTR	(-10.14774)(4)(0.0000)	(-10.07059)(4)(0.0000)	(-9.962616)(4)(0.0000)
D-CPI	(-3.988286)(0)(0.0001)	(-5.620624)(0)(0.0000)	(-5.572211)(0)(0.0001)
D-ONI	(-3.880700)(0)(0.0002)	(-3.923999)(1)(0.0035)	(-4.123960)(0)(0.0101)
D-DEP	(-4.166875)(0)(0.0001)	(-4.342900)(0)(0.0009)	(-4.576179)(0)(0.0027)
D-TLIB	(-5.635986)(1)(0.0000)	(-5.654292)(1)(0.0000)	(-5.869059)(1)(0.0000)
D-STC	(-6.118585)(0)(0.0000)	(-6.116592)(0)(0.0000)	(-6.286986)(0)(0.0000)
D-USD	(-5.541958)(0)(0.0000)	(-5.508905)(0)(0.0000)	(-5.453362)(0)(0.0002)
D-CBL	(-8.340584)(1)(0.0000)	(-8.273415)(1)(0.0000)	(-8.209749)(1)(0.0000)
D-GBB	(-11.58248)(1)(0.0000)	(-11.50335)(1)(0.0000)	(-11.40870)(1)(0.0000)
D-CDS	(-6.173874)(0)(0.0000)	(-6.119518)(0)(0.0000)	(-6.115044)(0)(0.0000)

*Data is in order as t-statistic, Lag Length, Probability

As it is shown in the table above all the series gain stationary characteristics after first difference application.

5.1.3. Estimating Equations

These stationary series are ready for creation of model for estimating equations. In this stage of the study, effect of the stationary series and those series which become stationary after application of the differentiation, over ACR is examined through the ordinary least squares method and the model has been formed in accordance to these results.

$$\begin{aligned}
 DACR = & C + C(1) * DMTR + C(2) * DCPI + C(3) * DONI + C(4)DDEP + C(5)DTLIB \\
 & + C(6) * DSTC + C(7) * DUSD + C(8) * CBL + C(9)GBB + C(10)DCDS \\
 & + \varepsilon
 \end{aligned}$$

Table 8: Least Square Equation Estimations Including All Variables

Dependent Variable: DACR				
Method: Least Squares				
Date: 03/05/11 Time: 17:19				
Sample (adjusted): 2006M02 2010M12				
Included observations: 59 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.031785	0.115280	-0.275718	0.7839
DMTR	0.000935	0.000766	1.221.094	0.2280
DCPI	0.045955	0.077542	0.592643	0.5562
DONI	0.549369	0.179090	3.067.550	0.0035
DDEP	-0.543957	0.194843	-2.791.768	0.0075
DTLIB	0.498678	0.141206	3.531.573	0.0009
DSTC	-0.000125	3.86E-05	-3.226.995	0.0023
DUSD	-3.799.932	2.701.702	-1.406.496	0.1660
DCBL	2.30E-08	2.91E-08	0.788073	0.4345
DGBB	-2.53E-08	3.33E-08	-0.760069	0.4509
DCDS	0.002469	0.002586	0.954654	0.3445
R-squared	0.768475	Mean dependent v	-0.107397	
Adjusted R-squared	0.720240	S.D. dependent var	1.187.093	
S.E. of regression	0.627881	Akaike info criterio	2.073.613	
Sum squared resid	1.892.327	Schwarz criterion	2.460.951	
Log likelihood	-5.017.160	F-statistic	1.593.207	
Durbin-Watson stat	2.834.151	Prob(F-statistic)	0.000000	

Estimation Command:LS DACR C DMTR DCPI DONI DDEP DTLIB DSTC DUSD DCBL DGBB DCDS

Estimation Equation:

$$\text{DACR} = C(1) + C(2)*\text{DMTR} + C(3)*\text{DCPI} + C(4)*\text{DONI} + C(5)*\text{DDEP} + C(6)*\text{DTLIB} + C(7)*\text{DSTC} + C(8)*\text{DUSD} + C(9)*\text{DCBL} + C(10)*\text{DGBB} + C(11)*\text{DCDS}$$

Substituted Coefficients:

$$\begin{aligned} \text{DACR} = & -0.03178469644 + 0.0009352821816*\text{DMTR} + 0.0459547021*\text{DCPI} + \\ & 0.5493689549*\text{DONI} - 0.5439567309*\text{DDEP} + 0.4986778884*\text{DTLIB} - \\ & 0.0001247040289*\text{DSTC} - 3.799932424*\text{DUSD} + 2.296509515\text{e-}008*\text{DCBL} - \\ & 2.533084943\text{e-}008*\text{DGBB} + 0.002469015232*\text{DCDS} \end{aligned}$$

5.1.3.1. Interpretation of the Initial Equation Estimation Results

In this section, relations between dependent variable and the independent variables are interpreted from the perspective of how the changes in the dependent variables affect the independent variable.

DMTR which represents first level difference of the monthly average maturities of the bonds auctioned is in positive relation with DACR (Average compound interest rates of the discounted treasury bonds). This situation means increase in MTR leads to increase in ACR or decrease leads to decrease in the same positive relationship manner. This condition is acceptable because maturity premium is one of the determinants of interest rates. In his book, Investment and Valuation, Aswath Damodaran states that discount rate used to discount cash flows on a bond is determined by a number of variables - the general level of interest rates in the economy, the term structure of interest rates and the default risk of the bond. (Damodaran, 2002, p.888) But, this variable is not significant with respect to the 0,05 of significance level.

DCPI variable which is first level difference of CPI, consumer price index, has positive relation with DACR variable. This situation is also acceptable because expected inflation is one of the determinants of the interest rates. When CPI increased interest rate applied to the treasury auctions should increase according to the nature of the relation. "Expected inflation is clearly the dominant variable determining interest rates. Generally speaking, a forecaster who can predict changes in inflation well should also have a good track record in predicting interest rate changes." (Damodaran, 2002, p.888). This variable is not significant according to the same level of 0,05.

DONI variable is the first level difference of ONI variable which is Monthly average of overnight interest rates declared by the CBRT. According to the result of the model there is positive and significant relation between ACR and ONI variables. This situation is acceptable, because overnight interest rates both serve as reference interest rate in the market and investors may consider level of overnight interest rates. Overnight

interest rates are determined and declared by the CBRT according to economic and monetary policies. Consequently lenders inevitably consider overnight interest rates while deciding on interest rates they are going to offer in the Treasury Auctions organized by the CBRT.

DDEP is the first level difference series of the DEP variable which is weighted monthly average of interest rate of one year TL time deposits in Turkish Banks. According to the results of the equity estimation, DDEP variable is in negative and significant relation with DACR variable. This situation can be interpreted as a consequence of the monetary policies of governments. Central Banks are in charge of currency issuance, regulation of the money supply, and control of the interest rates in a country. Changes in interest rates in the monetary market are responded immediately by loan and deposit interest rates of commercial banks. (Kasapoğlu, 2007, p.34)

DTLIB is the first level difference series of the TLIB variable which is monthly averages of the TRLIBOR rates by the Banks Association of Turkey. The Association has been fixing this Turkish Lira Reference Interest rates since 2000. As the rates become valuable indicator of the interest rates in the Turkish monetary market, in this study, they have been assumed to have possible effect on the interest rates realized in the Treasury auctions. Results of the estimation equations proves this assumptions and shows a positive and significant relations, which means increase in TRLIBOR rates leads increase in ACR variable. This is an expected result when the reference characteristic is TRLIBOR rate is accepted.

DSTC, IMKB 100 index and USD rates are included in the analysis as alternative investment instruments considering their possible effects on determination of the interest rates of the auctions. It is assumed that as the stock exchange performs good and investment in the stocks in the Istanbul Stock Exchange becomes considerable, more profitable, then the investors may prefer to invest in the stocks instead of investing in the bonds. Results show negative relationship between ACR and STC and USD variables. But, only the STC variable is significant with respect to the 0,05 of significance level.

DCBL and DGBB series which represent the monthly general budget cash balance of the government and monthly general budget balance of the government in sequence are included in the model to consider effect of the borrowing requirement of the Treasury, because, it is assumed that as the government budget's cash and general balances results change every month and borrowing requirement of the Treasury may increase or decrease according to these results. Finally this situation may lead to changes in interest rates applied to the bonds auctioned. But interestingly, according to the results of the initial estimation, DCBL variable is in positive relation with DACR variable, while DGBB variable is in negative relation. On the other side both of these variables are not significant with respect to the 0,5of significance level.

CDS rates of Turkey are included to the model as independent variable due to its attribute of having a reference value regarding risk perception of Turkey by investors. It is assumed that interest of the investors to the Treasury auctions may be affected by the CDS premium rates. Because, these country CDS rates are considered as risk indicator of that country's market. According to the equation estimation results there is a positive relation between CDS and ACR variables. This situation is acceptable because as the CDS premiums increase, risk perception of Turkey may increase and as a result of this condition lenders may request higher interest rates in the Treasury Auctions.

After trying to interpret the relation between the dependent variable and the independent variables, econometrically numeric results of the equation estimation including all of the variables shows that MTR, CPI, USD, CBL, GBB, CDS variables are not significantly effective on ACR, having 5% as significance level. But, ONI, DEP, TLIB and STC variables are significantly effective on ACR variable at the same significance threshold.

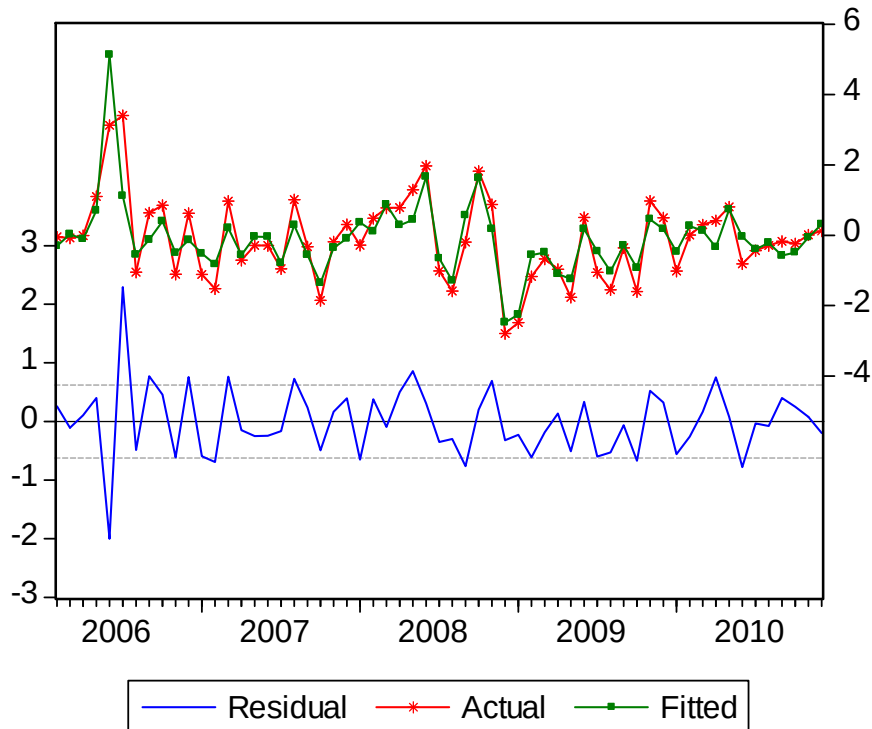
Table 9: Final Equation Estimation

Dependent Variable: DACR				
Method: Least Squares				
Date: 03/05/11 Time: 20:31				
Sample (adjusted): 2006M02 2010M12				
Included observations: 59 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.004373	0.085164	-0.051350	0.9592
DONI	0.504610	0.159409	3.165.514	0.0025
DDEP	-0.463721	0.187250	-2.476.485	0.0164
DTLIB	0.495337	0.115340	4.294.583	0.0001
DSTC	-9.85E-05	3.04E-05	-3.238.790	0.0021
-				
R-squared	0.739000	Mean dependent var		0.107397
Adjusted R-squared	0.719667	S.D. dependent var		1.187.093
S.E. of regression	0.628524	Akaike info criterion		1.990.054
Sum squared resid	2.133.231	Schwarz criterion		2.166.117
Log likelihood	-5.370.660	F-statistic		3.822.416
Durbin-Watson stat	2.705.148	Prob(F-statistic)		0.000000

Estimation Equation: $DACR = C(1) + C(2)*DONI + C(3)*DDEP + C(4)*DTLIB + C(5)*DSTC$

Substituted Coefficients: $DACR = -0.004373130094 + 0.5046103105*DONI - 0.4637209057*DDEP + 0.4953370121*DTLIB - 9.852173706e-005*DSTC$

Graph 12: Residual-Actual Graph of Final Equation



According to results of this estimation, probability values indicate that DONIDDEP, DTLIB and DSTC variables are significantly effective on DACR variable. Besides, R-squared and Adjusted R-Squared figures prove that this equation model is capable of explaining 74 percent of the dependent variables movements.

Sum squared residual is the sum of squares of residuals. It is a measure of the discrepancy between the data and an estimation model. A small sum of squared residual indicates a tight fit of the model to the data.

Durbin–Watson statistic is a test statistic used to examine the presence of autocorrelation in the residuals from a regression analysis. Durbin – Watson statistic result near to 2 means desired result which is nonexistence of autocorrelation between variables. (Vogelvang, 2005, p 124)

For an advanced examination of the variables, DONI and DTLIB variables are put into equation with each of other variables one by one and results are shown below.

Table 10: Equation Estimation includes DACR, DONI, DDEP, DTLIB, DSTC and DMTR Variables

Dependent Variable: DACR				
Method: Least Squares				
Date: 03/09/11 Time: 18:04				
Sample (adjusted): 2006M02 2010M12				
Included observations: 59 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.004763	0.084237	-0.056543	0.9551
DONI	0.523211	0.158172	3.307.854	0.0017
DDEP	-0.461394	0.185218	-2.491.088	0.0159
DTLIB	0.494360	0.114086	4.333.217	0.0001
DSTC	-0.000100	3.01E-05	-3.323.231	0.0016
DMTR	0.000941	0.000635	1.481.626	0.1444
R-squared	0.749381	Mean dependent var	-0.107397	
Adjusted R-squared	0.725737	S.D. dependent var	1.187.093	
S.E. of regression	0.621682	Akaike info criterion	1.983.368	
Sum squared resid	2.048.389	Schwarz criterion	2.194.643	
Log likelihood	-5.250.936	F-statistic	3.169.520	
Durbin-Watson stat	2.776.283	Prob(F-statistic)	0.000000	

Table 11: Equation Estimation includes DACR, DONI, DDEP, DTLIB, DSTC and DCPI Variables

Dependent Variable: DACR				
Method: Least Squares				
Date: 03/09/11 Time: 18:08				
Sample (adjusted): 2006M02 2010M12				
Included observations: 59 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.089851	0.108653	-0.826954	0.4120
DONI	0.544269	0.161674	3.366.462	0.0014
DDEP	-0.480529	0.186735	-2.573.321	0.0129
DTLIB	0.464990	0.117243	3.966.038	0.0002
DSTC	-9.94E-05	3.03E-05	-3.284.988	0.0018
DCPI	0.086254	0.068658	1.256.288	0.2145
R-squared	0.746548	Mean dependent var		-0.107397
Adjusted R-squared	0.722637	S.D. dependent var		1.187.093
S.E. of regression	0.625186	Akaike info criterion		1.994.609
Sum squared resid	2.071.544	Schwarz criterion		2.205.884
Log likelihood	-5.284.096	F-statistic		3.122.244
Durbin-Watson stat	2.712.548	Prob(F-statistic)		0.000000

Table 12: Equation Estimation includes DACR, DONI, DDEP, DTLIB, DSTC and DUSD Variables

Dependent Variable: DACR				
Method: Least Squares				
Date: 03/09/11 Time: 18:13				
Sample (adjusted): 2006M02 2010M12				
Included observations: 59 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.015079	0.085480	0.176407	0.8606
DONI	0.434323	0.165510	2.624.155	0.0113
DDEP	-0.501474	0.187410	-2.675.809	0.0099
DTLIB	0.582883	0.129849	4.488.927	0.0000
DSTC	-0.000130	3.76E-05	-3.468.660	0.0010
DUSD	-3.321.576	2.339.755	-1.419.625	0.1616
R-squared	0.748561	Mean dependent var		-0.107397
Adjusted R-squared	0.724840	S.D. dependent var		1.187.093
S.E. of regression	0.622697	Akaike info criterion		1.986.632
Sum squared resid	2.055.086	Schwarz criterion		2.197.907
Log likelihood	-5.260.566	F-statistic		3.155.736
Durbin-Watson stat	2.789.985	Prob(F-statistic)		0.000000

Table 13: Equation Estimation includes DACR, DONI, DDEP, DTLIB, DSTC and DCBL Variables

Dependent Variable: DACR				
Method: Least Squares				
Date: 03/09/11 Time: 18:11				
Sample (adjusted): 2006M02 2010M12				
Included observations: 59 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000406	0.085890	0.004730	0.9962
DONI	0.522568	0.162418	3.217.437	0.0022
DDEP	-0.469823	0.188420	-2.493.495	0.0158
DTLIB	0.482481	0.117484	4.106.785	0.0001
DSTC	-0.000101	3.08E-05	-3.280.414	0.0018
DCBL	8.38E-09	1.24E-08	0.674355	0.5030
R-squared	0.741220	Mean dependent var		-0.107397
Adjusted R-squared	0.716807	S.D. dependent var		1.187.093
S.E. of regression	0.631722	Akaike info criterion		2.015.409
Sum squared resid	2.115.083	Schwarz criterion		2.226.684
Log likelihood	-5.345.456	F-statistic		3.036.151
Durbin-Watson stat	2.709.981	Prob(F-statistic)		0.000000

Table 14: Equation Estimation includes DACR, DONI, DDEP, DTLIB, DSTC and GBB Variables

Dependent Variable: DACR				
Method: Least Squares				
Date: 03/09/11 Time: 18:15				
Sample (adjusted): 2006M02 2010M12				
Included observations: 59 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001968	0.085884	-0.022919	0.9818
DONI	0.512932	0.161345	3.179.103	0.0025
DDEP	-0.469075	0.188841	-2.483.966	0.0162
DTLIB	0.492142	0.116309	4.231.328	0.0001
DSTC	-9.93E-05	3.07E-05	-3.237.537	0.0021
DGBB	7.13E-09	1.40E-08	0.508836	0.6130
R-squared	0.740269	Mean dependent var		-0.107397
Adjusted R-squared	0.715766	S.D. dependent var		1.187.093
S.E. of regression	0.632882	Akaike info criterion		2.019.079
Sum squared resid	2.122.861	Schwarz criterion		2.230.354
Log likelihood	-5.356.284	F-statistic		3.021.144
Durbin-Watson stat	2.715.500	Prob(F-statistic)		0.000000

Table 14: Equation Estimation includes DACR, DONI, DDEP, DTLIB, DSTC and DCDS Variables

Dependent Variable: DACR				
Method: Least Squares				
Date: 03/09/11 Time: 18:17				
Sample (adjusted): 2006M02 2010M12				
Included observations: 59 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.007917	0.086098	-0.091953	0.9271
DONI	0.532820	0.171042	3.115.150	0.0030
DDEP	-0.477719	0.190856	-2.503.026	0.0154
DTLIB	0.471458	0.126439	3.728.747	0.0005
DSTC	-9.14E-05	3.40E-05	-2.686.718	0.0096
DCDS	0.001056	0.002208	0.478478	0.6343
R-squared				
Adjusted R-squared				
S.E. of regression				
Sum squared resid				
Log likelihood				
Durbin-Watson stat				
Mean dependent var				
S.D. dependent var				
Akaike info criterion				
Schwarz criterion				
F-statistic				
Prob(F-statistic)				

As it can be observed from these results, no other variable becomes significant together with DONI, DDEP, DTLIB and DSTC variables. Consequently, model of this study can be derived as shown below.

$$DACR = C + C(1) * DONI + C(2) * DDEP + C(3) * DTLIB + C(4) * DSTC$$

$$DACR = -0.004373130094 + 0.5046103105 * DONI - 0.4637209057 * DDEP + 0.4953370121 * DTLIB - 9.852173706 * DSTC$$

$C = -0.004373130094$
 $C(1) = +0.5046103105$
 $C(2) = -0.4637209057$
 $C(3) = +0.4953370121$
 $C(4) = -9.852173706$

5.1.4. Testing the Findings with Actual Values

Variables	Nov.'10	Dec.'10	Diff.	Coefficients	Estimates
ONI	8,75	9	0,25	0,504610311	0,126152578
DEP	9,04	8,97	-0,07	-0,463720906	0,032460463
TLIB	8,01	7,83	-0,18	0,495337012	-0,089160662
STC	68609	66128	-2481	-9,85217E-05	0,24443243

TOTAL **0,313884808**
CONSTANT -0,00437313
EST. TOTAL 0,309511678

	Nov.'10	Dec.'10	Difference
ACR	7,56294	7,682977888	0,120038847

Difference from
Estimation -0,19

ACR's Estimated December 2010 Value: 7,87

In case when ONI variable assumed to be less than 9 in December 2010, such as 8,50, then the precision of the estimation would be higher. Here below there are the estimation results according to this assumption.

Variables	Nov.'10	Dec.'10	Diff.	Coefficients	Estimates
ONI	8,75	8,5	-0,25	0,504610311	-0,126152578
DEP	9,04	8,97	-0,07	-0,463720906	0,032460463
TLIB	8,01	7,83	-0,18	0,495337012	-0,089160662
STC	68609	66128	-2481	-9,85217E-05	0,24443243

TOTAL **0,061579653**
CONSTANT -0,00437313
EST. TOTAL 0,057206523

	Nov.'10	Dec.'10	Difference
ACR	7,56294	7,682977888	0,120038847

Difference from
Estimation 0,06

ACR's Estimated December 2010 Value: 7,62

It can be obviously observed in this result that there is just 0,06of difference between actual and estimated values of the ACR variable when ONI variable assumed to be decreased to 8,50percent in January 2011.

As it was already explained in the previous sections of this study, the Central Bank of Turkey's Monetary Policy Committee decided to decrease short-term interest rates, dropping the overnight borrowing rate to 1,75 percent, from 5,75 percent on October 15. 2010. By this move the central bank has decided on a discount of 4 percentage points. On the other hand the Monetary Policy Committee did not change overnight lending at the same time. According to experts, with this strategy the central bank wants to discourage "hot money" and encourage investment in foreign currency. According to an explanation by the Central Bank, the bank pursues a strategy of price stability as well as financial stability.

It is obvious that the Central Bank pursuing a monetary strategy aiming creation of some desired result in the country economy. In line with this strategy, while the overnight borrowing rates decreased to 1,50 percent level on December 2010 from 5,75 percent level on October 2010 and this rate is kept constant as of March 2011, overnight lending rate increased to 9 percent level from 8,75 percent level in the same period.

But according to the general trend of the overnight interest rates, both lending and borrowing rates are expected to move in same direction with and acceptable margin between them. As it is understood from the interventions of the Monetary Policy Committee, the Central Banks intentionally changes to achieve some desired results for the economy of the country. In such a situation, making estimation through assuming an expected decrease in the overnight lending rate is meaningful for the understanding of the relationship between the variables of this study.

6. CONCLUSION

Treasury auctions are the most important of all auctions in terms of their impact on the economy. Huge amounts of money are raised through sales of the debt securities in these auctions. The fund is mainly required to finance the income gap of the state. On the other side, the debt securities issued through the auctions are among the most important financial instruments for the investors, especially the commercial banks, who trade these instruments both on their own and their customer behalves. Therefore, buying these instruments on a suitable price is very important for the investors.

Consequently, this thesis analyzes Turkish treasury auctions on a financial, economic, political and social ground through dealing with debt securities, public finance and auctioning of securities with its practices in Turkey. Relatively, average interest rate of discounted TL denominated treasury auctions was observed and an econometric model

which best suits for estimation of the average interest rate was tried to be developed in this study.

Ordinary least squares method was applied to the model due to its appropriateness for time series analysis. Alternative investment instruments of the Treasury bond and the reference variables were emphasized in the model. A financial model aiming estimation of annual compound interest rate of TL discounted bond auctions was developed. This model can be used by researchers to have an idea about the relations among the variables of the model and the model can also be used by investors, like commercial banks for estimation of the interest rates to be realized in the treasury auctions.

According to the results of the estimation study, annual compound interest rate of discounted TL auctions of the Treasury is significantly affected by overnight interest rates, interest rate for deposits in TL, TRLIBOR rates, and Istanbul Stock Exchange's IMKB100 index. One unit change in overnight rates, TL deposits' interest rate, TRLIBOR rate and IMKB100 Index leads to 50 percent increase, 46 percent decrease, 49 percent increase, 9,85E-05 percent decrease in interest rates of discounted TL auctions, respectively. As the R^2 and Adjusted R^2 numbers of the model is 0,73, this model is capable of estimating 73 percent of the change in interest rates of the discounted TL auctions. Testing of the model shows that direction of the change in the interest rate is estimated with a considerable deviation with respect to the R^2 of the model and other unidentifiable areas of the financial matters.

Among the independent variables, overnight interest rate of the Central Bank is the most determinant variable over the auction rates. But as we discussed above, Central Bank of Turkey's Monetary Policy Committee decreased the overnight lending interest rates abruptly and widened margin between lending and borrowing rates. By this move, as it has been explained by the Bank and the experts in the press, central bank wants to discourage "hot money" and encourage investment in foreign currency. According to an explanation by the Central Bank, the bank pursues a strategy of price stability as well as financial stability.

But according to the general trend of the overnight interest rates, both lending and borrowing rates are expected to move in same direction and with an acceptable margin between them. As it is understood from the interventions of the Monetary Policy Committee, the Central Banks intentionally changes to achieve some desired results for the economy of the country.

The deviation in the estimation is probably due to this situation. Precision of the estimation made by intentionally decreased overnight interest rate proves this idea.

In summary, auction is an organized price mechanism which is conducted according to open and identifiable rules and where distribution of the sources and prices are determined by the bids of the auction participants. Transparency, equality of opportunity, and effectiveness advantages of the auctions make them the most widely used financing method. On the other side, the debt securities issued through the auctions are among the most important financial instruments for the investors, especially the commercial banks who trade these instruments both on their own and their customer behalves. Therefore, as well as buying these instruments on a suitable price is very important for the investors, estimation of the price, namely the interest rates of the debt securities that auctioned by the Turkish Treasury arises is also an important problem of the investors. As a result of this requirement, interest rate of discounted TL denominated treasury auctions is observed and an econometric model for estimation of the average interest rate is developed and presented. In this respect, this study can be considered as a contribution to the finance literature.

APPENDICES

DATA SERIES

DATE	ACR	MTR	INF	CPI	ONI	TLIB	STC	USD	CBL	GBB	CDS	DEP
January-06	14,02	389	7,93	123,57	16,5	14,79	43.384	1,3279	644.776	1.965.374	54	16,29
February-06	13,97	350	8,15	123,84	16,5	14,71	45.321	1,3202	-3.913.082	-2.689.921	29	16,45
March-06	13,89	315	8,16	124,18	16,5	14,48	44.007	1,3287	-956.297	-1.035.119	33	16,43
April-06	13,88	553	8,83	125,84	16,3	14,22	43.690	1,3309	-2.371.228	-2.915.022	38	16,19
May-06	14,98	532	9,86	128,2	16,3	14,77	40.947	1,4139	4.254.301	4.160.085	66	15,85
June-06	18,11	376	10,1	128,63	20,2	20,36	34.839	1,5929	2.586.366	1.648.732	104	16,32
July-06	21,51	341	11,7	129,72	22,5	20,24	35.290	1,5508	-202.507	-1.918.937	90	16,24
August-06	20,47	406	10,3	129,15	22,5	19,56	36.922	1,4622	-1.555.896	-104.564	57	16,37
September-06	21,11	420	10,6	130,81	22,5	19,52	37.497	1,4721	-2.347.795	-2.344.214	47	16,49
October-06	21,96	385	9,98	132,47	22,5	20,37	38.433	1,4762	-2.527.956	-2.458.155	46	16,34
November-06	20,85	522	9,86	134,18	22,5	19,79	38.967	1,4510	3.607.716	3.968.410	42	16,69
December-06	21,47	494	9,65	134,49	22,5	19,81	39.008	1,4264	-3.563.127	-4.044.962	42	16,99
January-07	20,36	315	9,93	135,84	22,5	19,50	39.701	1,4198	-2.026.771	-5.958.349	39	17,63
February-07	18,85	413	10,2	136,42	22,5	18,83	42.879	1,3902	-5.558.656	-2.120.950	39	18,02
March-07	19,81	406	10,9	137,67	22,5	19,31	41.838	1,4029	3.491.711	4.564.336	60	18,32
April-07	19,10	375	10,7	139,33	22,5	19,00	45.982	1,3553	-2.063.798	-2.208.638	52	18,32
May-07	18,81	637	9,23	140,03	22,5	18,75	45.567	1,3319	1.457.447	1.401.059	35	18,23
June-07	18,52	476	8,6	139,69	22,5	18,63	45.664	1,3152	-2.924.866	-2.721.748	34	18,19
July-07	17,56	315	6,9	138,67	22,5	18,19	51.606	1,2760	-4.318.021	-5.992.886	39	18,16
August-07	18,58	182	7,39	138,7	22,5	18,09	48.674	1,3083	2.952.842	3.340.065	51	18,06
September-07	18,25	397	7,12	140,13	22,3	17,73	51.322	1,2613	-4.074.304	-3.710.323	60	18,05
October-07	16,40	375	7,39	142,67	21,5	16,61	56.177	1,1966	-36.333	-219.869	53	17,93
November-07	16,21	637	8,4	145,45	20,8	16,27	54.382	1,1847	2.646.504	2.541.107	73	17,9
December-07	16,52	487	8,39	145,77	20	16,35	55.346	1,1730	-3.970.458	-3.405.009	61	17,15
January-08	16,23	301	8,17	146,94	19,5	16,10	48.744	1,1704	1.055.419	-403.733	67	16,95
February-08	16,72	389	9,1	148,84	19,3	16,05	44.700	1,1882	-1.385.697	372.099	78	17,26
March-08	17,49	378	9,15	150,27	19,3	16,88	41.465	1,2324	-7.065.559	-5.509.037	119	16,95
April-08	18,28	504	9,66	152,79	19,3	17,47	42.174	1,2967	602.808	-308.415	115	16,82
May-08	19,57	616	10,7	155,07	19,8	17,75	41.583	1,2470	3.748.692	3.739.963	104	16,85
June-08	21,54	581	10,6	154,51	20,3	19,88	38.342	1,2278	3.914.430	4.077.502	111	16,78
July-08	20,53	394	12,1	155,4	20,3	19,64	36.722	1,2100	-2.599.930	-2.750.866	113	18,3
August-08	18,94	376	11,8	155,02	20,3	18,22	41.236	1,1727	3.983.255	5.732.608	88	18,61
September-08	18,75	382	11,1	155,72	20,3	18,53	37.153	1,2296	-8.305.587	-9.477.211	99	18,59
October-08	20,57	515	12	159,77	19,8	20,70	28.245	1,4733	-1.462.184	-289.752	420	18,76
November-08	21,44	385	10,8	161,1	18,8	21,80	25.228	1,5879	-2.349.567	-4.515.687	477	19,11
December-08	18,64	445	10,1	160,44	17,5	18,18	25.716	1,5388	-9.633.491	-8.539.351	454	19,12
January-09	16,16	420	9,5	160,9	15,5	15,49	26.053	1,5891	-6.352.197	-2.872.056	406	18,86
February-09	14,99	404	7,73	160,35	14	14,34	24.990	1,6524	-10.695.924	-8.505.004	455	17,43
March-09	14,31	270	7,89	162,12	13	13,73	24.084	1,7045	-7.584.940	-8.944.471	426	16,94
April-09	13,35	665	6,13	162,15	12,3	12,68	28.466	1,6042	-531.849	-630.888	275	16,44
May-09	11,59	501	5,24	163,19	11,8	11,50	33.901	1,5518	-1.002.716	-547.287	224	16,17
June-09	12,09	588	5,73	163,37	11,3	11,85	35.266	1,5398	-880.991	-1.931.778	221	15,33
July-09	11,04	424	5,39	163,78	10,8	10,38	38.274	1,5137	-7.646.920	-7.323.488	173	13,56
August-09	9,49	394	5,33	163,29	10,3	9,52	45.434	1,4792	-580.897	-842.872	106	12,78
September-09	9,13	396	5,27	163,93	9,75	9,07	46.528	1,4852	-6.553.281	-9.016.716	100	12,15
October-09	7,53	546	5,08	167,88	9,25	7,93	49.939	1,4621	-3.533.867	-3.191.042	78	11,67
November-09	8,51	504	5,53	170,01	9	7,78	47.089	1,4800	-1.501.719	-3.222.338	88	10,87
December-09	9,00	602	6,53	170,91	9	8,24	50.275	1,4995	-10.910.180	-6.085.076	94	10,31
January-10	7,98	432	8,19	174,07	9	7,86	54.399	1,4663	567.171	-2.835.052	79	10,03
February-10	7,99	415	10,1	176,59	9	7,77	52.067	1,5056	-7.344.527	-3.489.169	136	9,86
March-10	8,29	403	9,56	177,62	9	7,83	53.649	1,5283	-5.219.296	-5.985.807	95	9,3
April-10	8,70	536	10,2	178,68	9	8,04	58.461	1,4879	-4.911.056	-4.709.211	91	9,23
May-10	9,51	630	9,1	178,04	9	8,86	55.608	1,5348	6.160.698	5.991.466	99	9,13
June-10	8,69	462	8,37	177,04	9	8,80	55.567	1,5703	-4.497.406	-4.750.922	111	9,16
July-10	8,26	397	7,58	176,19	9	8,56	58.108	1,5363	-2.326.785	-3.678.902	97	9,23
August-10	7,97	476	8,33	176,9	9	8,21	59.220	1,5016	3.229.976	3.797.997	89	9,08
September-10	7,79	385	9,24	179,07	8,75	8,15	63.098	1,4889	-1.866.920	-6.231.768	85	9,16
October-10	7,55	651	8,62	182,35	8,75	8,16	68.743	1,4185	-2.038.732	-3.075.254	54	9,03
November-10	7,56	483	7,29	182,4	8,75	8,01	68.609	1,4296	3.223.509	-384.709	50	9,04
December-10	7,68	609	6,4	181,85	9	7,83	66.128	1,5131	-26.087.221	-15.363.289	45	8,97

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