EFFECTS OF MONETARY POLICY ON BANKING INTEREST RATES: INTEREST RATE PASS-THROUGH IN TURKEY

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ABSTRACT

EFFECTS OF MONETARY POLICY ON BANKING INTEREST RATES:
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In this study, the effects of CBRT monetary policy decisions on the consumer, automobile, housing and commercial loans of the banks during the period from the early of 2004 to the middle of 2011 are examined. In order to perform this study, it is benefited from weekly weighted average loan interest rate data of the banks, which is the data having the highest frequency that could be obtained from the electronic data distribution system of CBRT.

Monetary policy instruments of Central Bank may change in the course of time or monetary policy could be executed by more than one instrument. Therefore, as the political interest rate would be insufficient in the calculation of the effect of monetary policy on loan interest rates of the banks, Government Dept Securities' premiums are used instead of the political interest rates in this study to make it reflect the policies of central bank more clearly as a whole. Among the Government Dept Securities that have different maturity structure, benchmark bonds that are adapted to the expected political interest rate changes and that react to the unexpected interest rate changes at the high rate (reaction coefficient 0.983) are used.

In order to weight the cointegration relation between interest rates, unrestricted error correction model is established and it is determined by Bound Test that there is a long-term relation between each interest rate and interest rate of benchmark bond. After a cointegration relation is determined among the serials, autoregressive distributed lag model is used to determine the level of transitivity and it is determined that monetary policy decisions affect the banking interest rate at 77% level and by 13 weeks delay on average.

Keywords: Interest Rate Pass-Through, Expected and Unexpected (Surprise) Political Interest Rate, Cointegration Analysis, Bound Test,Unrestricted Error Correction Model (UECM), Autoregressive Distributed Lag Model (ARDL).

ÖZ

PARA POLİTİKASININ BANKA FAİZLERİ ÜZERİNDEKİ ETKİSİ:
TÜRKİYEDE FAİZ ORANI GEÇİŞKENLİĞİ

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Bu çalışmada, 2004 yılı başından 2011 yılı ortasına kadar olan dönemde, TCMB para politikası kararlarının bankaların ihtiyaç, taşıt, konut ve ticari kredi faiz oranları üzerindeki etkileri araştırılmıştır. Bunun için TCMB elektronik veri dağıtım sisteminden elde edilebilen en yüksek frekanslı veri olan bankaların haftalık ağırlıklı ortalama kredi faiz oranı verilerinden yararlanılmıştır.

Merkez bankası para politikası araçları zaman içerisinde değişebilmekte veya para politikası birden fazla araçla yürütülebilmektedir. Bu nedenle para politikasının bankaların kredi faiz oranları üzerindeki etkisinin hesaplanmasında politika faiz oranı tek başına yetersiz kalacağından merkez bankası politikalarını bir bütün olarak daha iyi yansıtabilmesi için bu çalışmada politika faiz oranları yerine Devlet tahvili getirileri kullanılmıştır. Farklı vade yapısına sahip devlet tahvilleri arasından, beklenen politika faiz oranı değişiklerine adapte olmuş ve beklenmeyen faiz oranı değişiklerine ise yüksek oranda (tepki katsayısı 0.983) tepki veren gösterge tahvilleri kullanılmıştır.

Faiz oranları arasındaki eşbütünleşme ilişkisini ölçmek için Sınırlandırılmamış Hata Düzeltme Modeli kurulmuş ve her bir kredi faiz oranı ile gösterge tahvili faiz oranı arasında uzun dönem ilişki bulunduğu Sınır Testi ile tespit edilmiştir. Seriler arasında eşbütünleşme ilişkisi tespit edildikten sonra geçişkenliğin düzeyini tespit edebilmek için Otoregresif Dağıtılmış Gecikmeler modelinden faydalanılmış ve Para politikası kararlarının bankacılık faiz oranını ortalama %77 düzeyinde ve 13 haftalık bir gecikme ile etkilediği tespit edilmiştir.

Anahtar Kelimeler: Faiz Oranı Geçişkenliği, Beklenen ve Beklenmeyen (Sürpriz) Para Palitikası Faiz Oranları, Eşbütünleşme Analizi, Sınır Testi, Hata Düzeltme Modeli, Otoregresif Dağıtılmış Gecikmeler Modeli

To my family

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CHAPTER 1

INTRODUCTION

Central Banks seek to affect economy by means of monetary transmission mechanism, using short-term interest rates as a key policy instrument. They reflect the evolution on other short-term interest rates and expectations created by changes done on political interest rates to the long-term market and bank interest rates and affect total demand, output level and inflation via transfer mechanism. By this way, inflation targeting regime is being applied in recent years across many countries.

Monetary policy is one of the key instruments used in order to affect direction and development of general economic activities such as total production, employment and price movements. Monetary policy shows its effect on economy by mostly having effect on total demand rather than direct effect on the supply side. Therefore, monetary policy has a significant effect on real activities within short and medium terms while it determines the overall price level within long-term [65].

Central Banks should have correct assessments about the effect of applied policies on economy and time passed for these effects to appear in order to succeed in decisions they have taken as they determine these price levels. Namely, having knowlegde about monetary shocks have effect on production process via which channels and in which way allows central banks to apply more effective monetary policy.

For these reasons, while the issue that how market interests react to monetary policy decisions is important for monetary policy makers in terms of understanding the reaction of security prices to monetary policy instruments, evaluating effectiveness of applicable monetary policy and taking more effective policy decisions; to estimate the reaction of security prices to monetary policy instruments in the most reliable way is also important for financial market participants in terms of taking an effective investment decision and determining risk management strategies [36].

How market and banking interest rates react the changes in monetary political interest rates and speed and level of this reaction imply interest rate pass-through as a whole. The transition level and time determine the effectiveness of all transmission channels. For Central bank, to have a strong effect on inflation depends on both pass-through of interest rate to be rapid and its level to be higher.

Theoretically while it is expected that interest rate pass-through would be thorough under perfect competition conditions, this transition cannot be thorough in practice due to many reasons varying according to structure of financial systems and banks. The common result obtained from empirical studies done in this way reveals that banking interest rates are solid in short-term and not very high in long-term thus there is imperfect transitivity.

1.1 Aim of the Study

In this study, transitivity of monetary policy decisions by Central Bank of the Republic of Turkey to commercial banks' consumer, automobile, housing and commercial loans has been investigated.

When we use the political intereset rate data alone to measure the effects of monetary policy decisions on commercial banks' loans we face with two problems. Firstly, Central Bank uses some tools to affect the financial system. For instance Monetary Policy Committee can intervine to the financial market using the open market operations or determinig the reserve requirement and the currency ratios besides determinig the political interest rate. Moreover they can direct the perceptions and expectations of the investors as well. Because of that, only using the political interest rate data in the analysis couses the representation problem since these data is not the only instrument that the Monetary Policy Committee uses. Second one is the predicted value problem. In order to catch up the cointegration more precisely between the rates, we should use the weekly data. However, while the banking interest rates are observable as weekly, certain amaunt of missing political interest rate data are occured. Thus, we have to predict them using the interpolation or other methods. In this case we act as if we assume that " If Central Bank intervined the political interest rate in this week, it would determine the

ratio at this predicted value." But most of the time, this assumption is not correct. Because, within a month there could be events that Central Bank would react them in opposite ways. But, due to the fact that it did not intervene within the month, at the end of the month Central Bank displays its overall reaction (upwards, downwards or same level) to these events. So we connot catch up the true volatility with the predicted values. Consequently, using political interest rate alone is insufficient in the calculation of the effect of monetary policy on banking interest rates as a whole and also in this case approximately 75% of the weekly data does not represent the real reactions of the Central Bank.

In the light of above discussion, in this study, Government Dept Securities with highest trading size in İstanbul Stock Exchange according to its term, are selected. By use of these bills and bonds being treated with higher trading size and number of contract, it is aimed that both the security mostly including financial information within the markets would be used and information losses resulting from methods used when the frequency of the data are adjusted would be prevented by use of direct political interest rates. At this stage State Internal Borrowing Notes treated in the market within 2004 – 2011 years, which are 3 months, 6 months, 12 months bonds and benchmark bond that has approximately 20 months remained for due date, are monitored. As to be used in the model to be created in order to measure transitivity, it is aimed to obtain the serial which gives the best reaction to monetary policy committee decisions, among these securities with having different due dates. For this purpose, first of all expected and unexpected (surprise) parts of political interest rates among these dates are divided and analyzed then it is decided that which serial shall be used according to the result of such analysis.

After deciding the Government Securities' maturity, we construct the Unrestricted Error Correction Model and use Bound Test in order to see whether there is a cointegration between the serials ot not. Then we apply Autoregressive Distributed Lag Model to measure the level of the transitivity.

1.2 Scope of the Thesis

Introduction shall take place in the first section of the thesis and background information about monetary policy transmission mechanism in the second section and after treatment of such transmission mechanism is referred, information shall be given about monetary transmission channels as in particular interest and credit channels. Interest rate pass-through which is one of the most important components of transmission mechanism and respective literature review shall be referred in third section of the thesis. In the fourth section of the thesis, firstly methodology and information about obtaining data shall be provided then the analysis done takes place. In the final section, results and a summary shall take place.

CHAPTER 2

MONETARY POLICY TRANSMISSION MECHANISM

It was decided that the only currency which can be turned into gold would be U.S. dollar and other currencies might be adjusted according to value of U.S. dollar after a decision adopted by United Nations Money and Finance Conference during World War II. Within this period, economy policies were mostly created within the frame of public finance policies. Monetary policies have also been used as a supplementary component for reach of sustainable growth, price stability and full employment targets. In early 1970s, with the effect of oil crisis the excess increase in oil price and in order to eliminate negative effects of this external shock on country economies; central banks have followed large monetary policies. As a result, system collapsed and higher inflation costs emerged worldwide after USA declaration that they abandoned from indexing U.S. dollar to gold in 1971. After that main objective of central banks became to ensure and keep price stability.

General practices related to selection of monetary policy instrument have been changed in time. While central banks were choosing amount variables such as reserve amount or monetary base as for instrument in 1970s and 80s, it is seen that in early 2000s, most of central banks of developed countries have chosen interest rate as monetary policy instrument. It is suggested that the instability created by financial inovations on money demand function has caused such case. In case of the central bank chosed short-term interest rate as monetary policy instrument, direct effect of change of policy on market interest rates is obvious. In case of selection of monetary sizes as monetary policy instrument, short-term interest rates will change as a result of an increase or decrease in total reserve amount by means of open market transactions. With the increase in reserve amount, banking system having reserves more than its need makes an increase in the demand of banks to the instruments with higher interest yield so that prices of these securities will increase and interest rates will decrease. With the decrease in reserve amount, in case of banking system having reserves less than its need, they will tend to

sell instruments with higher interest yields, so that price of this securities will decrease and interest rates will increase [61].

Monetary transmission mechanism is the mechanism which indicates that the effect of monetary policy decisions with total demand, output and so like real economic variables on price movements is happening by which channels and at which level, namely the interaction between monetary policy and real economy.

Bernanke and Gertler (1995) defined the reflection mechanism of monetary policy practices on real economy as "black box" and believed that knowing what is exactly in this black box is impossible. Central banks' ability to implement proper policies and to make proper evaluations about effects of these policies on the economy depends on understanding functions of this complex mechanism.

2.1 Functioning of the Monetary Policy Transmission Mechanism

Ability of monetary policy to affect real economy which is one of the most important problems of economic theory have been started to be investigated intensely from 1980s and many papers related to functioning of this monetary transmission mechanism have been published. Even though there is an agreement between economists on the issue that monetary policy affects real economy in short-term, this effect emerges in which way and how it occurs have become a significant discussion and research issue. Opinions related to functioning monetary transmission mechanism are reviewed in literature generally within the framework of Keynesian and Monetarist approaches. Monetarist economists claim that change in other asset prices also plays a significant role in monetary transmission while Keynesian economists believe that monetary transmission functions via interest rates [39].

Transmission mechanism begins with the change of interest rates by central banks, of which they use in their operations for the purpose of meeting fund requirements of banks and/or withdrawing residual liquidities. This case affects money market conditions and thus banks' funding costs. Changes occured in interest rates of money market reflect to other market and banking interest rates in different levels. While transitivity to short-term interest rates appears to be direct, transitivity to long-term interest rates appears to be indirect. Main component having effect on long-term interest rates is the expectations

related to the further development of political interest rates. In other words, unless changes in political interest rates create a change in market expectations related to the long-term economic trends, long-term interest rates would be difficult to change [25].

Egert and MacDonald (2009) summarize the operation of monetary transmission mechanism and the relations of the transmission channels on this mechanism with each other in the economy where short-term nominal interest rates are used as a monetary policy instrument as indicated in the Figure 2.1

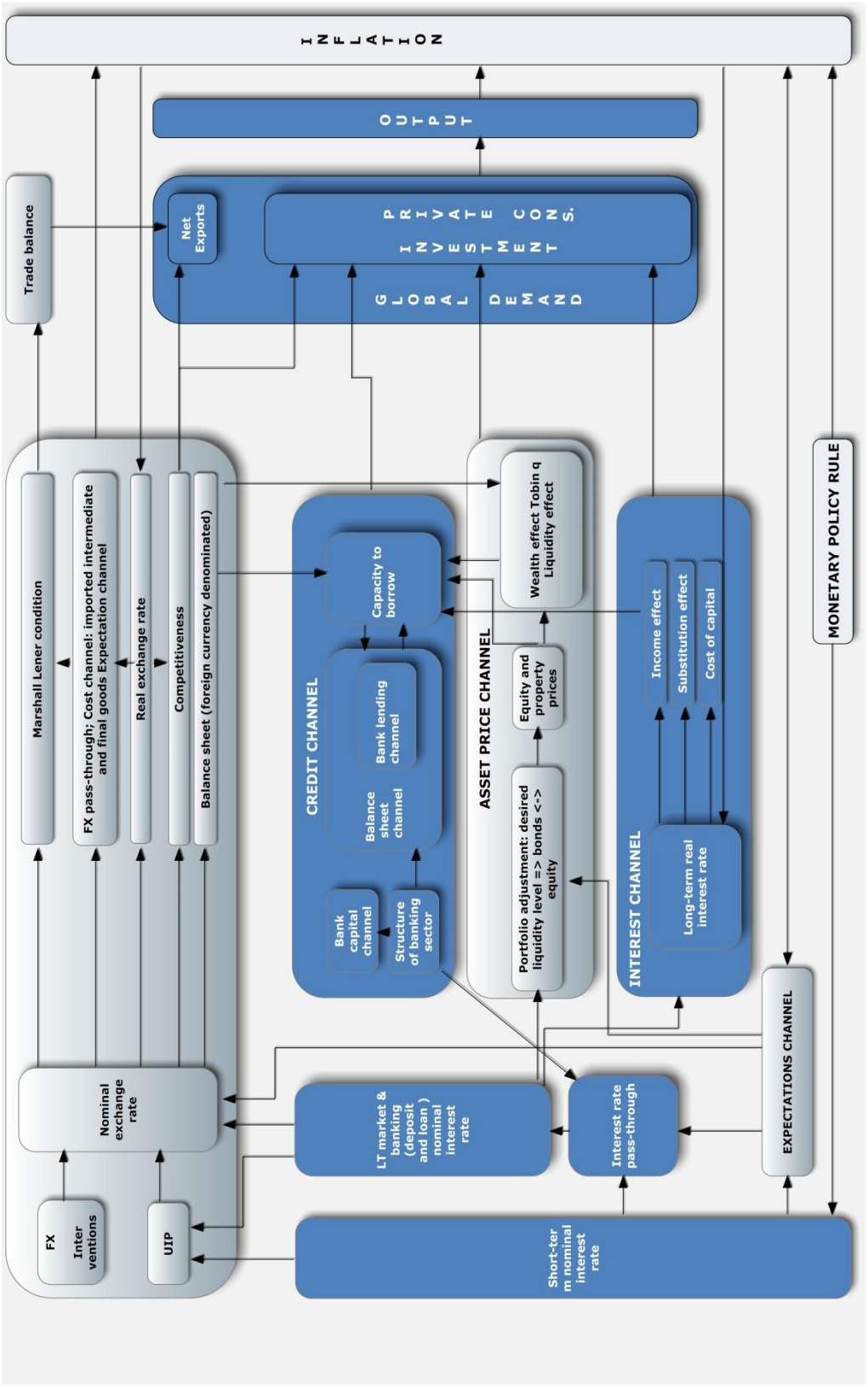
As it is seen in Figure 2.1 changes made on the political interest rates at first change the short-term interest rates and expectation, and changes on the short-term interest rates affect the long-term market and bank interest rates with the changes on the expectations. Changes that occur in the expectations and interest rates affect the total demand through transmission channels and therefore affect the output level. Expectations, level of exchange rates and level of total demand and output also determine the inflation. When there are deviations from targeted inflation, transmission mechanism is activated by making necessary policy changes by means of a monetary policy role determined by central banks [16].

2.2 Monetary Policy Transmission Channels

Monetary transmission mechanism channels affect different variables in different speed and volume. Therefore, answering questions that whether effects of the transmission channels are same in all economies or not and what features of these economies relatively determine functionality of transmission mechanism channels and their noteworthiness, would gain importance [42].

All transmission channels interact each other or complete each other's transmission mechanism. Therefore, it is not possible to distinguish monetary transmission mechanism channels with certain lines. At the analysis stage of this study, a model regarding interest channel and credit channel will be created thereof, notions in literature with respect to primarily these two channels, and monetary channels will take place herein.

Figure 2.1: Monetary Policy Transmission Mechanism



Source: Egert and MacDonald (2009)

2.2.1 Interest Rate Channel

According to Keynes, as the change in real interests is effective only over investment decisions, further researches indicate that changes in interests are effective on decisions to spend for housing and durable goods [46].

Traditional approach to interest rate depends on the notion that no perfect substitutes of money exist within financial markets. Because if it exists, in case of monetary policy replacing with money supply, it compensates money supply and demand by moving contrary to perfect substitute of money and thus it would have reduced the effect of money supply changes on interest rates [27].

Theoretically it is hard to distinguish whether short-term interest rates or long-term interest rates are more effective on consumption and investment. However long-term interest rates have higher effect on long-term decisions such as acquiring housing or machinery and equipment investments [60].

At this point, the cases that central banks' ability to affect only the short-term interest rates and mainly long-term interest rates being effective on investment and spending decisions do not create a contradiction. Because, the substitute relation between debt instruments in asset portfolio of investors out of bank causes short and long-term interest rates move together; i.e, as other variables are stable, the decrease in short-term interest rates will create a movement from short-term assets towards long-term assets and due to excess demand, price of long tm assets will increase and long-term interest rates will decrease [61].

Monetary policy changes cause individuals face with new interest rates for their savings and debts. Namely, disposable income belonging to savers and debtors might change. Changes in interest rates might significantly affect credit debtors (especially, housing loan debtors). In cases that loan interests are variable, the increases in interests cause individuals' disposable income decrease. Therefore, funds that individuals would allocate for good and service expenditures might decrease. In such case, individuals do not continue their previous spending levels and their consumption spendings might decrease. Similarly, ones who think to take loan with fixed rate might also do the same. Although debtors who took loan with fixed rate will not be affected by changes in

interest rates, new debtors will be affected so they would reduce their consumption expenditures. So that, the increase in interest rates might cause present consumption be suspended and might encourage for future consumption with the assumption that inflation expectations are stable. Namely, future consumption might substitute present consumption [65].

In addition, changing firms' future expectations and confidences with monetary policy might also affect their investment decisions. As fixed capital investments are hard to be changed afterwards, long-term demand projections and risk assessments are highly important when these decisions are taken. With the increase in interest rates, decrease in demand expectations related to the next term or increase in uncertainity and decrease in confidence thereof; fixed capital investment expenditures might significantly reduce. Finally, increase in interest rates might cause investment expenditures to be suspended, inventories to be reduced while condition of the firms which need short-term borrowing is getting worse [65].

In functioning of interest channel, increase in real interest rates (iR) increase costs of capital, thus it decreases investments (I) and so total demand. Although Keynes said that this channel functions through firms' investment decisions, latter studies indicated that consumers' housing and durable goods consuption (C) are also affected from real interests [45]. Accordingly, movements of real interest rate affect consumption, saving and investment decisions as well as aggregate demand (AD), production (Y) and inflation (π) by changing firms' and households' borrowing and lending costs and cash and time choises of them [35].

$$iR \downarrow \Rightarrow I \uparrow \text{ and } C \uparrow \Rightarrow AD \uparrow \Rightarrow Y \uparrow \Rightarrow \pi$$

On the other hand, changes in real interest rates accompany with two contradictory effects. While increase in interest rates causes an increase in incomes of ones who have assets with interest and thus in their consumptions with its effect on income, and with the substitution effect of higher interest rates, it may also cause economic units tend to saving instead of consumption [20].

In theory, the increase in real interest rates may lead to prices of the goods bought today be more expensive when compared to prices of the goods to be bought in the future. In

addition, there are strong empirical evidences on the subject that both consumption and investment have inverse relation with real interest rates. It is also found that durable consumption expenditures, fixed commercial investments, housing investments and even stock investments have inverse relation with real interest rates in many countries [60].

Meltzer (1995) stated that traditional interest channel based transmission process is very limited and mechanic from the viewpoint of monetarist economists, monetary policy not only affect real interest rates but also domestic and foreign assets' prices and also highlighted the importance of asset prices channel in terms of monetary transmission.

2.2.2 Credit Channel

Another channel suggested within the frame of loan notion which defends that monetary policies are effective on loans opened by banks is the credit channel. In the first study ever done regarding this case, the points which could not be explained by interest channel are tried to be explained with credit channel through the loan notion developed by adding loans into the traditional IS-LM model [2].

According to Cecchetti (1999), financial system is developed in the countries where law system functions well and rights of shareholders and debtors are kept well by law. In the countries which have a developed financial system and large alternative loan opportunities, credit channel of transmission mechanism is less effective. Therefore, it is expected that effect of monetary policy changes in such countries on production and inflation via credit channel would be limited. In the countries where the banking system is weak and higher dependency of firms to banks, credit channel is stronger. Because in this kind of countries, decrease in deposits as a result of monetary policy change might lead to a shrinkage in balance sheets of the banks which have limited resources out of deposits and to a decrease in credit supply. Firms' failure to find alternative sources from capital markets might affect expenditure and investment decisions significantly.

Determining the relative importance of money and credit channels allows central banks to understand effect of monetary policy changes on the real sector properly and determine proper monetary targets by developing their knowledge on interaction between financial and real sector [54].

According to credit approach of the monetary transmission mechanism, money and bonds are included as well as “credits” into the analyses. So that in credit approach, both money and loan creating function of the banks takes place. Money policy functions by affecting assets and liabilities of the banks [61]. Therefore, credit approach foresees that bank credit interets would move differently from money market interest rates and measures the deviation occured in nominal expenditures in such case [17].

According to ones defending that credit channel is effective on transmission of monetary policy into real sector, monetary policy does not only affects the real interest rate level. According to credit channel approach, monetary policy changes leading to change in short-term interests might affect borrowing costs of the firms as a reason for changes in outsourced funding premium on the same direction. Therefore, monetary policy’s effect on real expenditures and real activities gains power [3].

While bigger companies have the opportunity to supply fund via stock certificate and bond markets other than bank credits, small companies and households need intermediate services of banks because of the asymmetric information problem in meeting their fund needs. Higher knowledge acquisition costs and bankrupty risks on small companies increase the costs for lenders. Banks’ expertise in knowledge acquisition and loan monitoring allows them to give loan with lower interest rates to small companies. For household, there is no perfect substitute against bank credits. Therefore, household and small companies have dependency to banks. The case that majority of the economy being dependent to bank credits allows monetary policy to affect economy through credit channel. But this case causes small sized firms which are dependent to bank credits, affected from credit supply changes deeper than bigger sized firms [16].

As a result of financial developments and improvements experienced in recent years, role of the banks in monetary transmission and dependency of economic units to bank credits have begun to reduce thereof, effectiveness of bank credit channel is also begun to reduce [45]. In developing countries like Turkey, which is not wealthy in terms of financial instruments, it is seen that credit channel functions effectively due to the dependency of small firms to banks.

2.2.3 Other Channels

Another monetary transmission channel is also exchange rate channel. Thanks to flexible exchange rate regimes and globalization, the effect of monetary transmission on export and production level by means of exchange rate channel gained importance. Namely, the higher being outward-oriented degree of a country, the more effective the exchange rate channel in such country [47].

During investigation of the effect of exchange rate changes on economy, distinguishing real exchange rates and nominal exchange rates is important. Due to slow adjustment in wages and prices, the increase in nominal exchange rates causes an increase in real exchange rates in short-term. But in long-term, since prices and nominal exchange rates will be adjusted, real exchange rates will reach to equilibrium level [60].

According to Taylor (1995), there are solid emprical findings towards the change in real exchange rate have effect on real export and import. In particular, there is an inverse relation, statistically significant between real exchange rate and real net export. With the assumption of temporary inflexibility in prices of goods and wages, a reduction in short-term interest rates might cause a reduction in real exchange rate in short-terms. Exchange rate channel functions by affecting both total demand and total supply. With the monetary enlargement, to invest in that country looses its attraction for investors when domestic real interest rates decrease, thus capital escape might be observed. The value of the national currency starts to decrease then value of domestic goods becomes cheaper than value of foreign goods. Net export and total demand increase. This case leads to an increase in prices of import goods in national currency and also a direct increase in inflation. In addition, increasing prices of import intermediary goods might cause a decrease in total supply and in line with this an increase in prices [42].

Exchange rate channel functions by affecting both total demand and total supply. When viewed from demand side, according to unmet interest parity as domestic real interest rates (iR) decreases, to invest in domestic currency looses its attraction, investments in foreign currency increase and value of domestic currency (E) decreases. In addition, reduction of domestic real interest rates might cause capital escapes from the country, thus value of the domestic currency decreases. Loss of value in domestic currency leads

to domestic goods become cheaper than foreign goods and demand to these goods increase. This case leads an increase in net export (NX) and production (Y) [45]:

$$iR \downarrow \Rightarrow E \downarrow \Rightarrow NX \uparrow \Rightarrow AD \uparrow \Rightarrow Y \uparrow \Rightarrow \pi$$

On the supply side, loss of value in domestic currency (E) leads to an increase in prices of import goods (Pi) in domestic currency and a direct increase in inflation (π). In addition, increasing price of import intermediary goods might increase marginal costs in production, thus leads an increase in prices of goods produced in domestic [42]:

$$iR \downarrow \Rightarrow E \downarrow \Rightarrow Pi \uparrow \Rightarrow \pi \uparrow$$

On the other hand, exchange rate movements in particular in developing countries might affect total demand by having effect on balance sheets of financial and not financial firms, liabilities of which are mostly in foreign currency. Loss of value in domestic currency (E) might lead an increase in debt burden of these firms, in cases that these debts cannot be completely met with assets in foreign currency, net value of the firms (NW) reduces. This malfunction in balance sheets might cause reduction in loans (L) as well as investments (I) and production (Y) by increasing reverse selection and moral risk problems [47]:

$$iR \downarrow \Rightarrow E \downarrow \Rightarrow NW \downarrow \Rightarrow L \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow \Rightarrow \pi$$

Another monetary transmission channel is over asset prices. It means that after monetary policy changes, short and long-term interest rates increase, other factors (especially inflation expectation) remain stable, prices of securities such as stock certificate are lower. Because in such case, expected future yield of securities is reduced into a present value by means of a higher interest rate. With the increase of money supply, according to monetary approach the relation between increase in prices of 19 stock certificates can be explained as an increase in asset prices and consumers' fortune by the increase of money supply and therefore increase of expenditures. According to Keynesian approach, it is expected that the increase of money supply decreases interest rates and makes stock market more attractive [42].

The effect of political interest rate changes on funding conditions an expectation in economy might change interest rates as well as prices of other assets such as exchange rates and stock certificates. Such changes in interest rates and financial asset prices affect saving, expenditure and investment decisions of household and firms. For example; as interest rates increase, firms' will to take loan for consumption and investment would decrease, and also households would tend to make saving rather than consumption. In addition, since interest rate increases might improve the risk that some debtors will not pay back their loans, banks' will to lend loan would decrease and thus credit supply will be decreased as well. Movements in asset prices might affect consumption and investments by means of income and fortune effets. For example; as capital prices decrease, shareholder household's income and thus consumption decrease. In addition, if deposit value of the assets decreases, both loans would become more expensive due to the increase in risk premiums required by banks for loans and available loan amount would reduce in line with the deposit, so investment and expenditures would reduce [16].

Tobin (1969) explains the effects of monetary policy on economy through stock certificate, with "q theory". Tobin defines "q" as the ratio of firm's market value to capital replenishment cost. A firm having higher q value means that such firm's market value is higher than capital replenishment cost. In such case, this firm is able to increase investment expenditures, since the yield to be obtained by exporting stock certificate would be higher than capital investment costs to be made [46].

Key point in Tobin's q theory is the relation between stock certificate prices and investment expenditures. Accordingly, as the real interest rates (iR) decrease as a result of monetary policy practices, bond market looses its attraction and demand to stock market which is an alternative investment instrument increases. Demand increase leads to an increase in stock prices (Ps) and thus q ratio. That means reduction in firms' capital costs, namely they can buy a lot of investment goods by means of a few stock certificate submission. Ultimately, the increase in stock prices increases production level of economy (Y) by increasing investment (I) [47]:

$$iR \downarrow \Rightarrow Ps \uparrow \Rightarrow q \uparrow \Rightarrow I \uparrow \Rightarrow Y \uparrow \Rightarrow \pi$$

The monetary transmission mechanism's effect on consumption through stock certificate channel would be explained by fortune effect. According to Modigliani's (1971) life cycle hypothesis, consumption expenditures are determined by the fortune of consumers which they gained for their entire life. When stock prices (Ps) increase, which is one of the most important components of the financial fortune, wealth of consumers (Wc) increases. This case leads to increase in consumption (C) and thus total demand and production [46]:

$iR \downarrow \Rightarrow Ps \uparrow \Rightarrow Wc \uparrow \Rightarrow C \uparrow \Rightarrow Y \uparrow \Rightarrow \pi$

CHAPTER 3

INTEREST RATE PASS-THROUGH

In the transmission mechanism, the main reason why the financial transmission from the policy interest decisions considered primary is that the funding with overnight interest can be done only by banks and also real economy reacts to longer term interests, stock certificate prices, exchange rates an risk premium rather than overnight interest. Therefore, central bank should be able to affect market interests and other financial variables which play role on economic units' decision making process which have primary effect on monetary policy decisions, in order to have effect on real economy [1].

In literature, there is an agreement on the issue that total demand is more dependent to long-term interest rates than short-term interest rates. Power of short-term interest rates to affect long-term interest rates reflects management power of the central bank not only on total demand but also expectations. Therefore, the connection between short-term political interest rates and long-term interest rates must be taken into account when the effectiveness of monetary policy is evaluated [4].

Cottarelli and Kourelis (1994), being the first who measured transitivity to loan interest rates have compared transmission speed and levels for 31 countries including both developed and developing countries. They stated that size and speed of the reaction of loan interest rates to the change in monetary political interest rates indicate significant differences among countries and these differences are based on the structural features of the financial system.

3.1 Factors Affecting the Pass-Through

Speed and level of interest rate transitivity changes depending on the direction of periodic movements in economy. Under suitable economic conditions such as rapid economic growth, banks' ability to change deposit and loan interest rates would be easier and faster. During economic recession periods, banks which are not willing to supply loan for use due to the credit risk would not reflect political interest rate reductions to loan interest rates immidiately. In such periods, increase of loans having problem within

banking sector so profitability reduction might direct banks to increase their profitability by gaining on difference between loan – deposit interest rates. In such a case, banks either do not reflect reduction in political interest rates to loan interest rates or may be later while reflecting this reduction to deposit interest rates immidiately [12].

Increasing uncertainity in economy leads banks to keep their positions and thus a reduction to occur in transitivity by its negative effect [20]. In higher inflation periods, transitivity to interest rates might be faster due to ability to adjust prices more frequently [15].

The speed and degree of banks to adapt changes done in political interest rates might be different according to conditions of these changes such as expected or unexpected, permanent or temporary. Banks can adapt readily to expected changes in political interest rates, even in some cases they can reflect such expected changes to their interest rate in advance. In addition, since banks have to be faced with adjustment costs per changing interest rate, they are not willing to change interest rates frequently and they only prefer to reflect the changes that banks believe in them to be permanent, to their own interest rates. In banking sector, if a perception that the change in political interest rates may be temporary occurs, that might lead lower transitivity speed and degree [10].

The uncertainities regarding further developments in general market ratios and monetary policy practices also affect transition speed negatively, because of readjustment costs. In this case, banks prefer to wait until uncertainities reduce and to make less frequent but bigger changes [63].

The structure of financial system determines which transmission channel functions actively. Formation of the financial system with a few banks which have monopoly power (means being shallow), will cause the interest channel to function weakly; and lack of financial asset variety will cause asset price channel not to function actively. However, credit channel is effective in shallow financial markets in which moral risk and reverse selection problems exist. In addition, exchange rate channel is not effective in financially undeveloped countries since international trade and capital movements are often under state control. But, as financial system develops, deepens and becomes diversified, asset prices, interest rate and exchange rate channels will function more effectively [42].

Cottarelli and Kourelis (1994) stated that capital controls reduce competitive pressure on banking system and thus cause inflexibility on loan interest rates. They also stated that financial liberalisation eliminates geographic obstructs and product restrictions, by this way improves competition in pricing credits and other financial services and ensures that monetary policy changes are reflected to interest rates from a faster and higher level.

Mojon (2000) concluded that monetary market's investment funds, appearance of 16 and private sector bonds and so like alternative market instruments have significant effect on interest rate transitivity. Bondt (2004) stated that the increase of funding provided by firms from sources other than banks might increase competition and thus transitivity to loan interest rates.

Increasing asymmetric knowledge acquisiton costs causes banks' funding costs to increase and banks can increase loan interest rates by reflecting these costs to their customers. This increase in loan interest rates might cause two key problems: 1) reverse selection and 2) moral risk. Increase in loan interest rates might cause banks to prefer risky entrepreneurs (reverse selection), or entrepreneurs to invest in risky projects (moral risk). In another words, even if funding costs increase, increasing loan interest rates might reduce expected yields of banks since it increases credit risk. Banks can perform loan rationing in order to resolve these problems. Loan rationing might create an upstream inflexibility in loan interest rates [59].

According to Cottarelli and Kourelis (1994), unless the cost keeping interest rates out of balance value is higher than adjustment costs, banks willl not desire to change interest rates. As flexibility of demand to loan increases, cost for keeping interest rates out of balance value increases as well. Since flexibility of demand to loan is lower in short-term compared to long-term, adjustment costs cause larger inflexibility in interest rate in short-term. In addition, banks' perceptions towards the changes in policy and market interest rates will be temporary and uncertainities regarding further developments in interest rates might cause banks to delay reflecting changes in interest rates to their credit and deposit interest rates.

According to Lowe and Rohling (1992), who the buyer is does not have importance for supplier in commodity market. But, in loan market banks desire to know risk profile of their customers. Banks' performance of knowledge acquisition about their customers has

a specific cost and that cost is often reflected to the customers as a fixed charge. This charge makes transition of customer from one bank to another become costly.

On the other side, research costs borne by customer when switching to another bank (such as investigating different banks' interest rates and borrowing conditions, etc.) as well as application costs (filling application form and providing documents required by the bank, etc.) cause waste of time and effort so this might make switching to another bank become costly [43].

Size of banks affects conditions to provide fund. Due to asymmetric knowledge problems of small banks, their access to external financing sources would be more difficult. Banks having limited access to external financing sources (syndication credit, bond submission, etc.) are dependent to deposits and they reflect political interest rates increases (decreases) to deposit interest rates faster (or slower) and adjust loan interest rates accordingly, in order to collect more deposit [20].

According to Weth (2002), balance sheet structure of the banks affects transitivity together with their size. On the balance sheet, the higher share of saving deposits on liabilities side and long-term loans on assets side, the lower and slower pass-through of interest rate. Banks having opportunity to provide fund from money and capital markets and banks which fund long-term loans with long-term liabilities might change loan and deposit interest rates readily. Banks which fund long-term loans with short-term deposits might be exposed to interest rate risk because of due date inconsistency and they can adapt deposit interest rates in an environment where interest rates are increasing, slower [58].

3.2 Interest Rate Pass-Through in Turkey

If we consider general, it is possible to say that with the monetary and public finance policies applied steadfastly after February 2001 crisis, confident environment within markets is begun to be ensured and the bound between monetary policies and financial markets is getting stronger. Therefore, under present conditions and in further, in terms of reaching targeted final economic targets the relation between Central Bank of the Republic of Turkey's interest decisions and long-term interests is also important [36].

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Erelvanlı (2009) reported development of monetary policy transperancy in Turkey after 2001 by years as follows:

In 2001, some changes are made on 1211 numbered CBRT (Central Bank of the Republic of Turkey) Law by means of 4651 numbered law. The most important ones among these changes are; to ensure monetary policy instrument independency and to establish monetary policy committee. Duties and responsibilities of monetary policy committee which is formed by these legislative changes are specified as follows; to brief government and public by preparing periodic reports includind monetary policy targets and applications, to determine monetary policy principles and strategies for the purpose of ensuring price stability, to determine inflation target with the government within the framework of monetary policy strategy, to take required actions with government for keeping value of Turkish Lira in domestic and abroad and to determine exchange rate regime oriented to detemine accreditation before foreign currencies and gold.

Frame of monetary policy is defined as undercover inflation targeting in 2003 for the purpose of forming a preparation for transition to inflation targeting regime.

From early 2005, applications are begun that; forming monetary policy interest decisions in the light of monetary policy committee meetings, dates of which are announced to public earlier and announcing interest decision in the morning of the first working day following the meeting and declaring reason of the decision at latest within 2 days after the meeting.

Open inflation targeting regime is commissioned in 2006. Within this framework, it is begun to share CBRT's inflation predictions with public via Inflation Reports 4 times in a year; in January, April, July and October, to publish a text summarizing monetary

policy committee's assessments and its standing against the appearance of inslation within 8 working days following the date of meeting.

Political interest rate instead of borrowing interest rate is begun to be used for overnight operations and one week term repo procurement interest rate as of May 2010 as specified in Monetary Policy Exit Strategy declared on 12 April 2010 [50].

3.3 Expectations

Modern macroeconomic theory puts emphasis on future expectations of firms and households. Monetary transmission mechanism's channels are affected by these expectations either directly or indirectly. For example; households' saving and consumption decisions as well as firms' investment decisions are based on not only current interest rate but also future expected interest rate. Exchange rates are shaped according to future exchange rate and interest rate expectations. Ultimately, monetary policy affects the economy through not only current interest rate level, but also expectations related to future interest rate level. Consumption and investment commodities are based on future consumption and investment expectations, current inflation is based on inflation expectations. Therefore, central banks can help forming future expectations of firms and households by publishing estimations related to important variables [33].

To observe how monetary policy affects long-term interests, first of all it is a must to understand the relation between short-term interests and long-term interest in a better way. Expectancies hypothesis is important in terms of showing the relation between both interests. This is stated by Fisher (1896) for the first time, but the real development of the theory occured thanks to Hicks (1939).

In expectancies hypothesis, long-term paper's interest is formed by average of short-term interests expected during the term of the paper and risk premium. It is possible to show that via the following formula:

$$R^{n}{}_{t} = \frac{1}{n}\left(\sum_{i=1}^{n-1} E_t r_{t+i}\right) + \varepsilon_t$$

Whereas, R_t^n indicates interest of bond having a fixed term at t time, $E_t r_{t+i}$ indicates expectation of the interest for the next period at t time and ε_t indicates risk premium.

As it can be seen from the formula, long-term interest rates are the weightened average of present and future expected short-term interest rates. Therefore, the change created by changes in political interest rates on short-term market interest rates as well as their effect on interest rate expectations for the next period are very important for functionality of transmission mechanism. Expectations within the market regarding short-term interest rates may reduce to their previous levels although central bank increased them might cause a less increase in long-term interest rates. Meanwhile, central bank increases short-term interest rates and if an expectation that such increase will continue, within the market then long-term interest rates might have an increase higher than short-term interest rates [60].

The effects of monetary policy practices of economic units' expectations improve effectiveness and rapidness of monetary transmission mechanism's channels by reducing time of reactions that economy gives to policy changes. Particularly, Expectations Management which is one of the most important components of inflation targeting depends on central banks capability to ensure shaping economic units' decisions by gaining plausibility before public in line with the monetary policy targets rather than inflation for the previous period [16].

The change created by monetary policy on long-term interest rates by affecting short-term interest rates and expectations might cause banks to change deposit and loan interest rates. These changes in interest rates of the banks also affect real economy so create a change in output and inflation. Reflecting policy and market interest rates rapidly and completely to bank interest rates might affect price stability by enpowering monetary policy transmission mechanism. In addition, it affects financial stability which is a requirement for an active transmission mechanism by affecting profitability of banks and thus intactness of banking system [9].

3.4 Expected and Unexpected Political Interest Rates

As the bond market is a market in which the pricing depending on the expectations oriented to the future is made, the impact of political interest rate on the interest rates of the market depends on the fact that whether the change on interest rate is expected by the participants of the market or not. If the change that is made on the short-term interest rate is expected by the market, long-term interest rates should not give reaction to this change because the expectation related to this change should have been reflected on to prices before a change is made on the interest rate of the policy. On the other hand, if the change made on the interest rate of the monetary policy is not expected, long-term interests will be changed in a way to reflect the new information [36]. Unexpected part of the change on monetary policy is called as the surprise of the monetary policy.

There are many studies available in literature, which test the relationship between short-term interests and long-term interests. For example; in their studies, Cook and Hahn (1989) came to the conclusion that there is a same directional relation between the political interest rate (short-term interest) and long-term interests. This conclusion is compatible with the expectations hypothesis, increase in short-term interests leads to the increase in long-term interests.

Romer (2001) stated that the inflation will decrease by the increase in the short-term interests, and in parallel with this the long-term interests will also decrease

Romer and Romer (2000) emphasized that when strict monetary policy is implemented leading to the increase in long-term interests with the increase of short-term interests, the market participitants may change their estimations towards the idea that the inflation will increase by thinking that central bank has negative information on inflation

Ellingsen and Soderstrom (2001) came to the conclusion that the reaction given towards the change on monetary policy depends on how the participants of bond market interpret the reasons behind the monetary policy movement. According to this, if the policy change is interpreted as being made due to the new information and may be due to the private information related to the economy of the country, interests on all terms will

move in line with the interest rate of the policy. On the other hand, if the participants of bond market comprehend the change on monetary policy as a change made by central bank on policy preferences, short-term and long-term interests will move in reverse directions.

Besides, Gürkaynak, Sack and Swanson (2005) stated that interest rate changes of FED reflect the information related to the long-term inflation target of monetary authority.

In Kuttner's study which he carried out for USA, Kuttner (2001) divided the changes made by monetary authority on the interest rate into expected and unexpected parts by using the interest rates indicated by the prices of derivatives for the first time in the literature.

After this study, analyses that use interest rates which are expected and unexpected by the markets are begun to be used. However data used in these analyses differ. During these studies, while Kuttner (2001) was using the federal funds derivatives prices, Rigobon and Sack (2002) used three months euro – dollar derivatives interests.

Ellingsen and Soderstrom (2003) used three months Treasury bond interests in the calculation of the surprises of monetary policy. Cochrane and Piazzessi (2002) preferred one month euro – dollar deposit interests.

In the study performed by Gürkaynak, Sack and Swanson (2002) for the USA, various financial instruments were examined in terms of reflecting the expectations of the market and shocks of monetary policy. As a result of this study, it is realized that interest rates indicated by the prices of derivatives are better than other financial instruments on the matter of estimating the interest rate changes on monetary policy up to 6 months term. On the other hand, in the study of Gürkaynak et al. it is emphasized that interests of Treasury bond to be used in the calculation of the surprises of the monetary policy have the characteristics to be preferred as a market based measurement instrument

In their studies Gürkaynak, Sack and Swanson (2005) examined separately various financial instruments (interest rate of derivatives, Euro – Dollar derivatives, Euro – Dollar deposit, Treasury Bonds, commercial papers et al.) in terms of the expectations of

the market related to the future implementations of the monetary policies and its ability to reflect the shocks of monetary policy. They researched which of these financial instruments that are different from each other in terms of liquidity and risk will enable us to make the best estimation about the future course of the monetary policy implementations and what kind of appears could appear. As a result of this study that Gürkaynak, Sack and Swanson (2005) performed, they came to the conclusion that interest rates indicated by the prices of derivatives are better than other securities in estimating the change on the political interest rate up to 6 months term. It is envisaged that estimation powers of other instruments are closer to each other on longer terms

Aktaş et al. (2008) who calculated the surprises of monetary policy by using 1 month Dept Securities' interests for the period between July 2001 and August 2008 emphasized that the other method which could be used for Turkey is the expectation surveys of CBRT and that surprises calculated by using this method yielded results which were close to the surprises calculated by the usage of Dept Securities' interests. However, it is explained that this method is not preferable due to the incompatibility between the dates of expectation survey and dates of monetary policy decision

In İnsal (2006)'s study, İnsal divided the interest changes of CBRT into expected and unexpected parts by using the Government Debt Securities having the shortest term discount, and in his analysis he tested the reactions given by the interests of discounted DİBS which have nearly 3, 6 and 12 months for their terms, towards the expected monetary policy change and surprises of monetary policy. In his study where he used the data between the dates of July 2001 and March 2006, İnsal came to the conclusion that the effectiveness of the interest decisions of CBRT within the transmission mechanism are gradually increasing, and a relationship between the interest decisions of CBRT and interest rates of the market began to be formed.

Erelvanlı (2009) tested the reaction given by discounted Government Debt Securities that have 6 months and 12 months for their term to be completed, towards the surprises of monetary policy calculated by the usage of 1 month term discounted Government Debt Securities.

CHAPTER 4

MEASUREMENT OF THE PASS-THROUGH FROM POLITICAL INTEREST RATE TO BANK LOANS

4.1 Data

Macroeconomic stabilization that began to be formed after 2002 and steps taken on the matter of restructuring the financial sector turned the active structure of the banking sector that provides fund to the public sector into a structure which provides firms and households with finance. This formation in its active structure brought the service diversity and quality with itself by featuring the competition.

2004 was a year when the uncertainty in economy significantly decreased and an environment of trust was formed. During this period, inflation rates which exceeded 70% after 2001 crisis rapidly decreased by the appreciation of the TL in floating Exchange rate regime and with the contribution of monetary policy based on the price stabilization, and inflation rates that had single digit were reached in 2004. So high inflation period ended and during the period of 2004 – 2011 inflation rates became relatively stabilized. During this period, Central Bank significantly lowered its political interest rates as shown in Figure 4.1

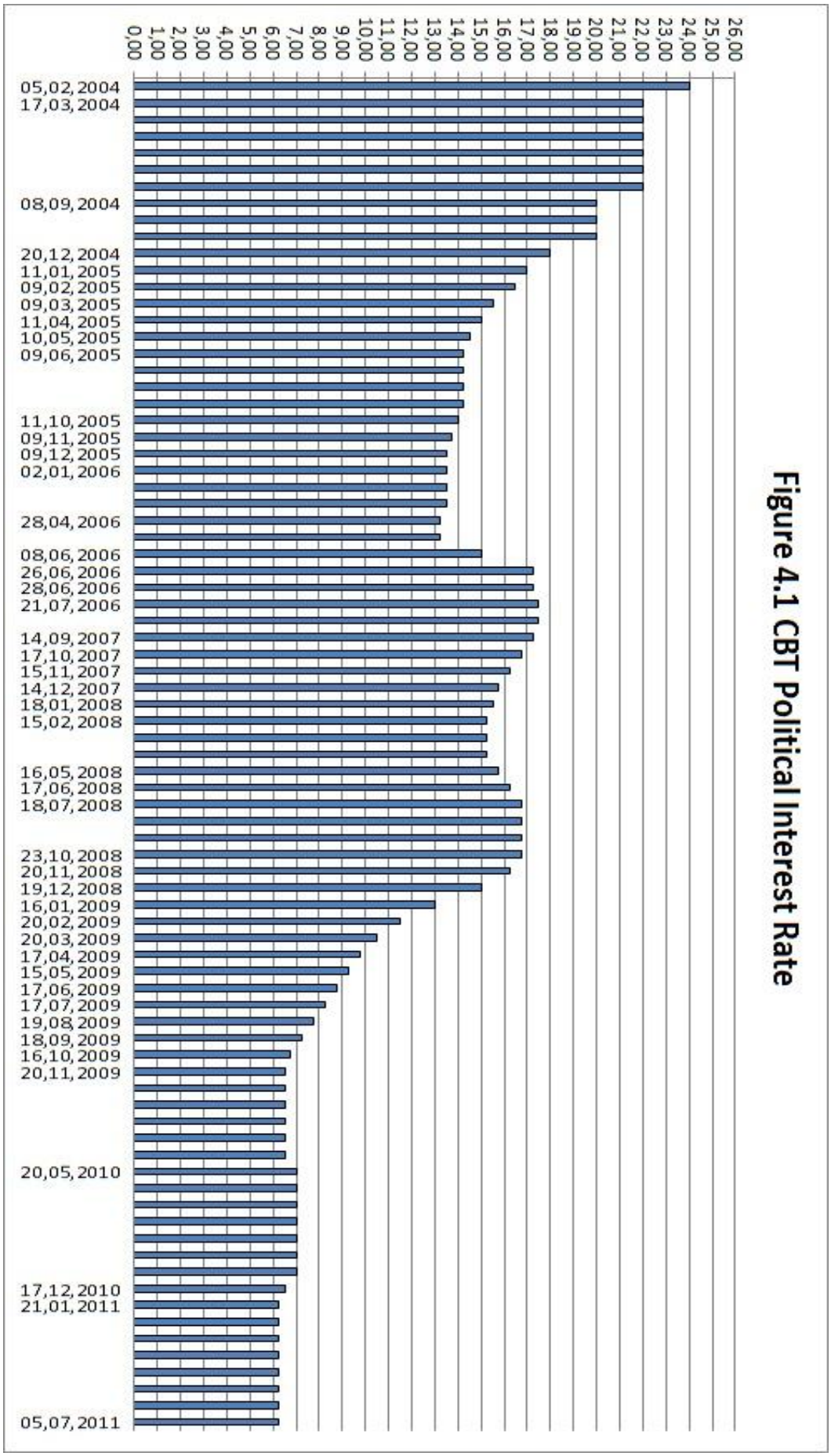
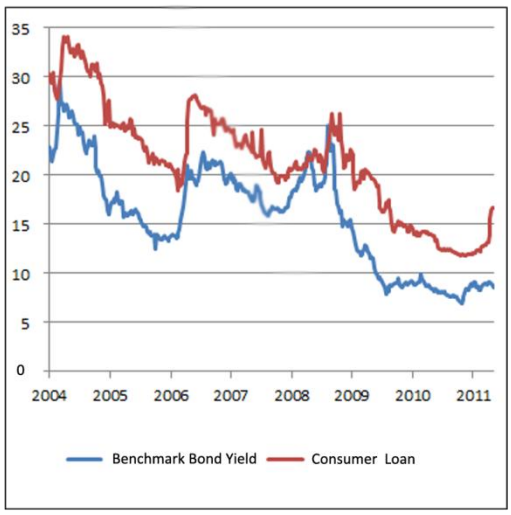
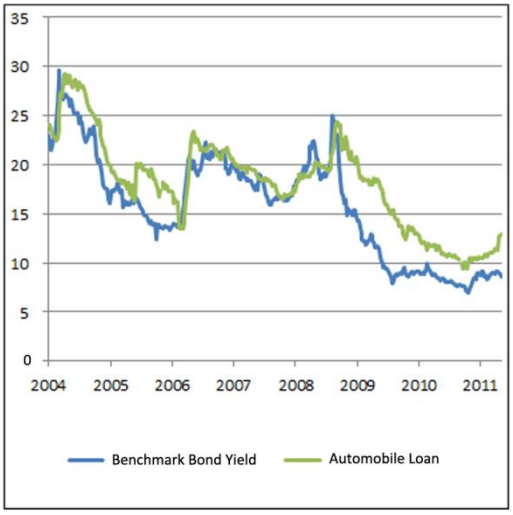


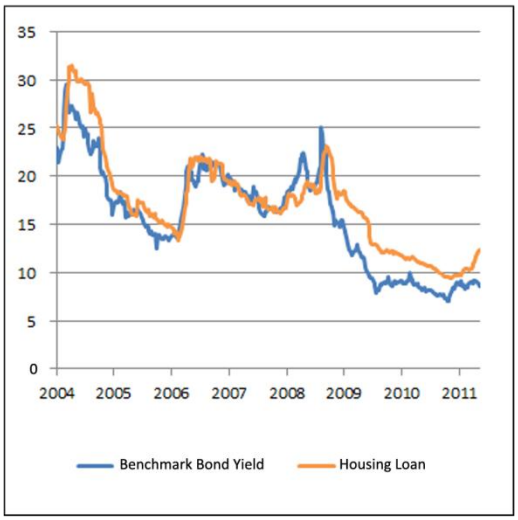
Figure 4.1 CBT Political Interest Rate

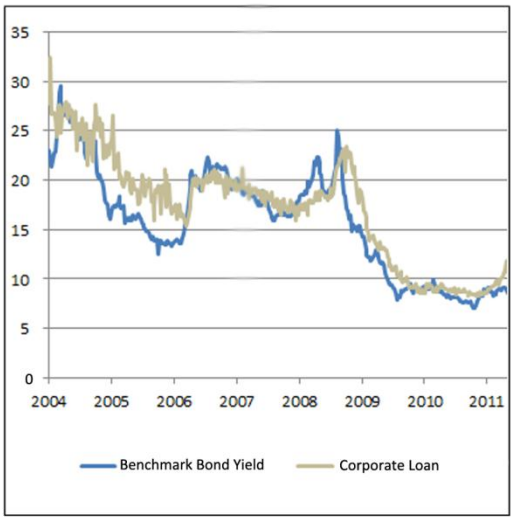
In the meantime, the changes on the consumer, automobile, households and commercial loan rates of the banks are indicated in Figure 4.2

Figure 4.2: Changes in Benchmark Bond Yield and Commercial Banks' Loans









4.1.1 Decision Announcement Times of the Monetary Policy Committee

In this study, interest rates of CBRT policy during the period between March 2004 and July 2011 are used.

As it is mentioned above, when the impacts of the political interest rates will be examined, these decisions will be divided into parts expected by the market and not expected by the market (surprise).

While making this division, it is necessary to clearly indicate the meeting dates of Monetary Policy Committee decision announcement times and the day of first reaction given by the markets to this decision..

In the year of 2006, the Monetary Policy Committee could change the meetings in any business day until January. Interest decisions which were made were announced in the early hours of the next day. In the event that there was no any extraordinary development observed during nearly 1 month period which is between the two decision making periods, short-term interests were kept stabilized. During the period from January 2006 to October 2011, Monetary Policy Committee announced the decisions at the evening of the day when the meeting was held after the markets were closed. And after October 2010, these decisions have been announced before the markets are closed on the date when the meeting is held.

Therefore while the date belonging to the date when the decision is announced and to the previous date of the decision were being used in the analysis made in order to determine the surprises of the monetary policies between the dates of March 2004 – December 2005 and November 2010 – July 2011, the data belonging to the day when the decision was announced and to the date after the decision was announced were used on the dates between January 2006 and October 2010.

At the beginning of 2006, inflation targeting implementation was begun to be performed and according to the transparency principle, the dates of meetings were begun to be announced annually before as of this date. While these dates were being determined, data flow processes within a month were taken into consideration in order to minimize the impacts of other macroeconomic data.

4.1.2 Determination of the Surprise and Expected Interest Rate Changes

In the first stage of the analysis, the impacts of political interest rates that are announced by CBRT on the Government Debt Securities that are processed in İstanbul Stock Exchange are examined. While this impact is examined, expected and unexpected impacts on securities that are selected are separated.

İnsal (2006) used the Treasury Bond which is the most closer to the transaction at İstanbul Stock Exchange on the relevant day in order to calculate the surprise in his study. Erelvanlı (2009) used the Treasury Bond which has one month for its term to be completed, in his study. If there was not any security available that had one month for its term to be completed, he obtained this data by interpolation method.

However in the markets, the number of days to maturity for the Treasury bond data which have the closest maturity term show much more difference especially after 2006. Therefore, the Treasury bonds that were mostly dealt and that had nearly one month to maturity are preferred in this study. It is aimed at being able to measure the reaction of the markets by selecting the mostly dealt treasury bonds which have the closest day to maturity. Otherwise, we could not be able to fully measure the reactions given by markets towards the decisions of monetary policy when we are making a selection by taking the numbers of remaining days for maturity among the Treasury bonds, the transaction volumes and contract numbers of which are gradually changing into account.

The difference of the securities selected in this way between the date when the decisions of the Monetary Policy Committee affect the market and annual interest data before these decisions affect the market is defined as the surprise part of the political interest rate announced on that date. Expected part is obtained by deducting the surprise part from the performed policy interest change. In the event that interest change is wholly expected by the markets, the surprise part of the policy interest decision on the relevant date is expected to be zero.

For instance, Monetary Policy Committee came together on February 14, 2008 and decided 25 basis point decrease in the political interest rate. This decision announced in the evening of the meeting day. Thus, it affected the market one day after. When we look

at the data of the İstanbul Stock Exchange Bond Market on Fabruary 14, 2008 we see that The Government Security named as TRB120308T13 had 15.18% yield. One day afer, when the reaction of the market to the change of the political interest rate occurred, we observe 8 basis point decrease (to 15.10%) at the same security's yield. So we say that this 8 basis point was unexpected by the market and call it as surprise part of the change of the political interest rate. And other 17 of the 25 basis point decrease is called expected part of the change of the political interest rate.

The idea that interest decision has already showed its effect on available securities of the expected part and therefore the change observed just after the decision fully results from the part perceived as the surprise makes it possible to measure the surprise [1].

While the impacts of interest decisions of CBRT on Government Debt Securities are being examined, Government Debt Securities that have nearly 3 months, 6 months and 12 months maturity and bonds that have 20 months on average for their maturity and that are mostly dealt and that are accepted as an benchmark bond are used. Since Government Debt Securities export that have long-term over 1 year was not made by the Treasury before the year of 2004, while the data set was being formed, Government Debt Securities that are mostly dealt in İstanbul Stock Exchange as of March 2004 were used.

In this part of the study, the change on the interests of Government Debt Securities as of the date when each of the political interest rate of CBRT was announced was followed up and the reactions of this change on the surprise and expected parts of the political interest rate were analyzed.

If the interest change decision made after Monetary Policy Committee is expected in advance, the markets will not overreact to this change. However if the interest change that is announced by Central Bank is a decision which is not expected by the markets, the impact of these decision on financial assets will be higher..

4.1.3 Determination of Commercial Banks' Interest Rates

In the second stage of the analysis, Weighted Average Interest Rates Implemented on Credits which are opened by Banks over TL are used..

Weighted average interest rates of the sector are calculated by linking the credit amounts that are permitted to be actually used within the relevant week with the interest rates implemented on each of the credit on client basis according to the credit types and by making them on a yearly basis. (Electronic Data Distribution System of CRBT).

4.2 Methodology

Egert and MacDonald (2009) stated that there is three fundamental approach available in the literature related to the selection of the interest rate variable that explains the changes made on the interest rates of the bank: The first approach tests the direct impact of changes on the interest rates of monetary policy on the interest rates of the bank and it is called as "monetary policy approach". The second approach measures the transitivity of interest rates of the market on interest rates of the bank under the comparable term, and it is called as "cost of fund approach". Third approach is the "unitary approach" and consists of two stages: In the first stage, the transitivity from interest rates of the monetary policy to interest rates of the market is measured, and in the second stage, the transmission from interest rated of the market to interest rates of the bank is measured.

On the other hand, in their studies, Donnay and Degryse (2001) are predicated on interests rates of monetary market and government bond yields by stating that instruments of monetary policy could change over time or monetary policy could be executed by more than one instrument, therefore interest rate of the policy in the calculation of the impact of monetary policy on the interest rates of the bank could be an impermanent and inadequate data on its own; interest rates of the market will reflect the policies of the central bank much better as a whole.

Gürkaynak et al. (2007) tested the alternative variables to be taken as basis in the measurement of the shocks of monetary policy in USA and put forward that Treasury bond which is one of these variables yielded objective results in estimating the surprises of the monetary policy.

In their studies, Bondt (2002, 2005) and Bernstein and Fuentes (2003) examined the transmission from interest rate of the policy to interest rate of the market and then from the interest rates of the market to the interest rates of the bank[1].

Due to these reasons, instead of examining the impacts of interest rate of the policy on the credits of commercial bank, the impacts of yields of government bonds on the credits of commercial bank are examined in this study. In order to measure the transitivity in the best way, the data of Government Debt Securities that are followed as 3 months, 6 months, 12 months and Benchmark bond and that have 20 months on average for their terms to be completed are tracked and Securities which give the best reaction towards the interest rates of the policy are chosen among them. In order to do this, the method which was put forward by Kuttner (2001) and the efficiency of which was indicated by Gürkaynak et al. (2007) was used.

4.2.1 Analysis of Surprise

The basic difficulty in examining the impact of monetary policy on financial markets is the fact that it is based on the expectations of the pricing behavior in financial markets and therefore it is needed to measure the surprises of the monetary policy. Due to the fact that expectations related to the monetary policy are reflected onto the prices in advance, financial markets are not expected to give reaction to the expected monetary policy developments just as the change on the monetary policy is performed. On the other hand, it is expected to see the impact of the unexpected part of the monetary policy change on the variables of the financial market after the announcement of the decision [1]. In the first part of this study, the impact of decisions related to the interest rates of Central Bank on the Government Debt Securities that have different terms is examined by dividing the decisions on monetary policy into the parts which are expected and unexpected by the market.

Measuring the impact of monetary policy on the price and yields of securities is difficulty due to the difficulty in determining the direction of the causality. For example; in the study made according to the monthly data, while finding the fact that overnight interest and exchange rate move in the same line with each other could mean that there is a casual connection from monetary policy to the exchange rate, it could also mean that

[1] In these studies both impacts was mesured with a single model.

increase in the exchange rate may affect the monetary policy or a third element like political risks may have affected both of them. However, at high frequency for example in the measurements made according to the daily data, it is possible to see that the direction of causality is towards from monetary policy to securities and it is possible to see the impact of decisions of monetary policy on the yields of securities [1]. Therefore, in this study, daily data are used as the highest frequency, and closing values of the interest decisions of the yields of the securities at the end of the day when they are implemented and closing values at the end of the previous day of the decision are compared.

Since the expectations on monetary policy are reflected onto the prices in advance, it is not expected to receive significant results from the regression of the changes of the yields of the securities on political interest rates. Therefore, it is needed to separate the surprising and expected parts of the interest decisions made by Central Bank. In the analysis made within this scope, it is expected for expected part of the monetary policy not to have an impact on the yields of the securities; and for surprising part of the decisions to have a significant impact on the afore mentioned yields. It should be especially emphasized that this argument does not mean that only the surprising parts of the decisions of monetary policy are effective and expected policy changes do not have any impact on the market of securities. The impact of expected monetary policy on the financial markets occurs not when the monetary policy is announced but when the expectation is formed. In this study, important assumptions are made such as on the date when the monetary policy is announced, changes observed in the risk premium of one month bond are independent and actors do not expect one night interest change (within one month) before the next Monetary Policy Committee [1].

Within the framework of the explanations stated above, every decision made by CBRT related to the short-term interests which are used as a fundamental monetary policy instrument (increase, decrease or fixed) will be divided into two parts as the part expected by the market and the part unexpected by the market. After this division is made, case studies which examine the impacts of monetary policies on the prices of

securities will become a common model especially in the current period in order to make regression analysis.[2]

4.2.2 Stationary Analysis

In the analyses where nonstationary serials are used, there may occur spurious regression problem, and high R^2 value could be obtained by meaningful t and F values which do not reflect the real relationships between the serials, and in these types of serials, the impacts of temporary shocks could become constant. Nonstationary serials could be turned to the stationary serial by getting their differences on d times [23]. This type of serial is called integrated serial and it is stated as I (d).

The fact that there is a unit root within the serial means that that serial is not stationary. In this study "Augmented Dickey – Fuller (ADF)" unit root test developed by Dickey and Fuller (1979) will be used with the methods that are being commonly used in empirical studies to determine the existence of unit root.

For the standart Dickey-Fuller model, set up a simple general AR(p) process given by

$$Y_t = \mu + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \ldots + \varphi_p Y_{t-p} + \varepsilon_t$$

If this is the process generating the data but an AR(1) model is fitted, suppose

$$Y_t = \mu + \varphi_1 Y_{t-1} + v_t$$

then

$$v_t = \varphi_2 Y_{t-2} + \ldots + \varphi_p Y_{t-p} + \varepsilon_t$$

and the autocorrelations of v_t and v_{t-k} for $k > 1$, will be nonzero, due to the presence of the lagged Y terms.

[2] This model was used bey Kuttner (2001), Bernanke and Kuttner (2005), Gürkaynak, Sack and Swanson (2005), İnsal (2006), Aktaş and others (2008) and Erelvanlı (2009).

Extention to AR processes of order greater than 1. Firstly the set up the AR(2) process

$$Y_t = \mu + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \varepsilon_t$$

This is the same as

$$Y_t = \mu + (\varphi_1 + \varphi_2) Y_{t-1} + \varphi_2 (Y_{t-1} - Y_{t-2}) + \varepsilon_t$$

now, subtract Y_{t-1} from both sides

$$\Delta Y_t = \mu + \gamma Y_{t-1} - \beta_1 \Delta Y_{t-1} + \varepsilon_t \ , \qquad \gamma = \varphi_1 + \varphi_2 - 1 \ \ \& \ \ \beta_1 = -\varphi_2$$

The test statistics provided by the statistics of the γ coefficient shows us wheter there is a unit root or not. This equation can be extented for AR(p) process in this way:

$$\Delta Y_t = \mu + \gamma Y_{t-1} - \sum_{j=1}^{p} \beta_j \Delta Y_{t-j} + \varepsilon_t$$

The standard Dickey-Fuller model has been "augmented" by ΔY_{t-j}. In this situation, the regression model and the *t* test are referred as the ADF test

4.2.3 Cointegration and ARDL Model

Expenditure, saving and investment decisions of the households and firms are significantly affected by the changes on the interest rates of credit and deposit. While the credit interest rates affect the credit demand of the households and firms, deposit interest rates become an important determiner of the demand for money in the economy. Therefore, transitivity speed and level of the changes made on the interest rate of the policy to the interest rates of credit and deposit are important in terms of its ability to affect the credit and money demand [9].

Since a long-term relationship is expected between the yields of Government Debt Securities and banking interest rates in terms of the efficiency of the monetary policy implementations, whether there is a long-term relationship exists between the above mentioned interest rates and cointegration analysis will be examined and it will be sought to determine the level and speed of the transitivity of the interest rate by error correction model (ECM).

Making time serials that are not stable become a stable by getting the variation leads to the loss of the long-term information related to the variables. Engle and Granger (1987) stated that the combination of two or more unstable serial may be stable. In other words, even if they have unit root, regression results obtained over the level values of the variables that have long-term relationship between themselves will not be fake.

Whether serials move together in the long-term or not are determined by cointegration analysis. The fact that there is a cointegration relation between serials means that deviations of the variables from the long-term balance value is temporary and that these deviations are corrected by the error correction mechanism. Therefore, cointegrated serials are modeled with error correction models.

Cointegration analyses can be performed by Engle – Granger cointegration test, Johansen cointegration test or Pesaran's Bound Test approach which is currently developed.

Engle – Granger cointegration test which is developed by Engle and Granger (1987) is based on the determination of the stability of the error terms obtained from the regression of the serials. Johansen cointegration test which is developed by Johansen (1988) and Johansen and Juselius (1990) determines the number of the cointegration relation between serials by using maximum probability method. While Engle – Granger test is mostly used for two variables, Johansen test is generally used in determining the cointegration relation of the variables more than two. However in order to implement both of these tests, each of the variable must be integrated over at least first degree and variables must have the same integration degrees.

In the Bound Test approach which is developed by Pesaran et al. (2001), it could be examined whether there is a cointegration relation exists or not between the serials

without considering on which level they are stable. Bound Test approach has other superiorities when compared with other cointegration methods. Monte – Carlo simulations indicated that the Bound Test made for the fewer amounts of observation yields more trustable results than the Engle – Granger and Johansen tests. It is better than Engle – Granger method in terms of its capability to test internality problem and hypothesis on long-term coefficients. While error correction models (ECM or VECM) are estimated as a second stage after the cointegration relation is determined by Engle – Granger and Johansen tests, in the Bound Test approach, by the existence of the cointegration relation, short-term and long-term parameters could be estimated simultaneously with the help a single model.

Due to the fact that the study will be performed by bivariate models and due to the superiorities stated above, Bound Test approach will be used in this study. In order for Bound Test that depends on the Auto Regressive Distributed Lags (ARDL) Model to be implemented, an Unrestricted Error Correction Model (UECM) which could be stated as below is formed.

The construction of this model was set by Hassler and Wolters (2006) in this way:

"The autoregressive distributed lag model of order *p* and *q*, ARDL(p,q), is constructed for a scalar variable y_t as

$$y_t = \sum_{i=1}^{p} \alpha_i \, y_{t-i} + \sum_{i=0}^{q} c_i' x_{t-i} + \varepsilon_t \quad , \tag{1}$$

where ε_t is a scalar zero mean error term and x_t is a *K*-dimensional column vector process. Typically, a constant is included into the above equation, which neglected here for brevity. The coefficients a_i are scalars while c_i' are row vectors. Using the lag operator *L* applied to each component of a vector, $L^{k}\, x_t = x_{t-k,}$ it is convenient to define the lag polynomial $a(L)$ and the vector polynomial $c(L)$,

$$\alpha(L) = 1 - \alpha_1 L - \ldots . - \alpha_p L^p$$

$$c(L) = c_0 - c_1 L - \ldots . - c_p L^q$$

Now, it is straightforward to write (1) more compactly:

$$\alpha(L)y_t = c'(L)x_t + \varepsilon_t$$

In order to obtain dynamic stability, it is maintained that

$$\alpha(z) = 0 \;\Rightarrow |\, z \,| > 1 \text{ for all } z \in \mathbb{C} \tag{2}$$

Under this condition there exists an absolutely summable infinite expansion of the inverted polynomial $\alpha^{-1}(L)$:

$$\alpha^{-1}(L) = \frac{1}{\alpha(L)} = \sum_{j=0}^{\infty} \alpha_j^* L^j \,, \qquad \sum_{j=0}^{\infty} |\alpha_j^*| < \infty$$

Invertibility of $a(L)$ hence yields the following representation:

$$y_t = \frac{c'}{\alpha(L)} x_t + e_t \,, \qquad \alpha(L)e_t = \varepsilon_t \,,$$

where e_t has a stable autoregressive structure of order *p*. Expanding $\alpha^{-1}(L)$ provides an infinite distributed lag representation,

$$y_t = \left(\sum_{j=0}^{\infty} \alpha_j^* L^j\right)\left(\sum_{j=0}^{\infty} c_j L^j\right)' x_t + e_t = \sum_{j=0}^{\infty} b_j' x_{t-j} + e_t \tag{3}$$

where *bj* are the vectors of dynamic multipliers derived by the method of in- determined coefficients. The vector of longrun multipliers of the ARDL(*p*,*q*) model may therefore be easily computed from:

$$\beta := \frac{c(1)}{\alpha(1)} = \sum_{j=0}^{\infty} b_j \tag{4}$$

It is worth mentioning that (1) is suitable for estimation but in order to obtain an economic interpretation of the parameters one has to consider a transformation like (3).

Different reparameterizations have been discussed in the literatüre; see, e.g, Wickens and Breusch (1988). By rearranging the x's one obtains with $\Delta = 1 - L$:

$$y_t = \sum_{i=1}^{p} \alpha_i y_{t-i} + \alpha(1)\beta' x_t - \sum_{i=0}^{q-1} \left(\sum_{j=i+1}^{q} c_j \right)' \Delta x_{t-i} + \varepsilon_t \,, \qquad (5)$$

where y_t is related to its own past, to contemporaneous x_t and differences Δx_{t-i}. The use of this specification has been suggested for cointegration analysis by Pesaran and Shin (1998). A further variant relates y_t to x_t and differences of both variables. By subtracting $(\sum_{i=1}^{p} \alpha_i)\, y_t$ and renormalizing, (5) yields:

This representation due to Bewley (1979) has the advantage that the long- run multipliers β are the coefficients of x_t. However, the contemporaneous Δy_t on the right-hand side is correlated with ε_t, which renders OLS invalid. Nevertheless, the use of $y_{t-1}, \dots, y_{t-p-1}$ and $x_{t-1}, \dots, x_{t-q+1}$ as instruments allows for consistent instrumental variable estimation.

One further transformation will turn out to be fruitful for cointegration testing and estimation. Notice that

$$\sum_{i=1}^{p} \alpha_i y_{t-i} - y_{t-1} = -\alpha(1) y_{t-1} - \sum_{i=1}^{p-1} \left(\sum_{j=i+1}^{p} \alpha_j \right) \Delta y_{t-i}$$

Using this result and $x_t = x_{t-1} + \Delta x_t$, (5) yields the error correction format:

$$\Delta y_t = -\alpha(1)(y_{t-1} - \beta' x_{t-1}) - \sum_{i=1}^{p-1}\left(\sum_{j=i+1}^{p}\alpha_j\right)\Delta y_{t-i} + \left(\alpha(1)\beta - \sum_{j=1}^{q} c_j\right)' \Delta x_t - \sum_{i=1}^{q-1}\left(\sum_{j=i+1}^{q} c_j\right)' \Delta x_{t-i} + \varepsilon_t$$

The interpretation relies on a long run equilibrium relation, $y = \beta' x$. The error correction mechanism is the adjustment of y_t via $\alpha(1)$ to equilibrium deviations in the previous period, $y_{t-1} - \beta' x_{t-1}$. In the following, this equation will often be rewritten as

$$\Delta y_t = \gamma y_{t-1} + \theta' x_{t-1} + \sum_{i=1}^{p-1} \alpha_i \Delta y_{t-i} + \sum_{i=0}^{q-1} \varphi_i' \Delta x_{t-i} + \varepsilon_t \ ,$$

where

$$\gamma = -\alpha(1), \ \ \theta = \alpha(1)\beta = -\gamma\beta \ ,$$

and α_i as well as φ_i are defined in an obvious manner."

In this study, we adapted this equation to our variables. We added a trend variable and took the logatihm of the variables and then set the model in this form:

$$\Delta Y_t = c + \gamma t + \sum_{i=1}^{p} \alpha_{1i} \Delta Y_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta X_{t-i} + \beta_1 Y_{t-1} + \beta_2 X_{t-1} + \varepsilon_t$$

Here, Y_t and X_t are the log of the y_t and x_t in the model presented by Hassler and Wolters' study respectively

After it is decided that there is a cointegration between the variables, ARDL model will be established as below for the examination of long-term relationship between the variables.

$$Y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{m} \alpha_{2i} Y_{t-i} + \sum_{i=0}^{n} \alpha_{3i} X_{t-i} + \mu_t$$

Unrestricted Error Correction Model based on ARDL approach is established as below for the examination of short-term relationship between the variables.

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \alpha_2 EC_{t-1} + \sum_{i=1}^{m} \alpha_{3i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta X_{t-i} + \mu_t$$

The EC_{t-1} variable in this study is the one period delayed value of error terms serials obtained from the long-term relation. Coefficient of this variable shows that how much of the disequilibrium on the short-term will be corrected on the long-term

4.3 The Analysis and Results

In the first stage of the analysis, as we mentioned before, the model used by Kuttner (2001) was considered as a basis:

$$\Delta Y_t = \beta_0 + \beta_1 i_t^e + \beta_2 i_t^s + \varepsilon_t$$

In this model, the dependent variable ΔY_t indicates the change of the Government Debt Securities that are qualified as 3 months, 6 months and 12 months and benchmark bond that have 20 month on average for their maturity.The explanatory variables i_t^e and i_t^s indicate the expected and surprise parts of the change on monetary policy, respectively, and it is the same for all regression analyses. Finally, ε_t includes the impacts observed out of the control of the monetary policy on the securities on the measurement date.

Data set on which the regression is performed begins on March 2004 and ends on July 2011. According to the results of the regression that is made, data set which shows the most reaction towards the surprise part of the political interest rate from the Government Debt Securities that are followed up as 3 months, 6 months, 12 months and a benchmark bond becomes the data set in which benchmark bonds exist. These data are indicated in the Table 4.1:

Table 4.1: Responses of Dept Securities

	Unexpected (Surprise) Parts			
	3 Months Bill	6 Months Bill	12 Months Bill	Benchmark Bond
Coefficients	0.575	0.415	0.805	0.983
Std. Error	0.090	0.075	0.073	0.092

When we consider the coefficients available in this table, the change having 57 basis point on 3 months bond, 41 basis point on 6 months bond and 80 basis point on 12 months bond is observed in exchange for the change at the amount of 100 basis point on the political interest rate. And a reaction at the high amount of 98 basis points attracts the attention on the benchmark bond.

Table 4.2: Response of The Benchmark Bond

	Variables			
	Constant	Expected	Surprise	R^2
Coefficients	-1.246	0.011	0.983	
Std. Error	3.253	0.079	0.092	0.623
Significance	0.703	0.886	0.000	

When we examine more closely, we see that benchmark bond does not show significant reaction to the changes on the expected part of the political interest rate. In the meantime, interest decisions of CBRT explain the 62% of the change on the benchmark bond as of the date when this decision is taken into effect.

On the other hand, when we look at the treasury bonds that have 3 months and 6 months for their maturity, it is observed that the reactions which they showed towards surprise changes are relatively lower.

Table 4.3: Response of The 3 Months Bill

	Variables			
	Constant	Expected	Surprise	R^2
Coefficients	0,668	0,197	0,575	
Std. Error	3,206	0,077	0,090	0,462
Significance	0,835	0,013	0,000	

Table 4.4: Response of The 6 Months Bill

	Variables			
	Constant	Expected	Surprise	R^2
Coefficients	-2,700	0,152	0,415	
Std. Error	2,641	0,064	0,075	0,398
Significance	0,310	0,020	0,000	

It is observed that R^2 values of the securities having the two shortest maturity used in the analysis are at the levels of 46 % and 39%.

When we look at the Treasury bonds that have one year maturity, we see that reaction coefficient and level of significance attributed to the surprise parts are high. However, since the analysis results of the benchmark bond are stronger than the results of the Treasury bonds that have one year maturity, we will proceed onto the second stage of the analysis by using the data of benchmark bonds.

Table 4.5: Response of The 12 Months Bill

	Variables			
	Constant	Expected	Surprise	R^2
Coefficients	-2,075	0,002	0,805	
Std. Error	2,600	0,063	0,073	0,632
Significance	0,427	0,973	0,000	

At this stage, before beginning to examine the relationship between benchmark bond interest rate and banking interest rate, it is necessary to examine whether interest rate serials are stationary or not.

In the serials that we will use, Augmented Dickey – Fuller (ADF) test was performed for the period of 2004 – 2009, and its results were indicated in the following table both on the level and on the first differences.

Table 4.6: ADF Unit Root Test[3]

	Results	
Coefficient	Initial Level	First Differences
Benchmark Bond	-1.05	-16.65***
Consumer Loan	-1.55	-19.48***
Automobile Loan	-1.47	-7.38***
Housing Loan	-1.64	-9.17***
Corporate Loan	-2.34	-34.76***
		t-Statistic
Test critical values	1 % level	-3.447534
	5 % level	-2.869009
	10% level	-2.570816

Unit root test results show that all interest rate serials are not stationary but they become stationary after their first differences are taken. In this situation, it is possible to say that interest rate serials are first degree integrated, in that I (1). For Phillips-Perron (PP) Unit Root Test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Unit Root Test Results, see Appendix.

However as we stated above, we will use Bound Test approach developed by Pesaran et al. (2001) in this study in order not to lose the long-term relations between the serials by using the serials, the first differences of which are taken. Therefore at first an unrestricted error correction model is established. The adapted type of this model to our study is as the following.

$$\Delta Y_t = c + \gamma t + \sum_{i=1}^{p} \alpha_{1i} \Delta Y_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta X_{t-i} + \beta_1 Y_{t-1} + \beta_2 X_{t-1} + \varepsilon_t$$

[3] Critical values are determined by MacKinnon (1996). Lag values are determined by Schwarz information criterias and (*), (**) and (***) notations express %10 %5 and %1 significance levels respectively

Bound Test could be performed by testing the null hypothesis H_0: $\beta_1=\beta_2=0$ in the above equation. Calculated Wald or *F* test statistics is compared with the lower and upper critic values which are calculated by Pesaran et al. (2001) for any level of significance.

The fact that aforementioned Wald or *F* statistics are higher than the upper critic value (rejection of the null hypothesis) indicates that there is a cointegration relation between serials, the fact that aforementioned Wald or *F* statistics are lower than the lower critic value (acceptance of the null hypothesis) indicates that there is a cointegration relation exists. If the Wald or *F* statistics fall a point between a lower and upper critic values, no certain interpretation could be made. In this case, before coming to any conclusion, it is needed to know the integration degrees of independent variables.

Results of Unrestricted Error Correction Model and Wald test statistics that are applied by using the data of 2004 – 2011 are indicated in the Table 4.7.

Table 4.7: Unrestricted Error Correction Model Results

	UECM (*p*,*q*)	Wald *F* Statistic	Cointegration
Consumer Loan	1,1	18,55	+
Automobile Loan	4,2	9,43	+
Housing Loan	0,0	17,74	+
Corporate Loan	3,0	19,71	+

Table 4.8: Critical Values[4]

	Upper Bound	Lower Bound
% 1 significance level	8,74	9,63
% 5 significance level	6,56	7,30

After it is decided that there is a cointegration among the variables, ARDL model is one by one established for each of the variable for the examination of long-term relationship between the variables. In order to determine the lag number, Schwarz Bayesian Criterion is used.

Pass-through to the Consumer Loans:

According to Schwarz Bayesian Criterion, ARDL(1,0) model is chosen for consumer loans which is stated in this way

$$LCNS_t = \alpha_0 + \alpha_1 t + \alpha_{21} LCNS_{t-1} + \alpha_{30} LBB_t + \mu_t$$

Table 4.9: ARDL(1,0) Estimation Results

Variables	Coefficients	*T* statistics
C	0,072	3.876***
T	-0,003	-2.331**
LCNS(-1)	0,895	49.743***
LBB	0,06	5.827***

[4] This values are taken by table CI(V) constructed by Paseran and others (2001) for unrestricted intercept unrestricted trend model.

Long-Term relationship:

Table 4.10: ARDL(1,0) Long-Term Coefficients

Variables	Coefficients	*T* statistics
LBB	0,578	8.494***
C	0,690	7.140***
T	-0,002	-2.919***

Short-Term relationship:

$$\Delta LCNS_t = \alpha_0 + \alpha_1 t + \alpha_2 ECT_{t-1} + \alpha_{31}\Delta LCNS_{t-1} + \alpha_{40}\Delta LBB_t + \mu_t$$

Table 4.11: UECM Coefficients [ARDL(1,0)]

Variables	Coefficients	*T* statistics
ΔLBB_t	0.060	5.827***
C	0.072	3.876***
T	-0.0003	-2.331**
ECT(-1)	-0.104	-5.809***

Pass-through to the Automobile Loans:

According to Schwarz Bayesian Criterion, ARDL(5,0) model is chosen for automobile loans which is stated in this way

$$LAUTO_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{5} \alpha_{2i} LAUTO_{t-i} + \alpha_{30} LBB_t + \mu_t$$

Table 4.12: ARDL(5,0) Estimation Results

Variables	Coefficients	*T* statistics
C	0.031	2.628**
T	-0.002	-0.041
LAUTO(-1)	0.969	19.086***
LAUTO(-2)	-0.069	-0.969
LAUTO(-3)	0.128	1.790*
LAUTO(-4)	0.094	1.295
LAUTO(-5)	-0.203	-4.120***
LBB	0.058	6.108***

Long-Term relationship:

Table 4.13: ARDL(5,0) Long-Term Coefficients

Variables	Coefficients	*T* statistics
LBB	0.725	8.564***
C	0.391	3.272***
T	-0.005	-0.041

Short-Term relationship:

$$\Delta LAUTO_t = \alpha_0 + \alpha_1 t + \alpha_2 ECT_{t-1} + \sum_{i=1}^{5} \alpha_{3i} \Delta LAUTO_{t-i} + \alpha_{40} \Delta LBB_t + \mu_t$$

Table 4.14: UECM Coefficients [ARDL(5,0)]

Variables	Coefficients	*T* statistics
$\Delta LAUTO(1)$	0.049	1.022
$\Delta LAUTO(2)$	-0.019	-0.4063
$\Delta LAUTO(3)$	0.109	2.215**
$\Delta LAUTO(4)$	0.203	4.120***
ΔLBB	0.058	6.108***
C	0.031	2.628**
T	-0.004	-0.041
ECT(-1)	-0.080	-6.502***

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Pass-through to the Housing Loans:

According to Schwarz Bayesian Criterion, ARDL(1,5) model is chosen for consumer loans which is stated in this way

$$LHOUS_t = \alpha_0 + \alpha_1 t + \alpha_{21} LHOUS_{t-1} + \sum_{I=0}^{5} \alpha_{3i} LBB_{t-i} + \mu_t$$

Table 4.15: ARDL(1,5) Estimation Results

Variables	Coefficients	*T* statistics
C	0.001	0.002
T	0.009	1.369
LHOUS(-1)	0.969	79.290***
LBB	0.010	0.299
LBB(-1)	0.065	1.392
LBB(-2)	0.168	3.584***
LBB(-3)	-0.094	-2.011**
LBB(-4)	.0141	0.302
LBB(-5)	-0.131	-4.099***

Long-Term relationship:

Table 4.16: ARDL(1,5) Long-Term Coefficients

Variables	Coefficients	*T* statistics
LBB	0.985	5.288***
C	0.004	0.002[
T	0.003	1.109

Short-Term relationship:

$$\Delta LHOUS_t = \alpha_0 + \alpha_1 t + \alpha_2 ECT_{t-1} + \alpha_{31}\Delta LHOUS_{t-1} + \sum_{i=0}^{5} \alpha_{4i}\Delta LBB_{t-i} + \mu_t$$

Table 4.17: UECM Coefficients [ARDL(1,5)]

Variables	Coefficients	*T* statistics
ΔLHOUS	0.010	0.299
ΔLHOUS(1)	0.044	1.315
ΔLHOUS(2)	0.212	6.352***
ΔLHOUS(3)	0.117	3.612***
ΔLHOUS(4)	0.131	4.099***
C	0.001	0.002
T	0.009	1.369
ECT(-1)	-0.130	-2.534**

Pass-through to the Corporate Loans:

According to Schwarz Bayesian Criterion, ARDL(2,0) model is chosen for consumer loans which is stated in this way

$$LCRPT_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{2} \alpha_{2i} LCRPT_{t-i} + \alpha_{30} LBB_t + \mu_t$$

Table 4.18: ARDL(2,0) Estimation Results

Variables	Coefficients	*T* statistics
C	0.041	2.121**
T	-0.003	-1.784*
LCRPT(-1)	0.436	9.380***
LCRPT(-2)	0.429	9.641***
LBB	0.107	6.007***

Long-Term relationship:

Table 4.19: ARDL(2,0) Long-Term Coefficients

Variables	Coefficients	*T* statistics
LBB	0.801	9.730***
C	0.307	2.618***
T	-0.002	-2.078**

Short-Term relationship:

$$\Delta LCRPT_t = \alpha_0 + \alpha_1 t + \alpha_2 ECT_{t-1} + \sum_{i=1}^{2} \alpha_{3i} \Delta LCRPT_{t-i} + \alpha_{40} \Delta LBB_t + \mu_t$$

Table 4.20: UECM Coefficients [ARDL(2,0)]

Variables	Coefficients	*T* statistics
ΔLCRPT(1)	-0.429	-9.641***
ΔLBB	0.107	6.007***
C	0.041	2.121**
T	-0.003	-1.784*
ECT(-1)	-0.133	-5.857***

When we look at the results obtained from the above mentioned models, it is seen that there is a meaningful relation on the long-term between the commercial bank loans and benchmark interest premiums. When we examine the transitivity coefficients of the benchmark bond on consumer loan, automobile loan, housing loan and commercial loans in the long-term, we see that they are statistically meaningful on the levels of 0,578 ; 0,725 ; 0,985 and 0,801 respectively with significance level of 1 %.

When we examine the results of Bound Test, we see that their transition speed is as below. As weekly data is used in the analysis, results will also be interpreted weekly.

Table 4.21: Speed of The Transaction

Variables	β_1	Speed
Consumer Loan	-0.119	8.4 weeks
Automobile Loan	-0.052	19.1 weeks
Housing Loan	-0.051	19.2 weeks
Corporate Loan	-0.163	6.1 weeks

When loan types are examined, it is seen that the highest rate of transitivity occurs on the interest rates of housing loan. This situation could be explained by the more rapid increase of supply and demand of housing loans when compared with other loans, and by the more competitive situation of the market of housing loan. When the transitivity speed for the housing loans is examined, it is seen that transitivity period is relatively high. As there is a general downward trend in the interest rates of central banks between the years of 2004 – 2011, it could be interpreted that the reason of commercial banks to act later on the matter of decreasing the long-term housing loans is to increase the profits during this passed period.

When we examine the automobile loans, we see that their transitivity speeds are almost at the same level with the housing loan but their transitivity level are below the housing loans. It could be said that its reason is that payback risk of automobile loans is higher than the payback risks of housing risks.

In the event that transitivity speed of the interest rates of consumer loan is lower than other loans, it is effective that these loans have relatively minimal assurance, that interest rate sensitivity of the consumers who wants to clear their credit card debts are low therefore that the price flexibility of their credit demand becomes low.

In the event that commercial loan transition is low, that they could not reach to the alternative fund sources due to the fact that standards on the loans issued to especially small scale enterprises in an environment in which the strictness on the loan conditions decreases with the effect of applied monetary policy and that these enterprises could not receive enough source from the banking system was effective.

CHAPTER 5

CONCLUSION

Changes on the political interest rate firstly affect the interest rates of the market and then begin to affect the investment, saving and consumption decisions of the real sector by means of monetary transmission channels with the change of deposit and loan interest rates by banks. Therefore, the effectiveness and period of monetary policy practices on market and bank interest rates is highly significant for the effectiveness of the monetary transmission mechanism.

For an effective monetary policy, the changes of political interest rate are expected to be reflected exactly and rapidly on the deposit and loan interest rates. However, macroeconomic conditions, monetary policy practices, some factors unique to the structure of financial system and banks affect the speed and level of transitivity. Many factors such as interbank competition, development of the monetary markets and financial system, financial deficit, asymmetric information, adjustment and transitivity costs, ownership structure of the banking system, balance sheet structure are stated in the literature as well as not being able to full consensus on the matter of the factors affecting the transitivity of interest rate.

In this study, the effects of CBRT monetary policy decisions on consumer, automobile, housing and commercial loan of the bank during the period from the early of 2004 to the middle of 2011 are examined. In order to perform this study, it is benefited from weekly weighted average loan interest rate data of the banks, which is the data having the highest frequency that could be obtained from the electronic data distribution system of CBRT.

Monetary policy instruments of Central Bank may change in the course of time or monetary policy could be executed by more than one instrument. Therefore, as the political interest rate would be insufficient in the calculation of the effect of monetary policy on loan interest rates of the banks, Government Bond premiums are used instead of the political interest rates in this study to make it reflect the policies of central bank

more clearly as a whole. Among the government bonds that have different maturity structure, benchmark bonds that are adapted to the expected political interest rate changes and that react to the unexpected interest rate changes at the high rate (reaction coefficient 0,983) are used.

In order to weight the cointegration relation between interest rates, unrestricted error correction model is established and it is determined by Bound Test that there is a long-term relation between each interest rate and interest rate of benchmark bond. After a cointegration relation is determined among the serials, autoregressive distributed lag model is used to determine the level of transitivity.

When loan types are examined, it is seen that the highest rate of transitivity occurs on the interest rates of housing loan. This situation could be explained by the more rapid increase of supply and demand of housing loans when compared with other loans, and by the more competitive situation of the market of housing loan. When the transitivity speed for the housing loans is examined, it is seen that transitivity period is relatively high. As there is a general downward trend in the interest rates of central banks between the years of 2004 – 2011, it could be interpreted that the reason of commercial banks to act later on the matter of decreasing the long-term housing loans is to increase the profits during this passed period.

When we examine the automobile loans, we see that their transitivity speeds are almost at the same level with the housing loan but their transitivity level are below the housing loans. It could be said that its reason is that payback risk of automobile loans is higher than the payback risks of housing risks.

In the event that the transitivity speed of the interest rates of consumer loan is lower than other loans, it is effective that these loans have relatively minimal assurance, that interest rate sensitivity of the consumers who wants to clear their credit card debts are low therefore that the price flexibility of their credit demand becomes low.

In the event that commercial loan transition is low, that they could not reach to the alternative fund sources due to the fact that standards on the loans issued to especially small scale enterprises in an environment in which the strictness on the loan conditions decreases with the effect of applied monetary policy and that these enterprises could not receive enough source from the banking system was effective.

In summary, it is observed that transitivity to the banking interest rates in Turkey between the period of 2004 – 2011 is at the rapid and high level. Although the transitivity to the housing loan is high, it occurs later when compared with other loans in terms of transitivity period. While the transitivity speed of the consumer and commercial loans are higher than the transitivity speed of the housing and automobile loans, transitivity level of the consumer loan is lower than the transitivity level of other loans. As a result, Central Bank affects the banking interest rate at 77% level and by 13 weeks delay on average. .

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APPENDIX

Phillps-Perron (PP) Unit Root Test Results:

PP Unit Root Test

	Results	
Coefficient	Initial Level	First Differences
Benchmark Bond	-1.30	-16.88***
Consumer Loan	-1.59	-19.49***
Automobile Loan	-1.55	-17.25***
Housing Loan	-1.60	-15.88***
Corporate Loan	-1.95	-35.83***
		t-Statistic
Test critical values	1 % level	-3.44
	5 % level	-2.86
	10% level	-2.57

Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Unit Root Test Results:

KPSS Unit Root Test

	Results	
Coefficient	Initial Level	First Differences
Benchmark Bond	1.48	0.05
Consumer Loan	1.86	0.06
Automobile Loan	1.45	0.04
Housing Loan	1.39	0.06
Corporate Loan	1.84	0.12
		t-Statistic
Test critical values	1 % level	0.73
	5 % level	0.46
	10% level	0.34