

**Ş. DEMET KAYA**

**A STUDY ABOUT THE MONETARY POLICY RULE OF THE CBRT**

**Bilkent 2006**

**A STUDY ABOUT THE MONETARY POLICY RULE OF THE CENTRAL  
BANK OF THE REPUBLIC OF TURKEY IN THE IMPLICIT INFLATION  
TARGETING FRAMEWORK**

A Master's Thesis

by  
**ŞERİFE DEMET KAYA**

Department of  
Economics  
Bilkent University  
Ankara  
February 2006



To Buket, Onur and Eylül

A STUDY ABOUT THE MONETARY POLICY RULE OF THE CENTRAL  
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The Institute of Economics and Social Sciences  
of  
Bilkent University

by

ŞERİFE DEMET KAYA

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in

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BİLKENT UNIVERSITY  
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FEBRUARY 2006

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Economics.

-----  
Prof. Erinç Yeldan  
Supervisor

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Economics.

-----  
Asst. Prof. Ümit Özlale  
Examining Committee Member

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Economics.

-----  
Asst. Prof. Erdal Özmen  
Examining Committee Member

Approval of the Institute of Economics and Social Sciences

-----  
Prof. Erdal Erel  
Director

## **ABSTRACT**

### **A STUDY ABOUT THE MONETARY POLICY RULE OF THE CENTRAL BANK OF THE REPUBLIC OF TURKEY IN THE IMPLICIT INFLATION TARGETING FRAMEWORK**

Kaya, Şerife Demet

M.A., Department of Economics

Supervisor: Prof. Erineç Yeldan

February 2006

The gist of the study presented in this thesis is to provide an answer mainly to two questions: First; whether in the last four years the Central Bank of the Republic of Turkey (CBRT or Central Bank) has followed a monetary policy rule consistent with its commitments about price stability objectives, implicit inflation targeting regime and floating exchange rate. Second one is if it has done to what extent this rule has resembled the original Taylor rule. In the study, to investigate the answer to these questions a backward-looking model for a monetary policy rule is described and is subjected to an econometric estimation process. It yields significant results for the interval between 2001 and 2005. In a summary, the findings support that while after 2001 the rate of inflation has continued to be a dominant indicator to which the CBRT reacted consistent with its commitments, coming to the current years the real exchange rate (RER) movements and current account deficits have gained an increasing significance in monetary policy rule. Hence, the thesis argues that instead of being tied to a simple Taylor rule, the CBRT might have adopted a differentiated policy rule where it has concerned RER and current account deficit beside the rate of inflation.

**Keywords:** The Central Bank of the Republic of Turkey, Inflation Targeting, Monetary Policy Rule, Taylor Rule, Real Exchange Rate, Current Account Deficit.

## ÖZET

### ÖRTÜLÜ ENFLASYON HEDEFLEMESİ ÇERÇEVESİNDE TÜRKİYE CUMHURİYET MERKEZ BANKASI'NIN PARA POLİTİKASI KURALI ÜZERİNE BİR ÇALIŞMA

Kaya, Şerife Demet

Yüksek Lisans, İktisat Bölümü

Tez Yöneticisi: Prof. Dr. Erinç Yeldan

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Bu tezde sunulan çalışmanın amacı başlıca iki soruya cevap vermektir: Birincisi, Türkiye Cumhuriyet Merkez Bankası (TCMB veya Merkez Bankası) son dört yılda fiyat istikrarı, örtülü enflasyon hedeflemesi ve dalgalı kur rejimine yönelik taahhütleriyle tutarlı bir politika izledi mi? İkincisi, eğer izlediyse bu kural, orjinal Taylor kuralına ne ölçüde benzemektedir? Çalışmada, bu sorulara verilebilecek yanıtları araştırmak üzere geriye dönük bir para politikası kuralı modeli oluşturulmuş ve daha sonra ekonometrik tahmin sürecine tabi tutulmuştur. Model söz konusu dönem için anlamlı sonuçlar vermiştir. Bulgular, 2001 yılından sonra enflasyon oranının TCMB'nin taahhütleri doğrultusunda tepkide bulunduğu temel bir gösterge olmaya devam ettiğini, ancak son yıllara gelindiğinde ise reel döviz kuru hareketlerinin ve cari işlemler açığının da para politikası kuralında artan bir önem kazandığını destekler niteliktedir. Bu nedenle, bu tez TCMB'nin basit bir Taylor kuralına bağlı kalmak yerine, enflasyon oranının yanı sıra reel döviz kurunu ve cari işlem açığını da gözetken farklılaştırılmış bir politika kuralı izlemiş olabileceğini savunmaktadır.

Anahtar Kelimeler: Türkiye Cumhuriyet Merkez Bankası, Enflasyon Hedeflemesi, Para Politikası Kuralı, Taylor Kuralı, Reel Döviz Kuru, Cari İşlem Açığı

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## CHAPTER 1

### INTRODUCTION

At the beginning of 1990's many developed economies launched to adopt Inflation Targeting (IT) as a monetary policy regime to achieve price stability and sustainable growth objectives. Under IT framework monetary policy focuses exclusively on the control of inflation and isolates itself to some extent from other real or financial considerations. After this progress, determination and implementation of monetary policy rule by central banks in IT framework have become a crucial phenomenon and of great concern in several debates in literature.

Mostly, the arguments of Taylor have become central to these debates. In 1993 Taylor suggested a monetary policy rule first for United States. This procedure has been frequently called as the Taylor rule. Taylor (2000) described the meaning of the monetary policy rule as a contingency plan that specifies as clearly as possible the circumstances under which central bank should change the instruments of monetary policy<sup>1</sup>. In the original Taylor rule he used the short term interest rate as the policy instrument and depicted this instrument as an econometric function of the output gap and deviation of actual inflation from targeted inflation. He refrained

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<sup>1</sup> In fact, by defining the meaning of a monetary policy rule he also set a distinction between a monetary policy rule and a policy proposal. A policy proposal can be real exchange rate targeting, nominal GNP targeting or inflation targeting. Central bank can use a monetary policy rule as a guideline to achieve the target he proposed. The policy rule can determine the circumstance under which central bank reacts to several indicators through changing its instrument which is whether interest rate or a monetary aggregate.(Taylor,2000)

from inserting other indicators in the policy rule since he believed that a strong reaction to these variables (particularly to real exchange rate) by central bank could deteriorate the output-inflation performance. (Taylor,2005)

The original Taylor rule and its modifications were tested for several developed economies afterwards. In their studies Clarida et al. (1998) found out that using Taylor rule under some form of inflation targeting (IT) could be useful for those countries (particularly,G3 and E3 countries) to maintain price stability and sustainable growth.

The debates about Taylor rule have risen substantially at the point whether the simple Taylor rule can be applicable (or optimal) to emerging market (small open) economies that have been planning to adopt IT regime after the collapse of the fixed exchange rate regimes. The debates have arisen from different fiscal and financial positions of emerging market economies. Calvo(2000) for instance, stresses liability dollarization and financial fragility caused by balance sheet problems of such markets and argues that these perils can hinder the success of IT. Blanchard (2004), Favero and Givazzi (2004) focus on the dominance of fiscal imbalances such as high level of public debt in such countries and point out that high country risks have arisen from high level of debt stock which in turn can have perverse effect on the performance of IT. Kumhof (2001) also proposes that IT is vulnerable to speculative attacks and can perform worse than exchange rate targeting regimes when policy sustainability is not sufficient.

The rationale behind all these arguments, on the desirability of IT lies on the behavior of the real exchange rate. Emerging markets have always had to concern more on exchange rate fluctuations than developed economies. A contractive monetary policy which favors reducing inflation can affect real exchange rate via unusual ways and drag the economy to an undesired state. In a developed economy which is implementing the IT regime, an increase in interest rate leads to real appreciation of domestic currency and appreciated currency restrains inflation through decreasing aggregate demand. On the other side, the result can be different in a financially vulnerable economy, as Blanchard (2004) argues. He clarifies the perverse effect of IT arguing that: in case of high debt stock, an increase in real interest rate to curb higher inflation and maintain capital flow increases default risk of debt; the increased risk premium causes ultimately real depreciation, this depreciation results in further increase of inflation via pass-through mechanism. As a result, the effectiveness of monetary policy to reduce inflation is reduced. Besides, Moron and Winkelried (2005) note the perverse effects of RER fluctuations to output in liability dollarized economies. They state that in a financial vulnerable economy under high liability dollarization, an unanticipated real depreciation (an external shock) can deteriorate the balance sheet of firms as increasing the burden of their debt and decreasing their net worth. Subsequently, the external competitiveness of the whole economy does not increase contrary to expectations hence expansion does not realize. The findings in their study, suggest that rather than focusing on inflation, defending the exchange rate in an inflation targeting policy rule can be more rational in a financially vulnerable economy with high degree of liability dollarization. Lastly, Frenkel (2004) also points out the problems created by misalignment of real interest rate. The distortion in real interest rate results in

misalignment of the real exchange rate. Overvalued exchange rate due to the high real interest rates brings about unsustainable balance of payments accounts. In case of balance of payments deficits and external debt stock, floating exchange regime and monetary policy defending inflation targeting can not completely prevent an external disequilibrium in context of full capital mobility.

Considering the arguments put forward it can be easily proposed that in a developing country a central bank planning to adopt IT regime might have real exchange rate considerations while implementing its monetary policy rule. Such a proposal is examined in some papers such as Calvo and Reinhart (2002). They found out in their study some empirical evidences which support the actual behavior of central banks in the direction of monitoring exchange rate though floating exchange rate regime is prevailing officially. Edwards (2005) points out that according to empirical evidence almost every central bank adopted inflation target regime take exchange rate behavior into account while conducting its monetary policy rule although a few of them recognize exchange rate officially in policy rule, in Taylor-rule.

The thesis puts forward that the proposal mentioned above can be valid for monetary policy implemented in Turkey after 2001 when macroeconomic policies have focused on control of inflation. The two questions to be answered in the thesis are: Has in the last four years the Central Bank of Republic of Turkey (CBRT) followed a monetary policy rule consistent with its commitments about price stability objectives and implicit IT regime? Second one is, if it has done to what extend this rule has resembled to simple Taylor rule which defends the optimality of the

reaction of the central bank to realized inflation deviations from target level and output gap? The rest of the thesis proceeds in four steps. In section two a brief overview of the Turkish economy over 1990's will be provided, with emphasis on the position of the monetary policy. Section three proposes a candidate model for a monetary policy rule where the o/n interest rates are described as a function of several financial and fiscal variables. The model will be subjected to an econometric estimation process to obtain significant results which can provide answers to the questions posed above. Section four covers the results obtained from the estimation of the model. After interpreting the results, the final section summarizes and concludes.

## **CHAPTER 2**

### **MAIN TRAITS OF THE TURKISH ECONOMY AFTER 1990<sup>2</sup>**

#### **2.1. 1990-1999**

In 1980's the Turkish economy took a big step to an accelerated reform and adjustment process in all sectors of economy. The process launched with foreign trade liberalization, continued with liberalization in financial sector and culminated in capital account liberalization in 1989. All the steps taken towards the integration of Turkey into international markets altered the trend of all the macro economic indicators and the patterns of policy making considering these trends.

With the reforms oriented towards removing the constraints against international trade and capital movements it was expected that the Turkish economy could attain financial deepening, accelerating investments pushed by capital accumulation, sustainable long term growth and a more efficient resource allocation hence a much-desired equilibrium. Contrary to expectations economy was introduced with an unstable environment caused by internal and international distortions.

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<sup>2</sup>The information and arguments presented in this part are extensively discussed in The Impact of Globalization on the Turkish Economy, CBRT (2002), The Presentation of Monetary Policy for the year 2002, CBRT(2002) in Yeldan (2002), Boratav(2003)

After trade liberalization Turkey has been often bothered with balance of payments problems caused by large amounts of trade and current account deficits and capital flows volatility. Only in 1991, 1994, 1998 a current account surplus was experienced due to the sudden depreciation of domestic currency. Especially, just before the crisis in 1994, current account deficit peaked as being 3.6% of GNP. To finance these deficits, Turkey tried to attract capital inflow provided by capital liberalization reforms.

On the other side, fiscal deficits continued being an important problem both the government and also the CBRT had to deal with. Till 1994 not only the conventional budget balance but also the budget balance excluding the interest payments, i.e primary balance account recorded deficit. The public deficits caused mostly from social security transfers, high interest payments on the expenditure side and low domestic savings on the revenue side. While savings were following a stable path during 1990's, interest payments revealed an increasing trend. The deficit was financed mainly by borrowing from domestic and foreign markets. Especially, net domestic borrowing in financing deficits increased more than doubling in some years such as in 1995 and 1998. In the meantime, the ratio of PSBR to GNP reached to considerable amounts through 1990's. Consequently, the accelerated borrowing requirement accompanied with increasing interest rate; high interest rates caused high interest payments; public deficits culminated with these payments. Meanwhile, the total domestic and foreign debt stock as a fraction of GNP rose continually and reached to 29% and 55.6% of GNP at the end of the decade, respectively. The public deficit and the debt stock together augmented the uncertainty and the risk premium perceived by both domestic and foreign agents.

The capital inflows were sustained by high real interest rates and used to finance current account deficits on the one hand and public deficit on the other hand. The description of short term capital inflows as “the long arm of fiscal policy credit restraints and money constraints of the monetary authority” (Cizre-Sakalhoğlu, Yeldan,1999:16) reveals the problematic side of this account. Net portfolio investments as a representative of short-term capital flows grew up in non-crisis periods substantially. The accelerating trend of capital flows caused a further financial problem: Real appreciations. Again, except in the years 1991-1994-1998 real exchange rate appreciated dramatically. Hence overvalued Turkish lira deteriorated the trade accounts and led to unsustainable balance of payments accounts.

High real interest rates had also negative effects on real sector. Simply, they made financial assets of the government more attractive and caused capital switching to financial markets instead of physical investment. Increase in investment became reluctant. Industrial production growth became volatile. After switching to outward-orientation market economy no structural changes in real sector towards being an industrialized economy were experienced contrary to the expectations. (Yeldan, 2001).

Turkey found itself in a vicious circle created by fiscal, financial and real sector imbalances.

This circle was cut by two currency crises. First of them was experienced in 1994 spring. The latter was a global one; it broke out in Russia and spread to several emerging markets in 1998.

The scope of monetary policy conducted over this period was determined under these financial and fiscal imbalances. In fact, in 1990's fiscal imbalances did not have a perverse effect directly to conducting the monetary policy. After 1985, the government launched to finance the deficit with T-bills and bonds she issued.

Concurrently, the short-term advance facility which had been largely used for PSBR was limited to certain percents. After 1996 short term advances used by government fell to zero. So, the CBRT found a chance to intensify on its balance sheet, foreign reserve position, interest rate and exchange rate policies. However, the increased risk premium connected to budget deficits and high debt stock became a peril against the performance of the monetary policy and the CBRT.

On the other side, financial imbalances after capital liberalization limited the effectiveness of monetary policy directly. It had to maintain capital inflows to the country and to pursue high real interest rate policy, yet at the same time it had to deal with RER appreciations and the problems arisen from overvalued exchange rate. Between 1990 and 1994 it pursued an exchange rate depreciation ceiling policy. After 1995 till 1998 it focused on the RER stabilization. However, these attempts became unsuccessful as a result of speculative attacks to the domestic currency. Both in crisis in 1994 and 1998 the CBRT lost large amount of its foreign reserves to prevent a jump in interest rates and simultaneously a depreciation of

domestic currency. Nevertheless, it could not prevent huge amounts of capital outflows.

In fact, just after the crises in 1994 and in 1998 Turkey launched a stabilization program supervised by the IMF. Shortly after the currency crisis in 1994 Turkey signed a stand-by agreement with the IMF to recover the adverse effects of crisis and regain credibility in international markets. This agreement included mainly a banking sector reform, a limitation on PSBR and short term advances of Treasury from the CBRT.

The macro-fundamentals started to depict a recovering picture. After a sudden contraction in output in 1994, economy grew up 8% in 1995; the inflation rate, o/n interest rate and the interest rate on domestic borrowing decreased. On the other hand, after having a surplus in 1994 the current account balance continued to have a deficit till 1998.

In 1998, a comprehensive disinflation program (so-called Staff Monitored Program) initiated. However, just after the Russian crises the program was collapsed and the state of the economy turned back to the period before 1994 crisis.

At the end of 1999 again an agreement was signed with the IMF. The objectives of the compromised program were similar to formerly executed programs such as decreasing inflation, achieving fiscal discipline and sustaining long term growth. This time, these goals were tried to be achieved specifically by an exchange rate stabilization program which relied on a nominally pegged exchange rate regime. At

the beginning all the parameters of the program such as interest rates, risk premiums and inflation were implying good progress. However, coming to the end of the decade growth rate turned to be negative, real exchange rate started to appreciate; current account recorded deficit after a surplus in 1998; foreign and domestic debt peaked; budget deficit and PSBR as a fraction of GNP reached its maximum levels. As a result, as being squeezed between financial volatilities, fiscal imbalances and currency crises the CBRT could not conduct a sustainable monetary policy at all. By giving priority to the preservation of free capital mobility hence pursuing high interest rate policy favoring capital flows it became unsuccessful in the stabilization of exchange rate and disinflation attempts. At the same time, real objectives seemed to be disregarded.

## **2.2. 2000-2005**

In the last five years of the Turkish economy experienced also a currency crisis again and executed several stabilization programs proposed and monitored by IMF.

In 2000, some macro fundamentals revealed an improvement: growth rate rose; both o/n interest rates and interest rates on government borrowing and also inflation rate fell down. On the other side, the Turkish economy witnessed also some unplanned and undesired changes in several fundamentals which have been always problematic for economy: Real exchange rate appreciated dramatically: current account deficits increased significantly as a consequence of real appreciation. To add, the reforms embarked by IMF as a requirement in the stabilization program were delayed.

Furthermore, political uncertainties, the reluctance of authorities in taking measures deteriorated the credibility of program in international market. Consequently, the Turkish economy suffered from a speculative attack in 2000 November and 2001 February which resulted in a rapid capital outflow (5.5 fold compared with the previous year), a jump in the interest rate (to 93.2) and sharp depreciation of the domestic currency (9.3%). The pegged exchange regime was abandoned by the CBRT. As operating with full capital account opening, the monetary policy became hardly effective to maintain a stable exchange rate in capital flow boom and bust phases. Indeed, both 1994 and 2001 crises monetary policy faced to a drawback so-called “open economy trilemma” in literature. Obsfeld and Taylor (2002) note the impossibility of focusing on domestic targets such as inflation while maintaining fixed exchange regime and full capital opening.

In May 2001 Turkey adopted a new IMF-supervised adjustment program, called as ‘Turkey’s Program for Transition to a Strong Economy’.

With this program it is aimed to increase the resistance of the Turkish economy to external shocks and simultaneously decrease its vulnerability against crises. To achieve these goals the main lines of the program are determined as following,

1. To achieve fiscal sustainability, creating a fiscal surplus of 6.5% of the GDP,
2. Adopting flexible exchange rate regime to strengthen the effectiveness of monetary policy towards price stability objective,
3. Completing reconstructing process of the banking sector,
4. Speeding up both the financial and public sector reforms,
5. Strengthening the role of the private sector in the economy.

So, the program has stipulated a budgetary discipline based on primary surplus on fiscal side. The policy advice about fiscal discipline is criticized in a series of studies in the sense that the decreases in public expenditure to achieve the desired public surplus can not be easily accompanied with sustainable growth in long term.

(Agenor et al., 2005)

The monetary base of the prevailing adjustment and stabilization program has consisted of several financial reforms devoted mainly to banking sector. As a result of these reforms, with the law enacted in 25th April 2001 the CBRT's main objective was defined as maintaining price stability. Concurrently, the short term advances which were formerly provided by the CBRT to Treasury and the purchases of Treasury debt instruments by the CBRT from the primary market were completely forbidden. The reforms have been an attempt towards the CBRT gaining operational independence which is accepted as one of the prerequisites of IT regime.

In order to achieve and maintain price stability, the program anticipated a tight monetary policy which would be implemented throughout firstly implicit later explicit IT regime. So, IT regime has been perceived as a monetary policy strategy to achieve to price stability goal. Before switching to explicit IT regime, the rate of inflation should be reduced to convenient levels. In the following years, the scope of the monetary policy would be arranged in order to prepare the convenient environment to switch to explicit IT regime. It is worth adding that interest rate and exchange rate policies pursued by the CBRT should be consistent with price stability aim. Therefore only excess fluctuations in exchange rate could be a cause of intervention. The decisions related to short term interest rate policy could be taken

only by considering the inflation in the future. The growth and employment policies of government could be supported only as long as they do not contradict with achieving price stability goal.

The performance of the fiscal adjustment program towards a budgetary discipline and monetary policy towards price stabilization can be tested through analyzing the trend in indicators after 2000.

The primary surplus has realized nearly the targeted levels. Domestic debt and accomplished interest rate and interest payments depict a downward trend. Foreign debt stock as a fraction of GNP decreased to before crisis level. However, the share of S-T foreign debt in total foreign debt started to increase after 2002. Furthermore, its ratio to the CBRT's gross reserves of foreign exchange also has following an upward trend.

Growth rates realized as 8%, 6% and 10% in 2002 and 2003 and 2004 respectively. On the other side, unemployment rate became stagnant at 10.3% and 10.5%.

After the program was launched to be implemented, a striking decrease in o/n interest rate is observed in the last four years. On the other side, the negative changes in money accounts imply to a contractive monetary policy as the program suggested. The contraction in monetary policy has had also positive effect on inflation. The rate of inflation started to fall down after 2000, the reduction gained speed with the implementation of the program and in 2005 it has reached to its minimum level of all fifteen years in the consideration.

Contrary to the improvements observed in several macro fundamentals, some particular accounts still depict a troublesome portrait. First one is real exchange rate. After the devaluation in 2001, it appreciated continually. Moreover, the amount of appreciation in 2005 is the highest one comparing with that of last fifteen years. Second one is the balance sheet accounts. The overvalued currency has deteriorated the trade balance account one more time. Trade and current account deficits have accelerated rapidly both in nominal terms and also as a fraction of GNP. Lastly, short term capital flows have still preserved its volatility. Moreover, its share in total capital flows has increased.

It can be easily argued that, the stabilization program after 2001 has become successful to large extend in recovering several macro fundamentals which have been deteriorated throughout the currency crises. On the other side, it has remained far from being a remedy or a solution to problematic balance payments accounts.<sup>3</sup>

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<sup>3</sup> See Appendix A for several macro indicators of the Turkish Economy after 1990

## **CHAPTER 3**

### **THE MODEL**

The model which is going to be introduced in this section can be identified as a candidate of monetary policy rule which might be pursued by the CBRT through last decade under consideration. As a policy instrument, interest rate is chosen. It is believed that identifying such a rule will be beneficial to convey which fundamentals the CBRT has regarded while determining its policy rate since the mid 1990's. Furthermore, investigating such a rule will give an answer to several questions mentioned in introduction part: Has the CBRT followed a policy rule consistent with his commitments about implicit inflation targeting regime and price stability objective? If such a rule exists, to what extent it has resembled to a typical Taylor rule which defends the optimality of the reaction of central bank to inflation and output gap for inflation targeting regime? While focusing on the control of inflation, has the CBRT completely disregarded real accounts such as real exchange rate (RER) or balance of payments accounts which have been particularly a problem in Turkish economy? To answer these questions, the model will be calibrated using the data of last ten years. Instead of covering the whole period in the study, the period will be divided to some sub periods to reach consistent results about which fiscal and financial accounts the CBRT might have taken in to account/reacted to in determining the policy rate through different periods. Furthermore, rather depicting

a rule with fixed variables, the formulations of the variables in the model will be altered between periods to obtain more significant and comparable results.

Considering such factors the basic model can be formed as follow:

$$i_t = \beta_0 + \beta_1 i_{t-1} + \beta_2 avm_{t-1} + \beta_3 inf_{t-1} + \beta_4 prod_{t-1} + \beta_5 rerc_{t-1} + \beta_6 ca_{t-1} + \varepsilon_t$$

$I_t$  is the monthly weighted average overnight interest rate of CBRT. Overnight interest rates are considered as the reaction tool (policy rate) of CBRT.

$I_{t-1}$  is the lagged value of overnight interest rate. It is settled into the equation in order to abstain from autocorrelation observed after running the model without it. Furthermore, central banks do not usually favor current interest rate deviating too much from previous periods. They take lagged interest rates into account in their policy rules. Therefore,  $i_{t-1}$  indicates “interest rate smoothing incentive” of the CBRT.

$Avm$  is the average maturity of domestic borrowing of government. Average maturity on its own can not be considered as a variable to whom CBRT could react directly. However, the rationale behind this variable taking part in this equation is that risk perception of the CBRT can be attributed to fiscal debt or average maturity of fiscal debt. Also, it should be emphasized that in order to refrain from a multicollinearity problem between explanatory variables, the average maturity of borrowing is also preferred to the real interest rate which includes risk premium on its own.

*Inf* is the inflation rate. In calibration of this model both WPI and CPI based inflation rates are used in order to make a comparison between the findings. For the period 1995-2004 1994=100 index, for 2004-2005 2003=100 index are used.

*Prod* refers to the change in the industrial production index (IPI). The IPI measures the physical volume of output of the nation's manufacturing sector, including factories, mines, and utilities. Because of its availability in high frequency, it is used as a proxy of aggregate economic activity instead of GDP/GNP growth rate of Turkey.

*Rerch* refers to the change in RER. In calibration process both WPI and CPI based RER are used to provide consistency with the type of the inflation rate used in the same model. Incidentally, an increase in the real exchange rate or a positive *rerch* means appreciation of the domestic currency against the foreign currency. An increase in the change in RER implies that the RER have appreciated or depreciated more compared with previous period. A decrease in the change in RER means a reduction in appreciation or depreciation of RER again compared with previous period. The reason of preferring the change in RER rather than its level is refraining from the problems caused by unit root characteristics of RER.

Lastly, *ca* is used in this model as the ratio of current account balance to gross exchange reserves of the Central Bank.

Monthly data is preferred for the variables in the model. To add, for the variables represented as ‘change’, both ‘monthly percentage change’ and also ‘annual percentage change’ formulations are used from time to time.

After clarifying the explanatory variables two important points remained to be emphasized. The model is designed in order to test whether the CBRT reacts to the indicators in a backward-looking fashion, in other words whether the CBRT takes one period/month lagged variables into consideration while establishing its reaction function or interest rate rule. In literature, it is possible to encounter studies which used extended Taylor rules based on both backward looking and forward looking or forecast-based models, such as Clarida et al.(1998) or Siklos et al.(2004). While some of them support that a forward looking model describes the central bank behavior quite well, some of them could not reach strong evidences to reject backward looking models outright. However, most of those studies concern the monetary policy in developed economies. Kesriyeli and Yalçın (1998) show in their study that a forward-looking policy rule performed insufficiently, unlike in a developed economy, in explaining the Central Bank reaction behavior. According their findings, such an insufficiency can support the argument about expectations formed inertial or in a backward-looking manner. Secondly, to clarify the connection between the policy rate and the lagged variables, a linear policy rule is examined. In fact, it is a simplification of more complicated non-linear rules with more lags for variables. Nevertheless, it is expected that this model could give meaningful results.

As a whole the equation attempts to depict the relationships between the CBRT’s policy rate and the several economic indicators mentioned above. The signs of the

coefficients, on the other side can imply the direction of this relationship or that of reaction of the Central Bank to the changes in these variables.

The sign of the coefficient of the rate of inflation is expected to be positive which means an increase in the inflation rate could be replied by the CBRT with an increase in interest rate in the next period. By increasing interest rate the CBRT could aim for curbing an increase in aggregate demand and alleviate inflationary pressures. This expectation is devoted especially to the period after 2001 when the Central Bank policy statements directed to price stability and IT policies.

Under the assumption that the CBRT reacts to risk premium of the country; the sign of the coefficient regarding the average maturity of domestic borrowing is expected to be negative. As the average maturity of domestic borrowing increases, the roll over of fiscal debt gets easy. This improvement is perceived by domestic and foreign lenders as a decrease in default risk of debt. The country's risk premium decreases and the CBRT can probably react to this situation by decreasing interest rates.

In case the CBRT giving a reaction to the movements in IPI, any increase in IPI change is expected to be followed by a positive reaction of central bank through increasing its policy rate. This expectation is valid under the assumption that the CBRT concerns about curbing a probable inflation increase caused by an expansionary situation. A contradiction in output on the other hand, might be mitigated by the CBRT through decreasing interest rate and inciting consumption and investment.

Including the RER directly in to the optimal policy rule is also a controversial subject in monetary policy literature for several years. The debates about this crucial subject have been mentioned in the introduction part. Therefore, inserting the RER into the model is essential in order to detect whether there has been an interest rate reaction to movements in RER. Furthermore, in case of finding a significant relationship between the RER movements and the policy rate, the direction of this relationship will be also important. The change in the RER can be in same magnitude but in opposite direction. Therefore, the sign of the reaction parameter related to RER movements have two different meanings. Suppose that the reaction parameter of *rerch* is negative: if the CBRT observes that the RER has appreciated more or depreciated less compared with previous period then it replies by a reduction in its policy rate in the current period. If the CBRT observes a more depreciation or less appreciation it prefers to increase its policy rate.

Lastly, the sign of the coefficient regarding the ratio of current account balance to the CBRT's gross exchange reserves can imply whether the Central Bank is cautious to its reserve position against current account deficits. If the CBRT abstains from high level of current account deficits, it can react as decreasing interest rates. So, it can prevent any further real exchange rate appreciation; hence can curb any further increase in import. The current account deficit can be lessened through recovering the trade balances. On the other side, if the CBRT aims to maintain the short term capital flow to finance the deficit, it could prefer to increase interest rate. Any rise in interest rate will also curb aggregate demand hence income and as a result import can be lessened through this channel. The latter expectation is more meaningful considering the monetary policy implemented during the last fifteen years. In

literature, such an indicator doesn't seem to be involved in a policy rule. Therefore, finding a significant reaction of the CBRT to this account will be surprising. To add, negative signs in data refer to deficits. Therefore, a negative reaction parameter for this account means a positive relationship between policy rate and the variable in question. That means, an increase in the current account deficit as to the CBRT's gross exchange reserves could be replied by an increase in the policy rate in the next period.

## **CHAPTER 4**

### **THE RESULTS**

The model described in the previous section is applied to the monthly data between 1995 and 2005 September. In estimation procedure, OLS method is used in e-views program. Meanwhile, as mentioned before instead of estimating the reaction parameters for the whole period, the period is divided mainly in three intervals.

The first part starts in 1995, after the currency crisis and continuous till November 1999, before switching to the new monetary policy relying on pegged exchange rate regime.

The second part begins with 2001 September when the negative effects of the currency crisis almost vanished and ends at 2005 September. The last part can be considered as a sub-period of the second part. It covers the interval between 2003 and 2005 September. Results obtained from estimation process covering this period will be essential in order to grasp the degree of conformity of the CBRT to his commitments about floating exchange rate, price stability and accordingly implicit IT.

The period which captures 1999 December and 2001 September is preferred to be excluded from the estimation process. That period covers totally 22 months and is

dominated by the adoption of the pegged exchange rate regime and a currency crisis followed the collapsing of this regime. Therefore, it is believed that including this period to the estimation procedure will not contribute much to obtaining significant results.

#### 4.1 1995:01 – 1999:11

The estimated equation accomplished to this period is:

$$i_t = 34.2 + 0.55i_{t-1} - 0.12avm_{t-1} - 0.03inf_{t-1} - 0.1prod_{t-1} - 0.3rerch_{t-1} - 0.1ca_{t-1}$$

(3.45)      (3.93)      (-0.04)      (-0.6)      (-0.2)      (-0.3)      (-0.2)  
(t-stat)

$$R^2 = 0.37$$

$$D - W = 1.64$$

$$t - critical = 1.96(\alpha = 0.05)$$

For the rate of inflation and the RER monthly percentage change in WPI based data are used. (table 1) When the equation above is analyzed it is seen that the signs of reaction parameters of lagged interest rate and average maturity of borrowing are consistent with the expectations. However, except those of the constant term and the lagged value of interest rate, all the other parameters are unsuccessful in revealing a meaningful relationship between the explanatory variables and the policy rate.

The model is also carried out by altering the formulation of data, such as converting the monthly percentage change data to annual percentage change data for relevant indicators yet this attempt does not result again in significant results. (table 2)

Going one step further, this model is carried out with CPI based data for the inflation rate and the RER. Whereas the model estimated with the monthly percentage change data does not yield any strong results (*table 3*), the model with the annual percentage data led to meaningful findings (*table 4*):

$$i_t = 36.7 + 0.43i_{t-1} - 0.2avm_{t-1} + 1.33inf_{t-1} - 0.4prod_{t-1} + 0.3rerch_{t-1} - 0.5ca_{t-1}$$

(3.75)
(3.49)
(-1.07)
(1.91)
(-2.1)
(2.45)
(-1.3)  
(t-stat)

$$R^2 = 0.45$$

$$D - W = 1.7$$

Beside the lagged value of interest rate and the constant term, the estimated reaction parameters of the changes in RER in IPI are found significant at %95 significance level. However, low R-squared implies to poor performance of the variables overall in explaining the variations in policy rate.

Lastly, to detect whether the policy rate reacted to fiscal accounts the model is modified as inserting some fiscal indicators such as budget deficit/GNP, PSBR/GNP, short term public debt/GNP directly into the model. Nevertheless, no significant relationship is found out between the CBRT's policy rate and the remaining variables. (*table 5*)

## 4.2 2001:09-2005:09

The importance of the estimation process regarding this period has been stressed beforehand. To obtain significant results the model is applied for different formulations of data. To add, before interpreting the estimation results it is worth emphasizing that after estimating the model, several residual tests are executed such as Autoregressive conditional heteroscedasticity (arch) LM test, serial correlation test to detect and refrain from any conditional heteroscedasticity or autocorrelation problems. Therefore, while making interpretation such factors also will be taken into account.<sup>4</sup>

A) In the first part, WPI based inflation rate, WPI based RER are used in the estimation process.

1. For the first estimated equation shown below, monthly percentage changes in the rate of inflation; the IPI and the RER are used.

$$\begin{aligned} \hat{i}_t = & -0.6 + 0.97\hat{i}_{t-1} + 0.003\text{avm}_{t-1} + 0.3\text{inf}_{t-1} - 0.1\text{prod}_{t-1} - 0.1\text{rerch}_{t-1} - 0.1\text{ca}_{t-1} \\ & (-0.86) \quad (58.58) \quad (0.25) \quad (2.52) \quad (-1.70) \quad (-1.54) \quad (-0.98) \\ & \hspace{15em} \text{(t-stat)} \end{aligned}$$

$$R^2 = 0.996$$

$$D-W = 1.65$$

$$t - \text{critical} = 2.01 (\text{at } \alpha = 0.05)$$

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<sup>4</sup> Only the model estimated by using CPI based monthly percentage change data in parts B-1-2 has created a problem in terms of “arch” and serial correlation. See appendix B, table 22-23.

When the t- statistics are compared with t critical value at %95 significance level, only the effects of lagged interest rate and rate of inflation to policy rate are found out as significant. (table 6) The estimated parameter of the inflation rate has expected sign. The CBRT could be poised to any increase in inflation and might have tried to prevent any inflationary situation by increasing interest rate and decreasing aggregate demand.

2. This time, the equation is estimated as replacing the old IPI series with the new IPI series. The new IPI data is recorded monthly. The estimated equation is stated below:

$$i_t = -0.8 + 0.97i_{t-1} + 0.02avm_{t-1} + 0.4inf_{t-1} - 0.03prod_{t-1} - 0.1rerch_{t-1} - 0.04ca_{t-1}$$

(-1.2)    (61.88)            (0.97)            (3.28)            (-1.31)            (-2.09)            (-0.65)  
(t-stat)

$$R^2 = 0.996$$

$$D - W = 1.79$$

Compared with the equation in which the old IPI data is used, this equation reveals several differences. While in the previous equation only the reaction parameters regarding inflation and lagged interest rate are significant, the results of this equation state that the Central Bank could have reacted through this period not only to the rate of inflation and the lagged interest rate but also to the changes in RER. The relationship between the change in RER and the policy rate is described by a negative estimated coefficient. So, the CBRT might not have favored any further appreciation of RER causing further contradiction in output, therefore it could have favored easing monetary policy by reducing the interest rate in the next period. (table 7)

- The model is also estimated by using annual percentage changes for the rate of inflation, the RER and the IPI. The estimated equation is shown below:

$$i_t = 0.1 + 0.96i_{t-1} - 0.01avm_{t-1} + 0.02inf_{t-1} + 0.1prod_{t-1} - 0.1rerch_{t-1} + 0.01ca_{t-1}$$

(-0.07)    (26.5)            (-0.37)            (0.7)            (1.27)            (-3.62)            (0.12)  
(t-stat)

$$R^2 = 0.996$$

$$D - W = 1.22$$

According to the estimation result, through these years the CBRT might have implemented its policy rule by taking only real exchange rate appreciations into consideration (beside lagged interest rate). However, the low D-W statistics can be a sign of autocorrelation which can easily overshadow the performance of the interpretation made considering the results. The model is also examined by using the new IPI series yet same problems are encountered. So, this part does not give any consistent result. (*table 8-9*)

**B)** The same procedure is followed this time by replacing WPI based inflation by CPI based inflation and at the same time converting WPI based RER to CPI based RER.

- Firstly, the equation is estimated by using the monthly percentage change data for the rate of inflation, the change in IPI and RER. The estimation output is obtained as:

$$i_t = -0.6 + 0.97i_{t-1} + 0.01avm_{t-1} + 0.01inf_{t-1} - 0.2prod_{t-1} - 0.1rerch_{t-1} - 0.05ca_{t-1}$$

(-0.86) (31.34)      (-0.77)      (0.54)      (-2.68)      (-1.43)      (-0.72)  
(t-stat)

$$R^2 = 0.996$$

$$D - W = 1.36$$

The estimated values depict a different picture: In reaction function beside lagged value of interest rate (which is an unsurprising result) only the IPI changes have a meaning. Nevertheless, such an interpretation based on the results can not be completely true due to a probable autocorrelation problem which is signaled by low D-W value. (*table 10*)

2. The same procedure is followed with the new IPI series. Except the constant term and the lagged interest rate none of explanatory variables passes the significance test. Again, the same autocorrelation problem is detected. The part can be also ignored. (*table 11*)

3. On the other side, estimating the model with the annual percentage change data gives some interesting results. The estimated equations by using the old IPI and the new IPI are stated respectively below:

$$i_t = -0.2 + 0.95i_{t-1} + 0.0001avm_{t-1} + 0.4inf_{t-1} + 0.1prod_{t-1} - 0.04rerch_{t-1} - 0.02ca_{t-1}$$

(-0.3) (64.96)      (-0.005)      (2.46)      (1.81)      (-3.06)      (-0.28)  
(t-stat)

$$R^2 = 0.996$$

$$D - W = 1.4$$

$$i_t = 0.2 + 0.95i_{t-1} - 0.01avm_{t-1} + 0.35inf_{t-1} - 0.03prod_{t-1} - 0.03rerch_{t-1} - 0.01ca_{t-1}$$

(0.26)      (62.2)              (-0.29)              (2.15)              (1.03)              (-2.66)              (-0.15)  
(t-stat)

$$R^2 = 0.996$$

$$D - W = 1.39$$

The values obtained from both of the equations show that the CBRT might have arranged its policy rate according to the movements in the rate of inflation and the RER. The signs of estimated reaction parameters imply to the similar reaction of the CBRT to the change in the rate of inflation and overvalued RER compared with part 'A2'. Again, low value of D-W statistics decreases the reliability of the result. (*table 12-13*)

### 4.3 2003:01- 2005:09

The results which will be obtained from estimating the model for the last period carry importance in the sense that they will provide an idea about current considerations of the CBRT and they will show whether there has been any change in considerations of the CBRT in the current period compared to whole period after 2001. The order of stating the results is similar to that of previous part.

A) In the first part, WPI based inflation rate and RER are used in the estimation process.

1. For the first estimated equation shown below, monthly percentage changes for the rate of inflation, old IPI and RER are used.

$$i_t = -0.1 + 0.97i_{t-1} - 0.03avm_{t-1} + 0.25inf_{t-1} - 0.1prod_{t-1} - 0.13rerch_{t-1} - 0.2ca_{t-1}$$

(-0.16)    (52.4)            (-0.15)            (2.4)            (-0.77)            (-2.47)            (-2.52)  
(t-stat)

$$R^2 = 0.994$$

$$D - W = 2.15$$

$$t - critical = 2.03(\alpha = 0.05)$$

The statistics are more successful compared those of for 2001-2005. Beyond this, one point should be emphasized regarding the estimation result:

Although the results regarding the previous period support that the CBRT policy might have been implemented by giving priority to inflationary concerns, after 2003 the movements in RER and the current account deficit also have become directly in the reaction function of the CBRT. The sign of the coefficients regarding significant indicators conform to those in part A1 of previous period. For instance, any one point increase in the current account deficit as to the CBRT gross reserves is replied with a 0.2 point increase in the policy rate. (*table 14*)

2. The same results described above are obtained as using the new IPI series instead of the old one.

$$i_t = -0.1 + 0.97i_{t-1} - 0.04avm_{t-1} + 0.3inf_{t-1} - 0.03prod_{t-1} - 0.13rerch_{t-1} - 0.2ca_{t-1}$$

(-0.15)    (5.71)            (-0.52)            (2.68)            (-1.5)            (-2.68)            (-2.87)  
(t-stat)

$$R^2 = 0.994$$

$$D - W = 2.16$$

Again, compared with the CBRT policy covering the whole period after 2001 September, the values obtained from the estimated model support the probability that in the recent years the CBRT has watched the current account deficits and its position against this deficit beside the rate of inflation and the movements in RER. (table 15)

3. This time, the same model is applied by replacing the monthly percentage change data formulation with annual percentage change one:

$$i_t = -0.9 + 0.94i_{t-1} - 0.02avm_{t-1} - 0.03inf_{t-1} + 0.1prod_{t-1} - 0.06rerch_{t-1} - 0.1ca_{t-1}$$

(-0.85)    (13.02)            (-0.65)            (0.37)            (2.3)            (-3.8)            (-1.62)  
(t-stat)

$$R^2 = 0.994$$

$$D - W = 1.97$$

$$i_t = -0.3 + 1.05i_{t-1} - 0.02avm_{t-1} - 0.1inf_{t-1} + 0.01prod_{t-1} - 0.05rerch_{t-1} - 0.06ca_{t-1}$$

(-0.26)    (15.2)            (-0.61)            (-1.4)            (0.27)            (-3.34)            (-0.89)  
(t-stat)

$$R^2 = 0.994$$

$$D - W = 1.67$$

In the latter equation new IPI series is used. Both equations describe only one significant relationship (except the lagged value of policy rate). That is between the change in RER and the policy rate. No autocorrelation, serial correlation or arch is detected in both estimated equations contrary to the model estimated with same type of data for 2001-2005.(table 16-17)

**B)** In this part, CPI based data is used for the rate of inflation and the RER.

1. The equation is estimated by using monthly percentage change data. The results are obtained as follow:

$$i_t = -0.2 + 0.95i_{t-1} - 0.02avm_{t-1} + 0.02inf_{t-1} - 0.1prod_{t-1} - 0.14rerch_{t-1} - 0.14ca_{t-1}$$

(-0.23) (17.21)      (-0.57)      (0.47)      (-1.43)      (-2.4)      (-2.26)  
(t-stat)

$$R^2 = 0.993$$

$$D - W = 1.58$$

$$i_t = -0.1 + 0.95i_{t-1} - 0.03avm_{t-1} + 0.02inf_{t-1} - 0.03prod_{t-1} - 0.14rerch_{t-1} - 0.2ca_{t-1}$$

(-0.13) (17.21)      (-1.002)      (0.46)      (-1.42)      (-2.4)      (-2.49)  
(t-stat)

$$R^2 = 0.993$$

$$D - W = 1.48$$

The first model is estimated with the old IPI series and the latter one with the new IPI series. Both of two give the same results. As mentioned before, the precision of the estimation results by using the same type of variables for period after 2001 has been weakened due to the autocorrelation problem.

Such a weakness is not encountered in the estimation process for sub period. Therefore, instead of comparing the sub period results with those of whole period, interpreting the findings accomplished to the period after 2003 individually can be also meaningful. The estimation results suggest that only the lagged real exchange rate movements and the reserve position of the CBRT towards the current account deficit significantly affected the policy decision of the CBRT. Besides, it is worth to emphasize that, the model does not support any significant relationship between the lagged inflation rate and the CBRT policy rate. (table 18-19)

2. The last version of the model uses annual percentage change data for the rate of inflation and the RER. The following equations are obtained with the old IPI and the new one respectively.

$$i_t = -0.2 + 0.94i_{t-1} - 0.01avm_{t-1} + 0.26inf_{t-1} + 0.1prod_{t-1} - 0.34rerch_{t-1} - 0.08ca_{t-1}$$

(-0.23) (48.75)      (-0.31)      (1.13)      (-2.01)      (-2.52)      (-1.36)  
 (t-stat)

$$R^2 = 0.994$$

$$D - W = 1.58$$

$$i_t = 0.4 + 0.94i_{t-1} - 0.02avm_{t-1} + 0.26inf_{t-1} + 0.05prod_{t-1} - 0.03rerch_{t-1} - 0.1ca_{t-1}$$

(-0.39) (46.4)      (-0.57)      (1.1)      (1.26)      (-2.33)      (-0.91)  
 (t-stat)

$$R^2 = 0.994$$

$$D - W = 1.63$$

The estimated values of reaction parameters in both equations describe only a meaningful connection between the movements in RER and the CBRT policy rate (beside interest smoothing factor). Both equations do not support any sensitivity of the Central Bank policy rate to the lagged inflation figure. *(table20-21)*

To summarize the findings and the performance of the estimated models:

1. For the period between 1995-1999 the performance of the model in explaining the CBRT's behavior (reaction function) with right hand side variables is low. This case is not surprising. It is hard to expect a meaningful and consistent monetary policy and a policy rule in such an unstable environment in the economy.
2. The explanatory power of the model for the period after 2001 has increased significantly. Estimating the model with different variables has given mostly meaningful and consistent results.
3. Average maturity of borrowing of government does not appear to be significant in all models estimated. No evidence has been found about that the CBRT has reacted to the length of the average maturity on domestic borrowing as perceiving it a sign of risk premium.
4. At 95% significance level no meaningful relationship has been detected between the policy rate and the industrial production index except in the

model where annual percentage change CPI based data are used for 2001-2005. However, due to the weak performance the reliability of the results obtained from this model is also low.

5. Nearly one to one relationship between the interest smoothing factor (the lagged interest rate) and the current interest rate has been detected almost in all the models. Evidence suggests that the CBRT might not have favored large differentials between its policy rate in the previous period and that in the current period.
6. In the models estimated for the period after 2001 R squared has got a value near to 1 (100%). Probably, such a case might have resulted from the close relationship between lagged interest rate and policy rate of the CBRT.
7. Although there is no significant difference between the formulations of data, the models estimated with those data have given different results and have shown performance at different levels.
8. Considering the performances of the models described above, it can be easily argued that the model which has been estimated by using WPI based data with monthly percentage change has performed better for both the intervals 2001-2005 and 2003-2005. On the other side, for the period between 1995 and 1999 the CPI based data have given more meaningful results, although the overall performance of the model has been low.

9. When the interval 2001-2005 is under consideration, it can be stated that the rate of inflation could have priority in constituting the monetary policy rule by the CBRT. Indeed, the findings support a significant relationship between the policy rate and the rate of inflation in a backward-looking fashion. The positive sign of the coefficient regarding the rate of inflation implies to a positive response of the CBRT to any increase in inflation in the previous period. However, in each model, the estimated coefficients are less than one. Thus, it is hard to say that the CBRT might have adopted 'greater than one principle' i.e. 'any one point increase in inflation is responded through more than one point raise in interest rate. (Taylor,2005) Moreover, in some estimated models, the effect of the RER is more than that of inflation rate.
10. During the study, some findings have revealed that the movements in RER might also have been reacted by the CBRT to. Furthermore, all the results obtained from the estimations whether performed well or not, suggest that the importance of the RER movements has amplified in the recent years. The results can hardly support the attitude of the CBRT towards focusing only on internal targets and favoring pure floating exchange rate.
11. To add, the sign of the estimated parameter regarding RER movements has been negative in all parts for the period after 2001. The negative sign of the coefficient supports the argument that any probable contraction in output caused by an increase in appreciation of the RER has been tried to be prevented by easing monetary policy.

12. Current account balance (in fact the foreign reserve position of the CBRT as to current account balance) did not appear to be reacted by the CBRT during to whole period after 2001. However, by referring to results obtained in parts A1-A2 and B1-B2 for the last period it can be put forward that the importance of the current account balance has risen in the CBRT's considerations. The negative sign of the estimated parameter regarding this account shows a positive relationship between the current account deficits and the interest rate. This relationship reveals that the CBRT might have aimed to finance the deficit by increasing its policy rate attracting short term capital flow. At the same time, by maintaining high level of interest rates it could have tried to decrease aggregate demand, income and hence imports.

## **CHAPTER 5**

### **CONCLUSION**

To summarize, with the reforms oriented towards removing the constraints against international trade and capital movements the Turkish economy was introduced with an unstable environment caused by internal and international distortions contrary to the expectations. The prevailing disequilibria in the economy throughout 1990's have caused two noteworthy external and domestic crises which deteriorated the fiscal and financial panorama drastically. As being squeezed by fiscal and financial imbalances and currency crises, monetary policy almost lost its effectiveness towards achieving the goal of stabilizing exchange rate and reducing inflation.

In fact, as being an emerging economy, Turkey experienced similar process with other emerging market countries.

Coming to the 2000's, new reforms and stabilization and adjustment programs were presented by international agencies to those countries. The monetary side of these reforms was oriented towards a pure floating exchange rate regime and implementation of a monetary policy that focuses entirely on the control of inflation while disregarding other fiscal or financial considerations to a large extent. The IT regime which has already been adopted by several developed countries was pushed

forward by international supervisors as a monetary policy strategy that the central banks could/should implement.

This thesis has focused on the monetary policy of the CBRT particularly after 2001 when the new fiscal adjustment and stabilization program started to be implemented under the supervision of IMF. Has the CBRT focused its monetary policy rule only on the control of inflation as being consistent with its commitments about inflation targeting regime or has it regarded other economic considerations in his reaction function as well?

Estimation of the model depicted as a monetary policy rule in section three has provided sufficient results to answer the questions posed.

To conclude, the findings regarding the period after 2001 support that the CBRT might have followed a backward-looking monetary policy rule in which it has mainly reacted to the rate of inflation increases via tightening of monetary policy. In that sense the policy rule could have similarities with the original Taylor rule.

However, considering the findings related to period after 2003 it can be evidently argued that the CBRT might have also concerned real exchange rate movements and current account deficits in his reaction function. On the one hand, it might have reacted to real appreciations by easing monetary policy in order to prevent any further contraction in output. On the other hand, a rise in current account deficit (as to its foreign exchange reserves) might have been responded by increasing policy rate in order to attract more capital into the country to finance the deficit and at the same time to reduce import level by decreasing aggregate demand and income. As a

whole, the findings draw a different picture about the current policy implementation of the CBRT under its commitments towards favoring floating exchange rate and focusing on inflation.

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## APPENDIX A

### Main Indicators of the Turkish Economy after 1990

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 <sup>a</sup>
<b>International Accounts</b>																
Current Account <sup>b</sup> (CA)	-2625	250	-974	-6433	2631	-2339	-2437	-2638	1984	-1344	-9819	3390	-1522	-8037	-15661	-16352
Current Account <sup>c</sup>		-109.5	-489.6	560.5	-140.9	-188.9	4.2	8.2	-175.2	-167.7	630.6	-134.5	-144.9	428.1	94.9	4.4
CA/GNP (%)	-1.7	0.2	-0.6	-3.6	2.0	-1.4	-1.3	-1.4	1.0	-0.7	-4.9	2.3	-0.8	-3.4	-5.2	
Trade Balance/GNP (%)	-6.3	-4.9	-5.1	-7.9	-3.1	-7.7	-5.6	-7.8	-6.8	-5.5	-11.0	-2.6	-4.0	-5.9	-8.0	
Net direct INV <sup>c</sup>		17.2	-0.5	-20.2	-10.1	38.1	-20.7	-9.5	3.4	-75.9	-18.8	2372.3	-70.2	48.9	55.3	56.1
Net Portfolio INV <sup>c</sup>		13.9	287.0	62.5	-70.4	-79.5	140.5	186.7	-510.7	-151.1	-70.2	-541.8	-86.9	-515.7	225.5	11.7
Net Portfoli INV share in Total	11.3	22.8	28.3	25.3	-12.7	4.4	11.8	15.6	-321.4	36.3		33.6	-21.8	27.2	25.4	30.5
Foreign Debt <sup>b</sup>		3.0	10.1	21.2	-2.6	11.7	8.2	6.1	14.5	6.8	15.1	-4.1	14.6	11.6	11.3	0.0
Foreign Debt/GNP(%)	32.5	33.6	35.2	37.7	49.6	43.1	43.2	43.7	46.7	55.6	59.3	78.0	72.0	60.8	54.0	
S-T Foreign Debt <sup>c</sup>		-4.0	38.9	46.4	-39.0	38.8	8.7	3.6	17.4	10.3	23.5	-42.0	0.1	40.1	38.8	4.9
S-T Foreign Debt/CBRTGross Reserves	165.0	189.4	207.3	295.2	163.8	130.4	104.2	95.1	105.4	98.9	112.8	86.8	60.8	68.2	88.7	74.7
S-T Foreign Debt/GNP(%)	6.3	6.1	8.0	10.4	8.5	9.2	9.3	9.2	10.1	12.4	14.1	11.3	9.1	9.6	10.7	
S-T Foreign Debt share in Total	19.4	18.1	22.8	27.5	17.2	21.4	21.5	21.0	21.6	22.3	23.9	14.4	12.6	15.8	19.7	20.7
M and L-T Foreign Debt <sup>c</sup>		4.6	3.8	13.7	11.2	6.1	8.0	6.8	13.8	5.9	12.7	7.7	17.0	7.5	6.2	-1.2
M and L-T Foreign Debt/GNP(%)	26.2	27.5	27.1	27.3	41.0	33.9	33.9	34.5	36.6	43.2	45.1	66.8	62.9	51.1	43.4	
Real Exchange Rate <sup>c</sup>	3.2	-7.2	0.9	2.3	-14.9	1.3	3.2	10.6	-2.5	0.8	8.7	-9.3	9.1	7.9	4.0	11.0

(cont'd)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 <sup>a</sup>
<b>Fiscal Accounts</b>																
PSBR <sup>c</sup>	139.6	119.1	81.0	105.5	28.0	28.0	229.5	74.5	122.1	142.2	21.8	95.5	20.6	-10.8		
Budget Deficit/GNP(%)	-3.3	-5.3	-4.3	-6.7	-3.9	-4.0	-8.3	-7.6	-6.9	-11.6	-10.2	-16.2	-14.2	-11.2	-7.1	
Primary Surplus/GNP(%)	-0.2	-1.5	-0.6	-0.9	3.8	3.3	1.7	0.1	4.6	2.1	6.0	7.1	4.6	5.3	6.1	
PSBR/GNP(%)	7.4	10.2	10.6	12.0	7.9	5.0	8.6	7.7	9.4	15.5	11.8	16.4	12.7	8.7		
<i>Financing of Deficit</i>																
Foreign borrowing, net <sup>d</sup>				-67,2	-79,6	-134,4	-447,1	-1035,6	459,7	2676,7	-4448,2	16570,5	2684,3	4014,5		
Domestic Borrowing, net <sup>d</sup>				173,9	282,9	1066,2	2505,5	4590,2	9740,5	9350,9	23542,3	17474,5	42883,8	30758,9		
Short Term Advance <sup>d</sup>				51,9	94,7	229,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0		
Domestic Debt <sup>c</sup>	36.4	70.8	98.9	84.0	123.7	70.3	131.4	99.5	84.8	97.4	58.9	235.4	22.7	29.7	15.5	
Domestic Debt/GNP(%)	14.4	15.4	17.6	17.9	20.6	17.3	21.0	21.4	21.7	29.3	29.0	69.2	54.5	54.5	52.3	
Avg. comp. Int Rate on Domestic Debt	54.0	80.5	87.7	87.6	164.0	121.9	135.2	127.2	122.5	109.5	38.0	96.2	63.8	45.0	27.0	25.0
Real Int. Rate on Domestic Borrowing <sup>c</sup>	-4.0	5.4	13.1	9.6	17.3	26.0	30.8	14.1	31.1	24.1	-0.7	16.4	26.2	22.5	16.2	
Int. Pay. of Domestic Debt/GNP(%)	2.4	2.7	2.8	4.6	6.0	6.2	9.0	7.7	11.7	14.0	16.4	22.6	19.0	16.4	11.7	

(cont'd)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 <sup>a</sup>
<b>Monetary Accounts</b>																
O/N Interest Rate	52.0	72.2	65.3	63.0	133.5	72.3	76.5	70.4	74.5	73.2	54.1	93.2	49.5	36.0	21.8	15.0
Gross Reserves of CBRT <sup>b</sup>	5759	4813	6107	6277	6906	12043	16386	18610	19718	23177	25097	18892	27006	33724	36006	44847
Gross Reserves of CBRT <sup>c</sup>		-16.4	26.9	2.8	10.0	74.4	36.1	13.6	6.0	17.5	8.3	-24.7	42.9	24.9	6.8	24.6
M1 <sup>c</sup>			67.4	64.8	78.8	68.2	131.0	76.3	62.1	82.7	61.3	50.6	39.2	45.4	25.1	21.0
M2 <sup>c</sup>			62.9	48.1	123.2	99.4	132.8	93.5	101.9	96.1	42.5	48.0	31.0	33.7	31.2	23.5
M2Y <sup>c</sup>			74.9	60.9	152.7	102.0	122.6	98.4	89.5	100.7	40.2	87.5	25.4	13.0	22.1	12.6
<b>Production- Prices</b>																
GDP <sup>b</sup>	9.3	0.9	6.0	8.0	-5.5	7.2	7.0	7.5	3.1	-4.7	7.4	-7.5	7.9	5.8	8.9	
Unemployment Rate											6.6	8.5	10.3	10.5	10.3	10.5
Growth Rate <sup>f</sup>	9.4	0.3	6.4	8.1	-6.1	8.0	7.1	8.3	3.9	-6.1	6.3	-9.5	7.9	5.9	9.9	
Per capita GNP (\$)	2682	2621	2708	3004	2184	2759	2928	3079	3255	2879	2965	2123	2598	3383	4172	
Industrial Production Index <sup>b</sup>		17.8	-7.3	7.7	76.5	-39.4	4.9	24.2	-29.6	-1.3	-43.3	75.6	-56.6	-38.3	-49.2	
CPI based Inflation Rate	60.4	71.1	66.0	71.1	125.5	76.1	79.8	99.1	69.7	68.8	39.0	68.5	29.8	18.4	9.3	
Resources:CBRT, State Planning Organization Main Economic Indicators																
<sup>a</sup> covers the last data recorded																
<sup>c</sup> change																
<sup>b</sup> million \$																
<sup>d</sup> million YTL																
<sup>e</sup> calculated by using CPI based Inf. Rate																
<sup>f</sup> change in Real GNP																

## APPENDIX B

### Tables related to Chapter 4<sup>5</sup>

Table 1

Dependent Variable: ONINT

Method: Least Squares

Date: 01/07/06 Time: 00:08

Sample(adjusted): 1995:02 1999:11

Included observations: 58 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	34.19899	9.903556	3.453203	0.0011
ONINT(-1)	0.549369	0.139732	3.931601	0.0003
AVMAT(-1)	-0.123455	0.207538	-0.594854	0.5546
INF_WPI(-1)	-0.031953	0.794721	-0.040206	0.9681
PROD(-1)	-0.071562	0.310443	-0.230516	0.8186
RERCH_WPI(-1)	-0.271466	0.973480	-0.278862	0.7815
CA(-1)	-0.059875	0.331962	-0.180366	0.8576
R-squared	0.364526	Mean dependent var	73.25929	
Adjusted R-squared	0.289764	S.D. dependent var	8.979100	
S.E. of regression	7.567182	Akaike info criterion	6.998280	
Sum squared resid	2920.374	Schwarz criterion	7.246955	
Log likelihood	-195.9501	F-statistic	4.875836	
Durbin-Watson stat	1.643910	Prob(F-statistic)	0.000526	

<sup>5</sup> In the tables following:

“\_wpi” refers to WPI based data for inflation rate and RER

“\_cpi” refers to CPI based data for inflation rate and RER

“\_apc” refers annual percentage change for relevant data

“\_new” refers to new IPI series used in the estimation of the model

**Table 2**

Dependent Variable: ONINT  
Method: Least Squares  
Date: 01/07/06 Time: 00:32  
Sample(adjusted): 1995:02 1999:11  
Included observations: 58 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	42.21878	12.02990	3.509488	0.0009
ONINT(-1)	0.524651	0.121530	4.317064	0.0001
AVMAT(-1)	-0.245610	0.223315	-1.099835	0.2766
INF_WPI_APC(-1)	-0.065241	0.061609	-1.058951	0.2946
PROD_APC(-1)	-0.203907	0.238474	-0.855048	0.3965
RERCH_WPI_APC(-1)	0.267308	0.238707	1.119820	0.2680
CA(-1)	-0.105723	0.338553	-0.312280	0.7561
R-squared	0.411236	Mean dependent var	73.25929	
Adjusted R-squared	0.341969	S.D. dependent var	8.979100	
S.E. of regression	7.283764	Akaike info criterion	6.921934	
Sum squared resid	2705.714	Schwarz criterion	7.170609	
Log likelihood	-193.7361	F-statistic	5.937020	
Durbin-Watson stat	1.677806	Prob(F-statistic)	0.000093	

**Table 3**

Dependent Variable: ONINT  
Method: Least Squares  
Date: 01/07/06 Time: 00:34  
Sample(adjusted): 1995:02 1999:11  
Included observations: 58 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	42.78203	12.51111	3.419523	0.0012
ONINT(-1)	0.509629	0.125582	4.058148	0.0002
AVMAT(-1)	-0.231843	0.228502	-1.014619	0.3151
INF_CPI(-1)	-0.058494	0.054516	-1.072987	0.2883
PROD(-1)	-0.058512	0.307238	-0.190445	0.8497
RERCH_CPI(-1)	-0.197039	0.716904	-0.274847	0.7845
CA(-1)	-0.060119	0.328160	-0.183201	0.8554
R-squared	0.378535	Mean dependent var	73.25929	
Adjusted R-squared	0.305421	S.D. dependent var	8.979100	
S.E. of regression	7.483307	Akaike info criterion	6.975989	
Sum squared resid	2855.994	Schwarz criterion	7.224663	
Log likelihood	-195.3037	F-statistic	5.177356	
Durbin-Watson stat	1.633073	Prob(F-statistic)	0.000319	

**Table 4**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/07/06 Time: 00:37  
 Sample(adjusted): 1995:02 1999:11  
 Included observations: 58 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	36.72914	9.772987	3.758231	0.0004
ONINT(-1)	0.432778	0.124013	3.489792	0.0010
AVMAT(-1)	-0.223441	0.208243	-1.072985	0.2883
INF_CPI_APC(-1)	1.333837	0.699823	1.905962	0.0623
PROD_APC(-1)	-0.360786	0.171969	-2.097976	0.0409
RERCH_CPI_APC(-1)	0.325193	0.132513	2.454056	0.0176
CA(-1)	-0.464185	0.356562	-1.301836	0.1988
R-squared	0.458262	Mean dependent var	73.25929	
Adjusted R-squared	0.394528	S.D. dependent var	8.979100	
S.E. of regression	6.986827	Akaike info criterion	6.838692	
Sum squared resid	2489.604	Schwarz criterion	7.087366	
Log likelihood	-191.3221	F-statistic	7.190228	
Durbin-Watson stat	1.708561	Prob(F-statistic)	0.000014	

**Table 5**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/07/06 Time: 01:25  
 Sample(adjusted): 1995:02 1999:11  
 Included observations: 58 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	46.84787	13.13925	3.565492	0.0008
ONINT(-1)	0.511375	0.123725	4.133140	0.0001
AVMAT(-1)	-0.191731	0.230332	-0.832411	0.4091
PROD(-1)	-0.037145	0.300788	-0.123492	0.9022
BD(-1)	5.073009	5.308919	0.955564	0.3438
RERCH_CPI(-1)	-0.396399	0.713335	-0.555699	0.5808
INF_CPI(-1)	-0.090571	0.063637	-1.423252	0.1608
R-squared	0.389064	Mean dependent var	73.25929	
Adjusted R-squared	0.317189	S.D. dependent var	8.979100	
S.E. of regression	7.419643	Akaike info criterion	6.958901	
Sum squared resid	2807.606	Schwarz criterion	7.207575	
Log likelihood	-194.8081	F-statistic	5.413079	
Durbin-Watson stat	1.632839	Prob(F-statistic)	0.000217	

**Table 6**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/07/06 Time: 00:05  
 Sample(adjusted): 2001:09 2005:07  
 Included observations: 47 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.554759	0.651136	-0.851986	0.3993
ONINT(-1)	0.971050	0.016578	58.57477	0.0000
AVMAT(-1)	0.003713	0.015177	0.244620	0.8080
INF_WPI(-1)	0.295735	0.117235	2.522590	0.0157
PROD(-1)	-0.125666	0.073801	-1.702763	0.0964
RERCH_WPI(-1)	-0.062351	0.040356	-1.544998	0.1302
CA(-1)	-0.063362	0.064692	-0.979448	0.3332
R-squared	0.995516	Mean dependent var	34.79975	
Adjusted R-squared	0.994844	S.D. dependent var	15.15236	
S.E. of regression	1.088064	Akaike info criterion	3.143281	
Sum squared resid	47.35533	Schwarz criterion	3.418835	
Log likelihood	-66.86711	F-statistic	1480.153	
Durbin-Watson stat	1.648238	Prob(F-statistic)	0.000000	

**Table 7**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/07/06 Time: 00:06  
 Sample(adjusted): 2001:10 2005:07  
 Included observations: 46 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.767205	0.639226	-1.200209	0.2373
ONINT(-1)	0.969967	0.015676	61.87655	0.0000
AVMAT(-1)	0.015118	0.015650	0.966017	0.3400
INF_WPI(-1)	0.349248	0.106262	3.286659	0.0022
PROD_NEW(-1)	-0.025028	0.019087	-1.311260	0.1974
RERCH_WPI(-1)	-0.085102	0.040773	-2.087241	0.0434
CA(-1)	-0.041131	0.063430	-0.648446	0.5205
R-squared	0.995664	Mean dependent var	34.27253	
Adjusted R-squared	0.994997	S.D. dependent var	14.87755	
S.E. of regression	1.052356	Akaike info criterion	3.079207	
Sum squared resid	43.19064	Schwarz criterion	3.357479	
Log likelihood	-63.82177	F-statistic	1492.491	
Durbin-Watson stat	1.795874	Prob(F-statistic)	0.000000	

**Table 8**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/07/06 Time: 00:06  
 Sample: 2001:09 2005:09  
 Included observations: 49

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.064061	0.904073	0.070858	0.9438
ONINT(-1)	0.960320	0.036265	26.48029	0.0000
AVMAT(-1)	-0.007158	0.019286	-0.371127	0.7124
INF_WPI_APC(-1)	0.016615	0.023469	0.707958	0.4829
PROD_APC(-1)	0.052665	0.041497	1.269125	0.2114
RERCH_WPI_APC(-1)	-0.048928	0.013512	-3.620969	0.0008
CA(-1)	0.007623	0.061602	0.123744	0.9021
R-squared	0.995675	Mean dependent var	33.96099	
Adjusted R-squared	0.995057	S.D. dependent var	15.39172	
S.E. of regression	1.082113	Akaike info criterion	3.127272	
Sum squared resid	49.18069	Schwarz criterion	3.397532	
Log likelihood	-69.61817	F-statistic	1611.523	
Durbin-Watson stat	1.217803	Prob(F-statistic)	0.000000	

**Table 9**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/07/06 Time: 00:06  
 Sample: 2001:09 2005:09  
 Included observations: 49

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.183139	0.914346	0.200295	0.8422
ONINT(-1)	0.970063	0.035807	27.09168	0.0000
AVMAT(-1)	-0.008691	0.020821	-0.417424	0.6785
INF_WPI_APC(-1)	0.007756	0.022325	0.347421	0.7300
PROD_NEW_APC(-1)	0.024143	0.036465	0.662066	0.5115
RERCH_WPI_APC(-1)	-0.044020	0.013450	-3.272848	0.0021
CA(-1)	0.007573	0.066130	0.114515	0.9094
R-squared	0.995556	Mean dependent var	33.96099	
Adjusted R-squared	0.994921	S.D. dependent var	15.39172	
S.E. of regression	1.096958	Akaike info criterion	3.154522	
Sum squared resid	50.53929	Schwarz criterion	3.424782	
Log likelihood	-70.28579	F-statistic	1568.013	
Durbin-Watson stat	1.217151	Prob(F-statistic)	0.000000	

**Table 10**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/05/06 Time: 14:57  
 Sample: 2001:09 2005:09  
 Included observations: 49

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.584865	0.676080	-0.865083	0.3919
ONINT(-1)	0.972898	0.031041	31.34254	0.0000
AVMAT(-1)	0.012348	0.016125	0.765755	0.4481
INF_CPI(-1)	0.010523	0.019689	0.534451	0.5958
PROD(-1)	-0.198195	0.073916	-2.681367	0.0104
RERCH_CPI(-1)	-0.061125	0.042617	-1.434279	0.1589
CA(-1)	-0.048587	0.067592	-0.718836	0.4762
R-squared	0.995141	Mean dependent var	33.96099	
Adjusted R-squared	0.994447	S.D. dependent var	15.39172	
S.E. of regression	1.146964	Akaike info criterion	3.243677	
Sum squared resid	55.25206	Schwarz criterion	3.513937	
Log likelihood	-72.47008	F-statistic	1433.671	
Durbin-Watson stat	1.356854	Prob(F-statistic)	0.000000	

**Table 11**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/05/06 Time: 15:22  
 Sample(adjusted): 2001:10 2005:09  
 Included observations: 48 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.184831	0.715847	-1.655146	0.1055
ONINT(-1)	1.018236	0.034244	29.73458	0.0000
AVMAT(-1)	0.021000	0.016795	1.250398	0.2182
INF_CPI(-1)	-0.020225	0.021372	-0.946359	0.3495
PROD_NEW(-1)	-0.028037	0.020895	-1.341793	0.1870
RERCH_CPI(-1)	-0.088256	0.046088	-1.914930	0.0625
CA(-1)	-0.022289	0.068645	-0.324700	0.7471
R-squared	0.994908	Mean dependent var	33.43826	
Adjusted R-squared	0.994163	S.D. dependent var	15.10866	
S.E. of regression	1.154292	Akaike info criterion	3.258890	
Sum squared resid	54.62803	Schwarz criterion	3.531773	
Log likelihood	-71.21335	F-statistic	1335.211	
Durbin-Watson stat	1.263891	Prob(F-statistic)	0.000000	

**Table 12**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/05/06 Time: 14:09  
 Sample: 2001:09 2005:09  
 Included observations: 49

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.222071	0.717384	-0.309556	0.7584
ONINT(-1)	0.952923	0.014669	64.96109	0.0000
AVMAT(-1)	8.20E-05	0.017026	0.004817	0.9962
INF_CPI_APC(-1)	0.401191	0.163284	2.457013	0.0182
PROD_APC(-1)	0.065439	0.036119	1.811770	0.0772
RERCH_CPI_APC(-1)	-0.037877	0.012388	-3.057675	0.0039
CA(-1)	-0.016252	0.058270	-0.278918	0.7817
R-squared	0.996218	Mean dependent var	33.96099	
Adjusted R-squared	0.995678	S.D. dependent var	15.39172	
S.E. of regression	1.011868	Akaike info criterion	2.993037	
Sum squared resid	43.00284	Schwarz criterion	3.263297	
Log likelihood	-66.32941	F-statistic	1844.042	
Durbin-Watson stat	1.402637	Prob(F-statistic)	0.000000	

**Table 13**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/05/06 Time: 12:33  
 Sample: 2001:09 2005:09  
 Included observations: 49

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.178437	0.686295	0.260000	0.7961
ONINT(-1)	0.952395	0.015310	62.20800	0.0000
AVMAT(-1)	-0.005316	0.018465	-0.287880	0.7749
INF_CPI_APC(-1)	0.353024	0.164130	2.150890	0.0373
PROD_NEW_APC(-1)	0.034239	0.033414	1.024712	0.3114
RERCH_CPI_APC(-1)	-0.034074	0.012818	-2.658252	0.0111
CA(-1)	-0.009371	0.062965	-0.148821	0.8824
R-squared	0.996022	Mean dependent var	33.96099	
Adjusted R-squared	0.995454	S.D. dependent var	15.39172	
S.E. of regression	1.037773	Akaike info criterion	3.043595	
Sum squared resid	45.23286	Schwarz criterion	3.313855	
Log likelihood	-67.56808	F-statistic	1752.784	
Durbin-Watson stat	1.385698	Prob(F-statistic)	0.000000	

**Table 14**

Dependent Variable: ONINT  
Method: Least Squares  
Date: 01/07/06 Time: 00:07  
Sample(adjusted): 2003:01 2005:07  
Included observations: 31 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.129465	0.803522	-0.161122	0.8733
ONINT(-1)	0.965835	0.018451	52.34729	0.0000
AVMAT(-1)	-0.032424	0.028181	-1.150569	0.2612
INF_WPI(-1)	0.250950	0.104100	2.410674	0.0239
PROD(-1)	-0.050960	0.065821	-0.774222	0.4464
RERCH_WPI(-1)	-0.125773	0.050973	-2.467446	0.0211
CA(-1)	-0.148842	0.059075	-2.519532	0.0188
R-squared	0.993995	Mean dependent var		25.94915
Adjusted R-squared	0.992493	S.D. dependent var		9.760831
S.E. of regression	0.845692	Akaike info criterion		2.698357
Sum squared resid	17.16468	Schwarz criterion		3.022160
Log likelihood	-34.82453	F-statistic		662.0688
Durbin-Watson stat	2.151188	Prob(F-statistic)		0.000000

**Table 15**

Dependent Variable: ONINT  
Method: Least Squares  
Date: 01/07/06 Time: 00:07  
Sample(adjusted): 2003:01 2005:07  
Included observations: 31 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.114304	0.764502	-0.149515	0.8824
ONINT(-1)	0.966662	0.017670	54.70697	0.0000
AVMAT(-1)	-0.039864	0.026279	-1.516976	0.1423
INF_WPI(-1)	0.260118	0.097200	2.676106	0.0132
PROD_NEW(-1)	-0.025575	0.017018	-1.502818	0.1459
RERCH_WPI(-1)	-0.132267	0.049269	-2.684561	0.0130
CA(-1)	-0.171263	0.059558	-2.875592	0.0083
R-squared	0.994374	Mean dependent var		25.94915
Adjusted R-squared	0.992968	S.D. dependent var		9.760831
S.E. of regression	0.818540	Akaike info criterion		2.633091
Sum squared resid	16.08019	Schwarz criterion		2.956895
Log likelihood	-33.81291	F-statistic		706.9900
Durbin-Watson stat	2.161621	Prob(F-statistic)		0.000000

**Table 16**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/07/06 Time: 00:07  
 Sample: 2003:01 2005:06  
 Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.863131	1.007289	-0.856886	0.4003
ONINT(-1)	0.945848	0.072591	13.02987	0.0000
AVMAT(-1)	-0.019031	0.029107	-0.653833	0.5197
INF_WPI_APC(-1)	0.028001	0.075408	0.371329	0.7138
PROD_APC(-1)	0.139683	0.060828	2.296366	0.0311
RERCH_WPI_APC(-1)	-0.054456	0.014232	-3.826270	0.0009
CA(-1)	-0.089913	0.055547	-1.618685	0.1191
R-squared	0.994788	Mean dependent var	26.33912	
Adjusted R-squared	0.993428	S.D. dependent var	9.678954	
S.E. of regression	0.784658	Akaike info criterion	2.553826	
Sum squared resid	14.16083	Schwarz criterion	2.880772	
Log likelihood	-31.30739	F-statistic	731.5988	
Durbin-Watson stat	1.971855	Prob(F-statistic)	0.000000	

**Table 17**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/07/06 Time: 00:08  
 Sample: 2003:01 2005:09  
 Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.270570	1.038854	-0.260451	0.7966
ONINT(-1)	1.052769	0.069168	15.22045	0.0000
AVMAT(-1)	-0.018645	0.030482	-0.611665	0.5461
INF_WPI_APC(-1)	-0.097754	0.069373	-1.409116	0.1706
PROD_NEW_APC(-1)	0.010497	0.039095	0.268485	0.7904
RERCH_WPI_APC(-1)	-0.052858	0.015822	-3.340730	0.0025
CA(-1)	-0.057041	0.063839	-0.893514	0.3798
R-squared	0.993506	Mean dependent var	25.24011	
Adjusted R-squared	0.992008	S.D. dependent var	9.866871	
S.E. of regression	0.882080	Akaike info criterion	2.772763	
Sum squared resid	20.22968	Schwarz criterion	3.090204	
Log likelihood	-38.75058	F-statistic	662.9987	
Durbin-Watson stat	1.669128	Prob(F-statistic)	0.000000	

**Table 18**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/05/06 Time: 12:25  
 Sample: 2003:01 2005:09  
 Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.214726	0.934123	-0.229869	0.8200
ONINT(-1)	0.952738	0.055330	17.21935	0.0000
AVMAT(-1)	-0.016333	0.028691	-0.569287	0.5740
INF_CPI(-1)	0.021392	0.045833	0.466736	0.6446
PROD(-1)	-0.100080	0.069871	-1.432345	0.1640
RERCH_CPI(-1)	-0.134696	0.056143	-2.399176	0.0239
CA(-1)	-0.144248	0.063697	-2.264610	0.0321
R-squared	0.992706	Mean dependent var	25.24011	
Adjusted R-squared	0.991023	S.D. dependent var	9.866871	
S.E. of regression	0.934870	Akaike info criterion	2.889012	
Sum squared resid	22.72351	Schwarz criterion	3.206453	
Log likelihood	-40.66870	F-statistic	589.7611	
Durbin-Watson stat	1.576891	Prob(F-statistic)	0.000000	

**Table 19**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/05/06 Time: 11:40  
 Sample: 2003:01 2005:09  
 Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.116513	0.923226	-0.126202	0.9005
ONINT(-1)	0.952945	0.055363	17.21260	0.0000
AVMAT(-1)	-0.027800	0.027753	-1.001673	0.3257
INF_CPI(-1)	0.020879	0.045881	0.455081	0.6528
PROD_NEW(-1)	-0.027781	0.019451	-1.428225	0.1651
RERCH_CPI(-1)	-0.134858	0.056182	-2.400390	0.0238
CA(-1)	-0.165049	0.066423	-2.484802	0.0197
R-squared	0.992703	Mean dependent var	25.24011	
Adjusted R-squared	0.991019	S.D. dependent var	9.866871	
S.E. of regression	0.935066	Akaike info criterion	2.889432	
Sum squared resid	22.73307	Schwarz criterion	3.206873	
Log likelihood	-40.67564	F-statistic	589.5114	
Durbin-Watson stat	1.477099	Prob(F-statistic)	0.000000	

**Table 20**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/05/06 Time: 12:20  
 Sample: 2003:01 2005:09  
 Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.226014	0.973308	-0.232213	0.8182
ONINT(-1)	0.941267	0.019308	48.75091	0.0000
AVMAT(-1)	-0.008990	0.028999	-0.309999	0.7590
INF_CPI_APC(-1)	0.257630	0.227497	1.132453	0.2678
PROD_APC(-1)	0.092804	0.046244	2.006830	0.0553
RERCH_CPI_APC(-1)	-0.033720	0.013393	-2.517686	0.0183
CA(-1)	-0.079402	0.058299	-1.361986	0.1849
R-squared	0.993898	Mean dependent var	25.24011	
Adjusted R-squared	0.992490	S.D. dependent var	9.866871	
S.E. of regression	0.855077	Akaike info criterion	2.710581	
Sum squared resid	19.01007	Schwarz criterion	3.028022	
Log likelihood	-37.72458	F-statistic	705.8120	
Durbin-Watson stat	1.581830	Prob(F-statistic)	0.000000	

**Table 21**

Dependent Variable: ONINT  
 Method: Least Squares  
 Date: 01/05/06 Time: 11:25  
 Sample: 2003:01 2005:09  
 Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.365382	0.933227	0.391525	0.6986
ONINT(-1)	0.941704	0.020290	46.41125	0.0000
AVMAT(-1)	-0.017497	0.030875	-0.566709	0.5758
INF_CPI_APC(-1)	0.261913	0.239449	1.093815	0.2841
PROD_NEW_APC(-1)	0.045528	0.036152	1.259342	0.2191
RERCH_CPI_APC(-1)	-0.032580	0.013994	-2.328104	0.0280
CA(-1)	-0.058652	0.064424	-0.910410	0.3710
R-squared	0.993358	Mean dependent var	25.24011	
Adjusted R-squared	0.991825	S.D. dependent var	9.866871	
S.E. of regression	0.892113	Akaike info criterion	2.795384	
Sum squared resid	20.69251	Schwarz criterion	3.112825	
Log likelihood	-39.12383	F-statistic	648.0725	
Durbin-Watson stat	1.630639	Prob(F-statistic)	0.000000	

**Table 22**

ARCH Test:

F-statistic	2.593051	Probability	0.086184
Obs*R-squared	4.955603	Probability	0.083928

Test Equation:  
 Dependent Variable: RESID^2  
 Method: Least Squares  
 Date: 01/05/06 Time: 14:58  
 Sample(adjusted): 2001:11 2005:09  
 Included observations: 47 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.726216	0.291793	2.488804	0.0167
RESID^2(-1)	-0.018748	0.143170	-0.130950	0.8964
RESID^2(-2)	0.315850	0.139192	2.269165	0.0282

R-squared	0.105438	Mean dependent var	1.073499
Adjusted R-squared	0.064776	S.D. dependent var	1.283975
S.E. of regression	1.241693	Akaike info criterion	3.332530
Sum squared resid	67.83924	Schwarz criterion	3.450624
Log likelihood	-75.31445	F-statistic	2.593051
Durbin-Watson stat	2.013785	Prob(F-statistic)	0.086184

**Table 23**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.239578	Probability	0.119693
Obs*R-squared	4.934416	Probability	0.084821

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 01/05/06 Time: 14:57

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.325574	0.684221	0.475832	0.6368
ONINT(-1)	-0.005251	0.030544	-0.171908	0.8644
AVMAT(-1)	-0.009547	0.016406	-0.581936	0.5639
INF_CPI(-1)	0.001977	0.019272	0.102568	0.9188
PROD(-1)	0.025681	0.073637	0.348753	0.7291
RERCH_CPI(-1)	0.014317	0.042005	0.340850	0.7350
CA(-1)	0.020249	0.066554	0.304249	0.7625
RESID(-1)	0.352342	0.166756	2.112927	0.0409
RESID(-2)	-0.051408	0.163064	-0.315261	0.7542
R-squared	0.100702	Mean dependent var	-6.56E-15	
Adjusted R-squared	-0.079157	S.D. dependent var	1.072886	
S.E. of regression	1.114541	Akaike info criterion	3.219168	
Sum squared resid	49.68805	Schwarz criterion	3.566645	
Log likelihood	-69.86962	F-statistic	0.559895	
Durbin-Watson stat	1.926919	Prob(F-statistic)	0.803898	