

T.C.
MARMARA ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İKTİSAT ANABİLİM DALI
İKTİSAT (İNG) BİLİM DALI

**INFLATION TARGETING AS A CURE
AND THE CASE OF TURKEY**

Yüksek Lisans Tezi

MEHMET AKİF MOROĞLU

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Marmara Üniversitesi
Sosyal Bilimler Enstitüsü Müdürlüğü

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ABSTRACT

Inflation targeting has been accepted as the monetary policy by several central banks in the last two decades. Following the successful results of several developed and developing countries, Turkey has launched its inflation targeting history in 2002. This study attempts to examine the success chance of Turkey in inflation targeting policy, by analyzing the preconditions of the policy for the case of Turkey. In the empirical side, this work employs the VAR and VEC models to investigate the relation between the monetary policy instruments and the inflation rate. The results of these models suggest that the high debt level of Turkey is a problem in the practical side of the inflation targeting as it prevents the central bank to control the inflation via its main policy instrument short term interest rates.

Keywords: Monetary Policy; Inflation Targeting; VAR Model; VEC Model; Turkey

ÖZET

Son yirmi yıllık süreçte enflasyon hedeflemesi birçok ülkenin merkez bankası tarafından para politikası olarak kabul edilmiştir. Gelişmiş ve gelişmekte olan ülke merkez bankalarının ulaştığı başarılı sonuçları takiben Türkiye Cumhuriyeti Merkez Bankası 2002 yılında enflasyon hedeflemesi uygulamasına başlamıştır. Bu çalışma enflasyon hedeflemesinin önkoşullarını Türkiye açısından sınavarak Türkiye Cumhuriyeti Merkez Bankası'nın söz konusu politikadaki başarı şansını sınamayı amaçlamıştır. Çalışmanın ampirik kısmında VAR ve VEC modelleri kullanılarak para politikası araçları ile enflasyon oranı arasındaki ilişki incelenmiştir. Sonuç olarak Türkiye'nin yüksek borç düzeyinin enflasyon düzeyinin temel para politikası aracı olan kısa vadeli faiz oranları ile kontrol altında tutulmasının önünde bir engel olarak durduğu ortaya çıkartılmıştır.

Anahtar Kelimeler: Para Politikası; Enflasyon Hedeflemesi; Vektör Otoregresif Model; Hata Düzeltme Modeli; Türkiye

PREFACE

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PART I

INTRODUCTION

Following a few periods, surrounded by stable prices, inflation became an important matter for economies at the beginnings of the 1970's. And furthermore it located as the dominant issue within the business circles. In the length of time, the awareness of the inflation concept has ascended gradually, even among the bottom course of the populace, as the most harmful economic problem. As a remarkable argument, Robert Shiller (1996, 2) revealed that the word "inflation" appears to be the most commonly used economic term among the general public, based on a computer search of news stories in all news section of the Nexis system, an electronic search system for English language news publications around the world. The word inflation appeared in 872,004 stories, far outnumbering the stories containing any other economic term.

In general meaning, high inflation damages the economy by corrupting the income distribution or by constraining the foresight for investors, while the price stability in the long run promotes a higher level of economic output and more rapid economic growth. Central banks that fight with high inflation have applied several policies to provide price stability. Accepting the responsibility for stable prices in the long term, they also strived to be consistent with policies regarding growth, unemployment and interest rates.

Inflation targeting is the mostly applied policy to control inflation especially in the near past. In inflation targeting, the central bank estimates and makes public target inflation rate and then attempts to conduct the actual inflation towards the target by using the monetary policy instruments. The policy was firstly developed at central banks like the Reserve Bank of New Zealand, the Bank of Canada, the Bank of England and the Bank of Sweden and following them it used by several developed and developing countries.

Being exposed to high inflation rates since the beginnings of the 1980's, Turkey has launched its inflation targeting history in 2002, putting a three-year program

that described as “implicit inflation targeting”. Following the mentioned process, the Central Bank of the Republic of Turkey disclosed its 2006 monetary policy as an “explicit inflation targeting”.

This thesis investigates the success chance of Turkey in applying the inflation targeting by examining the preconditions of the inflation targeting policy. Based on one of the crucial preconditions, the paper includes empirical analysis to examine the relationships between the inflation rate and the monetary policy instruments. This thesis will employ the static and dynamic OLS models, VAR and VEC models to examine the crucial precondition of the inflation targeting policy.

The econometric analyses have been performed for the period 1990-2006 to investigate the relationship between the monetary policy instruments and the inflation, as a measure of the controlling power of the CBRT on the inflation.

Getting to the root of the subject, the next section of the paper starts with a short glance to the time inconsistency problem and it follows with the definition and rationale for the targeting policies that formed to avoid the tendency to an inflationary bias produced by the time-inconsistency problem. In this section the inflation targeting was discussed deeply, including also the specification of it, while the other targeting policies were given place within the context of comparison with inflation targeting. The subsections 2.2.1.4 and 2.2.1.5 surveys the general features of inflation targeting in developing and developed countries, followed by some country samples. The section 3 deals with a short glance on Turkey’s near past monetary policy, handling the implicit and explicit inflation targeting processes. Finally the fourth section includes the investigation of recent studies done in this area. The empirical analysis; data set, model applications and results are presented in this section, too. Conclusion is to be found in end.

PART II

INFLATION TARGETING

2.1 The Time Inconsistency Problem

A large literature regarding the conflict between the rules for monetary policy, leading with the famous Taylor Rule, and discretionary monetary policies has gone on for a long time. And the time inconsistency problem exists at the core of this arena. The time inconsistency problem bases on the case that; when there is no rule regarding monetary policy, the policy-makers may easily alter their decisions in the future.

Under a rule-based monetary policy, the policy instruments of the central bank are set according to some formula, with almost no scope for discretionary action on the part of policymakers. For example, the Taylor Rule states that the short-term real interest rate, as a policy instrument, to be determined according to some factors such as; the distance between the actual and targeted level of inflation and the difference between the current and full employment levels (McCallum, 2000, 49). Tying the policy maker's hands, this type policy would help insulate monetary policy from outside political pressures.

On the other hand, in a discretionary monetary policy, the policy-maker may easily create higher than expected inflation by issuing money to reap the benefits as economic activity expansions. However, when people realize that the announcements are not credible, they adjust their expectations for inflation to higher levels. And this creates an inflation tendency in the economy.

Being more explicit, when the policymaker alters his policy regarding period "t", that he determined in period "t-1", the individuals reproduce their inflation expectations in the light of policymakers' new policy. In such a case, Barro and Gordon (1983,1) expect the average rates of inflation and monetary growth to be higher than otherwise. They assert that the equilibrium rates of inflation and monetary growth can be lowered by shifts from monetary institutions that allow discretion to ones that

enforce rules, basing on the fact that the enforced commitments on monetary behavior, as embodied in monetary or price rules, eliminate the potential for ex post surprises.

Even under the rules, the policy maker has temptations to cheat, but the potential loss of credibility motivates the policymaker to abide by the rule. In this case the policymaker can condition the inflation rate only on variables that are known also to private agents (Barro and Gordon, 1983,1). Consequently the time inconsistency problem could be avoided by some binding rules. The next section glances to main monetary strategy that fights with this problem.

2.2 Targeting

Starting with 1930's, several countries applied fixed exchange rate system, also known as the Bretton-Woods System. This program has successfully operated until early 1970's when the U.S.A. economy grew very quickly and inflation began to rise (Macfarlane, 1997, 24). In the early 1970's, the world was in an inflationary process. From that day on, several countries applied two other main policies to prevent inflation; monetary targeting and inflation targeting. Henceforward, the inflation targeting is discussed deeply and the others are given place within the context of comparison with inflation targeting.

2.2.1 Inflation Targeting

The inflation targeting was developed at central banks like the Reserve Bank of New Zealand, the Bank of Canada, the Bank of England and the Bank of Sweden in the beginnings of the 1990's and has reached 23 countries, including also several developing countries.

Bernanke and others (1999) defines inflation targeting as; "a framework for monetary policy characterized by the public announcement of official quantitative targets (or target ranges) for the inflation rate over one or more time horizons, and by explicit acknowledgement that low, stable inflation is monetary policy's primary long-run goal.

In the theory, inflation targeting is clear to understand: the central bank forecasts an inflation path for future and the forecast is compared to the targeted inflation rate. If there is difference between the forecast and inflation target, central bank uses necessary monetary instruments to reach the target.

Mishkin (2000, 1) lists five main elements that encompasses inflation targeting;

- the public announcement of a medium-term numerical target for inflation
- an institutional commitment to price stability as the primary goal of monetary policy, to which other goals subordinated
- an information inclusive strategy in which many variables, not just monetary aggregates or the exchange rate, are used for deciding the setting of policy instruments
- increased transparency of the monetary policy strategy through communication with the public and the markets about the plans, objectives and decisions of the monetary authorities
- increased accountability of the central bank for attaining its inflation objectives

In developing countries, policy makers sometimes report numerical values of inflation rate as a target. This does not imply that these countries implement inflation targeting regimes. The inflation targeting regime requires all of these five features.

However, Epstein (2003, 3) opposes Mishkin's list, emphasizing that only a few of the inflation targeting central banks reached an ideal level, looking at this main elements of the policy.

2.2.1.1 Specification of Inflation Targeting

2.2.1.1.1 Assignment of the Target

The authorities that determine the target differ across the countries. The issue of who assigns the inflation target is closely linked to the independence of the central bank. Independence of the central bank need not be associated with the freedom for it to choose its own goals (Debelle, 1997, 7).

The target is announced in some countries by the central bank and in others by the ministry of finance. Debelle (1997, 7) argues that it may be more appropriate for the central bank to be goal dependent (that is have its goals assigned by government) but have instrument independence, that is, be unconstrained in the operation of monetary policy in pursuing the assigned goal.

In some countries as Australia, Finland, Sweden, the inflation target was first announced by the central bank, while in Canada and New Zealand, the target was a result of a joint agreement between the Minister of Finance and the Governor of the central bank. On the other hand, in Czech Republic, Brazil, Chile, Colombia, Peru, South Africa, Thailand and Korea, the decisions were made by the MPC, that reduce the dependence of the decision making on a single personality.

2.2.1.1.2 The Horizon of the Target

The horizon, which is another component of inflation targeting that acquires different characters in various country samples, is the time period that the central bank wants to reach its inflation target. The adopted horizon depends in part on the initial level of inflation rate on the starting date. Those countries where the initial inflation rate differed significantly from the desired inflation level, has to witness a longer implementation period, because of the lags in the effect of monetary policy on inflation Debelle (1997, 10).

Another determinant of the horizon is the fact whether the central bank has more than one goal. As will be discussed below; the price stability should be the sole target of central banks. Notwithstanding; in several cases the central banks have to bear

some other variables in mind. Apel (1999,17) asserts that, in a case that the central bank also concerned about output stability the expected return of inflation target will take longer. If the central bank cares only about stabilizing inflation, the inflation rate will return to the target rate as soon as possible, in contrast, if equal importance is assigned to inflation and output stabilization, the central bank will allow the return to target to take significantly longer.

On the other hand, the level and the width of the target also affect the horizon. As the target range gets wider, the policymaker need more time to remain in the range. In parallel with this, as a result of his application on alternative band widths, Sherwin (1999, 81) concludes that the lower inflation expectations and a wider target range allow for a longer policy horizon.

Mentioning a few country samples; while many countries determined the horizon of the target as annual or indefinite, the New Zealand took the length of the contract of the central bank governor into consideration and England considered the end of the parliamentary term.

2.2.1.1.3 Level of the Target

In theory, zero inflation would appear to be equivalent to price stability, but in practice the concept of price stability is affected by issues such as the measurement and nominal rigidities. Debelle (1997,11) asserts that the biases in the calculation of the consumer price index imply that in practice, price stability is likely to be associated with a small positive rate of inflation in the CPI, rather than a zero rate. The bias in the CPI is one of the important reasons of nonzero inflation target. Introduction of new goods, quality biases and those caused by the adjustment of consumers to relative price changes between the periodic re-definitions of the basic consumption bundle cause biases in CPI.

There is another rationale of the nonzero inflation target advanced by central banks; the downward rigidity in prices and wages require a small positive inflation rate for the necessary relative price adjustments (Debelle, 1997, 12).

Two different views about the level of the target are presented here; Svensson (1998, 1) says that the center of the interval or the point target currently varies across countries from 1.5 to 2.5 percent per year. And as another point of view Croce and Khan (2000, 2) say that; most low-inflation industrial countries have chosen inflation targets of 10-3 percent.

It is common across inflation targeting countries to determine the target rate above zero percentages. In most of the developing countries, there is no consensus about the optimal inflation rate for their economy. The lack of consensus on a numerical value makes the choice of targeted variable arbitrary. But Masson, Savastano and Sharma (1997) say that ‘there is a presumption that developing countries should probably aim at attaining a medium term rate of inflation that is higher than that of industrial countries’.

2.2.1.1.4 Choice of the Price Index

There are different applications among inflation targeting countries regarding the price index that used to gauge the inflation. The index is defined broadly as CPI or narrowly as core inflation. The decision-maker faces a trade-off between transparency and the ability to control inflation.

There is an agreement that it should be a broad measure of general price level. The majority of central banks with inflation targets focus on the rate of change in some variant of the consumer price index. These have the added advantage of being price measures that are relatively well known and published at frequent, regular intervals. CPI is better understood by public because it consists of goods those are widely used by public. So using a broadly defined index (as CPI) will increase the credibility and the transparency. On the other hand, many of the components of a broadly defined index are difficult to control by the central bank (Debelle, 1997, 12).

Some countries use an underlying measure of inflation based on the CPI, rather than the headline CPI. Debelle (1997, 12) asserts that an underlying (core) inflation rate excludes the non-monetary determinants of inflation. In practice, measures of underlying (core) inflation exclude the first-round effects of particular shocks (which

are therefore accommodated by monetary policy), but not the second round effects those shocks on wages and prices (which are thus counter-acted by a tightening of monetary policy).

Looking at the country samples, different experiences are seen about the composition of the core inflation. For instance, mortgage interest payments, indirect taxes (in Canada and Finland), food and energy prices which tend to be highly volatile (in Canada and Australia) are some components that countries exclude to reach core inflation.

2.2.1.1.5 A Point or Band Target and the Width of the Band

The decision-maker faces another trade-off between credibility and flexibility while deciding whether the target is a point or a band target. In case the target is determined as a point target, the credibility of the monetary policy will be high.

Since the monetary policy has imperfect control over the inflation rate, it does not seem possible to forecast the future inflation rate exactly. Moreover, unpredictable shocks may cause inflation rate to be variable and make it harder for central bank to achieve the target value. For this reason, instead of a point target, a band target increases the possibility of reaching to the target (Debelle, 1997, 14).

The width of the band is also important. This choice reflects a tradeoff between announcing a tight-edged band and breaching it occasionally, and announcing a wide band which may be regarded as softness on the part of the central bank. A narrower band may be interpreted as indicating a stronger commitment to the inflation target (Debelle, 1997, 14). The wider the target band the more flexible the policy. But a too wide target may decrease the credibility of central bank, which is difficult to build especially in developing countries.

Sherwin (1999, 9) indicates to the need for a more active monetary policy in an inflation targeting policy with narrow target bands. Here, activism implies more variability in the interest rates, the exchange rate and output. As the target band gets

narrowed, the policymaker will need to use the monetary policy instruments rather frequently.

There are important differences across inflation targeting countries about the width of the band or whether the target is a band. In Finland, Australia and Norway the framework focuses on a point target whereas Canada, the UK, Sweden, New Zealand, Israel, Spain and other several countries have specified a range for inflation targeting.

2.2.1.2 Other Main Issues of Inflation Targeting

2.2.1.2.1 Accountability and Transparency

The central banks held accountable to reach their inflation targets. The deviations from the target are taken into the consideration while evaluating the performance of the central bank. Assigning an inflation target, the central bank defines a clear and easily measurable benchmark that serves to judge the bank's performance. When the actual inflation goes outside of the target range, the central bank is obliged to explain the causes of the breach and the plan to bring it into the range (Debelle, 1997, 17).

In case of a failure the responsible person or institution is penalized. In some cases, as New Zealand, the responsibilities and the sanctions, which will be applied in the failure case of the central bank, may be determined in a written agreement.

Accountability is closely related with independency and transparency. Unless the central bank has independency, we can not mention about the accountability. And unless the monetary policy is transparent, it is impossible that the central bank to be judged for inflation target.

In a transparent policy all available information about monetary policy is publicly available. This can be done by issuing regular inflation reports. The release of information increases the transparency. Since all individuals have the same information about monetary policy, this will help improve the pursuit of inflation targeting.

2.2.1.2.2 Prerequisites of Inflation Targeting

Three main preconditions regarding a successful implementation of inflation targeting frequently take place in the inflation targeting literature. The first one is the central bank independence, but it is not necessary for the central bank to have a fully independence, monetary authorities ought to be able to gear freely the instruments of monetary policy toward the attainment of some nominal objective. This condition may be summarized as the central banks should have reasonable degree of instrument independence, not necessarily goal independence.

To comprehend the first prerequisites precisely, one more concept must be defined here; “the fiscal dominance”. It defines the case that the conduct of monetary policy will be dictated or constrained by developments of a fiscal nature. Masson, Savastano and Sharma (1997, 8) states that the public sector direct borrowing from the central bank will be low or nonsexist, that the government will have a broad revenue base and therefore will not rely systematically and significantly on the revenues from seigniorage, that domestic financial markets will have enough depth to absorb placements of public debt instruments, and that the accumulation of public debt will not give rise to explosive dynamics.

And Masson, Savastano and Sharma (1997, 8) defines another prerequisites as the absence of any firm commitment by the authorities to target the level or path of any other nominal variable. The existence of another target may hinder the success of both targets. However, another objective may be admitted if it is consistent with inflation target. In some cases, as Chile and Israel, the central bank launched the monetary policy with two targets: an inflation target and an exchange rate target. But they decremented the attention paid on the exchange rate target, eventually abandoning it altogether.

Debelle (1997,6) presents a third condition for the success of inflation targeting; the linkage must be stronger between the instruments of monetary policy and inflation rate than the linkage via any intermediate target which has a stable relation with inflation. To be suitable as a target for monetary policy, the inflation target must be controllable by the instrument of monetary policy.

2.2.1.3 The Novelty Value of Inflation Targeting

In this section, the pros and cons of the inflation targeting are presented, comparing it with other policies that applied to reduce inflation. Here the major two policies; exchange rate pegging and monetary targeting are handled.

2.2.1.3.1 Exchange Rate Pegging

Basically this strategy is formed as for a country to peg the value of currency to that of a large, low-inflation country. This strategy applied in two different ways; in first one the exchange rate may be pegged at a fixed value to that of the other country. As a second case, the policy involves a crawling peg or target in which the currency is allowed to depreciate at a steady rate. Because of its easily understood and simple framework, the exchange rate targeting has gained popularity among the developed and developing countries in the past.

However there are some problems about exchange rate targeting. A country that has pegged its currency to that of the anchor country loses the ability to use monetary policy to respond to domestic shocks that are independent of those hitting the anchor country (Mishkin 1997, 13). The central bank can not interfere it even if it would be reversed by some monetary policy actions. But inflation targeting regime gives chance to respond shocks and focus on domestic issues.

Another disadvantage of exchange rate targeting is that if there is a shock even in the anchor country (the low inflation country in this policy), the exchange rate targeting country is easily affected from this shock. Mishkin samples this case with the German reunification; although it was a shock specific to Germany, the anchor country in the Exchange Rate Mechanism (ERM), it was transmitted directly to the other countries in the ERM whose currencies were pegged to the Mark because their interest rates now rose in tandem with those of Germany.

2.2.1.3.2 Monetary Targeting

Another monetary policy applied to control inflation is monetary targeting. In this regime, money supply will be the intermediate target and inflation will be the

objective. One way of pursuing monetary targeting is to follow Milton Friedman's suggestion for a constant-money-growth-rate rule in which the chosen monetary aggregate is targeted to grow at a constant rate (Mishkin, 1997, 19). In practice no monetary-targeting central bank has ever adhered to strict rules for monetary growth. Instead monetary targeting is quite flexible.

The policymakers have more chance to respond domestic shocks within this policy comparing with exchange rate targeting. And this policy abrogates the sensitivity to shocks emanating from other countries. Monetary targeting also promotes the accountability of central bank in comparison to exchange rate pegging and constrains policymaker to fall into time-inconsistency trap.

Notwithstanding, the success of the monetary targeting depends on two conditions; first of them is that there must be a strong and reliable relationship between the goal variable (inflation and nominal income) and targeted aggregate. As a second condition; Mishkin (1997, 21) asserts that the targeted monetary aggregate must be well controlled by the central bank. Although narrow monetary aggregates are easily controlled, it is far from clear that this is the case for broader monetary aggregates like M2 or M3. The presence of these problems, especially the second one, may be admitted as a rationale of that the central bankers applying monetary targeting have not obeyed strict rules.

2.2.1.3.3 Inflation Targeting

Shortly touching on the alternative monetary policies, the pros and cons of inflation targeting are presented under this title.

Like exchange rate and monetary aggregate targeting, inflation targeting is readily understood by the public, but even more directly than the others presenting a more clear commitment to price stability. Mishkin (1997, 22) uses the statement "it keeps the goal of price stability in the public's eye" for inflation targeting. Because an explicit numerical target for inflation increases the accountability of the central bank, inflation targeting also has the potential to reduce the likelihood that the central bank will fall into the time inconsistency trap.

The literature frequently mentions that the inflation targeting defeats also the problem of vulnerability to foreign economies that the exchange rate targeting came under. This is leaned on that a run on reserves can be averted because the central bank can simply “let the exchange rate go”. However, Kumhof (2001, 5) objects this allegation. He calls attention to the fact that the exchange rate significantly affects the consumer price index, so intervention on exchange rate may be necessary.

Comparing with the monetary targeting, inflation targeting do not strictly require a stable money-inflation relationship and allow the monetary authority to use all available information, not just one variable, to determine the best settings for monetary policy.

There are two important disadvantages of inflation targeting compared to either exchange rate targeting or monetary targeting. Firstly, the instruments of monetary policy show their impacts on inflation with long and variable lags, so inflation is harder to control.

As a second one; since inflation targeting requires exchange rate flexibility, a high degree of dollarization may create a potentially serious problem for the policy. This case is crucial especially for developing countries. This problem will be handled once more in the developing countries section.

2.2.1.4 Inflation Targeting In Developed Economies

Starting in 1990s several industrialized countries launched inflation targeting as the monetary policy strategy. The pioneer of these countries was New Zealand and it followed by Canada, the United Kingdom, Sweden, Finland, Australia, Spain, South Korea, and Norway in chronological order. There are significant discrepancies regarding the application of inflation targeting among these countries.

Notwithstanding, Masson, Savastano and Sharma (1997, 18) presents some common features of the experience with inflation targeting in advanced economies;

The first common feature is that inflation targeting was associated with a high degree of exchange rate flexibility. Indeed, in many of the countries inflation targeting

was adopted in the aftermath of a failed attempt to use the exchange rate as the main anchor of monetary policy (e.g. the UK, Sweden and Finland). In others, like Canada, it was associated with a decision by the authorities to place less emphasis on resisting exchange rate fluctuations. As an exception, Spain adopted inflation targeting while retaining its ERM central parity.

The second feature is that all countries that adopted inflation targeting had a measure of central bank independence. There are poor links between the central banks' actions and the financing of government budgets, and the central banks freely operate their monetary policy instruments. Also, in practice, the central banks of all these countries that adopted inflation targeting use the short-term interest rates as their main operating instrument, and rely on well developed financial markets to transmit the effects of changes in the instrument to aggregate demand and inflation.

Third, all these countries used inflation targeting as a tool for building the credibility of their macroeconomic policy framework. In most cases this task was facilitated by the fact that inflation targets were set by mutual agreement between the fiscal and monetary authorities, thus tending to reduce the public's perception of conflicting objectives of economic policy.

Finally an important common feature is that inflation targeting was not introduced in contexts of moderate or high inflation, but rather in situations where the inflation rate was fairly low (less than 10 percent in all the countries).

2.2.1.4.1 New Zealand Experience

Beginning from the mid 1980's New Zealand started to lower its inflation rate to one digit figures applying strict policies. The reform of monetary policy in the mid-1980s may be abridged by two key initiatives. The first one was to adopt the principle that government funding should be met from the private markets. The second one was the decision as moving to a clean float of New Zealand Dollar (McCallum, 1996).

In 1989 the parliament determined "stability of general level of prices" as the overriding objective of monetary policy. The accord, named the Reserve Bank of New

Zealand Act 1989, requires the Bank's Governor and the Minister of Finance to make periodic Policy Target Agreements (PTAs) regarding the price index to be targeted and its allowable range. And the Governor, who must report on inflation performance twice each year, may be dismissed prior to the end of his five-year term if the inflation rate falls outside its specific target band (Mishkin and Posen, 1997, 30).

From the start, the eventual goal of price stability was defined in practice as achieving a rate of measured annual inflation of between 0 and 2 percentages in the headline CPI. The result has been that the actual inflation rate has remained near the top of the range for much of the time since the adoption of targets, with the public focus being on the 2 percent (ceiling) rather than the 1 percent midpoint (Mishkin and Posen, 1997, 31). In the second act the bank has developed a measure of underlying inflation and determined the new target as 0-2 percents.

Some of the main components of the inflation targeting in New Zealand may be listed as (Mishkin and Posen, 1997, 29);

- Inflation targeting in New Zealand followed legislation that mandated a Policy Targets Agreement (PTA) between the elected government and the newly independent central bank, which resulted in a jointly decided numerical target for inflation.
- Inflation targeting was adopted only after a successful disinflation had largely taken place.
- Rather than using the headline consumer price index (CPI), the central bank uses a core-type price index to construct the inflation target variable; the variable excludes not only energy and commodity prices, but also, in particular, the effects of consumer interest rates as well as other prices on an ad hoc basis.

- Accountability of the central bank is a key feature of the inflation targeting regime; the Governor of the central bank is subject to possible dismissal by the government if the target is breached.
- The inflation target is stated as a range, rather than a point target – with the midpoint of this range above zero.
- Strict adherence to the narrowness of the inflation target range and the one-year time horizon of the target has resulted in two related problems: 1) a control problem -that is, the difficulty in keeping inflation within very narrow target ranges – and 2) an instrument instability problem – that is, wider swings in the policy instruments, interest rates, and exchange rates than might have been desirable.

It may be concluded from New Zealand's experience; the target range must be enough large to let the fluctuations in policy instruments. Notwithstanding, New Zealand meet with success, although it was the pioneer country applying this policy. Furthermore, New Zealand presents a good example of the distinction between goal and instrument independence. The terms of PTA are negotiated between the government and the central bank. On the other hand, the central bank had an instrument independence during the application period.

2.2.1.5 Inflation Targeting In Developing Economies

The successful results of inflation targeting in the industrialized countries gave rise to number of developing economies that started to implement this policy. However this group of countries has significant differences with respect to developed countries. Developing countries comprise a very heterogeneous group. This group consists of several dissimilar countries that exhibit assorted fundamental differences. Mishkin (2004, 2-3) lists five fundamental institutional differences for emerging market countries;

- weak fiscal institutions
- weak financial institutions including government prudential regulation and supervision
- low credibility of monetary institutions
- currency substitution
- vulnerability to sudden stops of capital inflows

Weak fiscal, financial and monetary institutions make emerging market countries very vulnerable to high inflation and currency crises, so that the real value of money can not be taken for granted. This can cause domestic residents in emerging markets to switch to a foreign currency, leading to currency substitution.

Another reason for the currency substitution is the fact that a currency like the US dollar is a key unit of account for international transactions. This fact causes banks to offer foreign exchange deposits, trying to secure themselves in response to a possible sudden switch away from domestic and into foreign money. And the foreign exchange deposits that banks hold stimulate them to offer loans denominated in foreign currency, causing a liability dollarization that renders the economy more vulnerable to currency crisis. In this case, the policymaker will worry about fluctuations in the nominal exchange rate (Mishkin, 2004, 4).

A dominant phenomenon in emerging market countries is a sudden stop, a large negative change in capital inflows, which, as a general rule, appear to contain a large unanticipated component (Mishkin, 2004, 4).

As mentioned above, these countries, which have complex structures, have completely different monetary processes. So, to say certain general things about inflation targeting for all developing countries is not possible. In the following sections, the preconditions of the inflation targeting are examined closely for developing countries field.

2.2.1.5.1 Prerequisites in Developing Countries

Two main conditions for inflation targeting are mentioned above in section 2.2.1.2.2.; the central bank independence and the absence of any firm commitment by the authorities to target the level or path of any other nominal variable.

The literature on the central bank independence has been enlarging gradually and this large base releases the bulky cliff between the developed countries and the developing countries. Masson, Savastano and Sharma (1997, 23) alleges three factors that restrict the central bank independence in developing countries; heavy reliance on seigniorage, shallow capital markets and fragile banking systems.

The reliance on seigniorage accepted as the most common and simplest advent of fiscal dominance. And it is much heavier than in advanced economies due to a number of structural factors such as unstable tax revenues, poor tax collection procedures, skewed income distributions and political instability.

Another main source of fiscal dominance is the shallow capital markets. The shallow financial markets constrain the government's ability to borrow from the domestic markets, and tend it to the seigniorage and other from of financial repression. Besides, if the financial markets are not deep enough, any borrowing of the government from the domestic market may cause the central bank to loose the control on the interest rates.

The third barrier for an independent central bank is fragile banking system. In developing countries, the conflict between the objectives of attaining price stability and preserving banking sector profitability reach high levels.

As mentioned above, as another condition, there must not be any other goal other than the price stability, which is inconsistent with it. But in developing countries, there may be more than one goal as; securing a certain growth rate, stability of general wage levels etc. In such cases, an agreement between government and central bank may not be occur for inflation targeting.

Sometimes when the inflation targeting regime is implemented, some other goals can not be reached. There may be some goals which are inconsistent with inflation targeting: for example fixed exchange rate policy can not be applied simultaneously with inflation targeting, because in this regime the country's inflation would be strictly dependent on the inflation rate of the anchor country, hindering targeting the inflation.

As a tangible result of this fact; looking at several country samples, a number of the countries has directly replaced the inflation targeting with the fixed exchange rate regime.

It is not clear whether there is a consensus that the overriding goal of monetary policy for some of the emerging market countries should be the control of inflation over the medium term. And it must be presented here that there are some other goals that are not necessarily inconsistent with inflation targeting; full employment and financial stability.

2.2.1.5.2 Country Experiences

By the end of 1990's the developing countries started to launch inflation targeting, forming a long and growing list. The list starts with Czech Republic and continues as; Poland, Brazil, Israel, Colombia, Chile, South Africa, Thailand, Mexico, Croatia, Philippines, Peru and Turkey in chronological order. When deeply examined, several dissimilarities among countries regarding the application and results of this policy come on the scene. Here some country experiences are given a run that is supposed to help on the rest of the work. The experiences of Israel, Czech Republic, Chile and Poland are examined in this section, noting the fact that the last three economies exist in the same income group with Turkey, in respect of the World Bank ranking.

2.2.1.5.2.1 Israel Experience

The price stabilization struggles in Israel may be distinguished into two parts; the first period, between 1985 and 1991, a policy based on cutting down government expenditures and sustaining a fixed but adjustable nominal exchange rate, which was

considered a key nominal anchor in the disinflation effort. The mentioned program executed to reduce the inflation rate from 450% to 20%. In the second period, from 1992 to 1996, the exchange rate modified to one based on a crawling exchange rate band. Additionally an explicit inflation targeting policy adopted. The crawling band stipulates a rate of crawl of the central parity that is approximately equal to the difference between the inflation target and a forecast of world inflation. In this second period, the inflation rate had reduced to 10 percent level (Leiderman and Bufman, 2000, 3). In the following period, the inflation targeting has continued to retreat and the 2007 target has been determined at 4.5% level.

Fundamental components of Israel inflation targeting is listed below (Usta, 2003; 32).

- The inflation target is determined by Minister of Finance with the consultancy of the central bank governor.
- The target is determined as consumer price index.
- The Israel Central Bank issued inflation and money policy changes six-monthly

In general acceptance, Israel's inflation targeting is a successful experience except the overshoots in 1994, 1996 and 1998 (Kadıoğlu, Özdemir, Yılmaz, 2000, 32). The upper limit of the band has breached only twice, emanating mostly from the coexistence of the exchange rate targeting. As explained in section 2.2.1.2.2 one of the pre-conditions of the inflation targeting is the absence of any firm commitment by the authorities to target the level of or path of any other nominal variable. However, Israel implemented inflation targeting and exchange rate targeting simultaneously. It is obvious that the interest rate during the inflation targeting would be higher than the one during the exchange rate targeting. The higher interest rate will attract hot money and affect the nominal exchange rate. Since this case conflict with the exchange rate targeting logic, the central bank would want to intervene. As a result, Israel central bank widened its exchange rate band eventually, signaling to the fact that it gives priority to the inflation target.

2.2.1.5.2.2 Czech Republic Experience

The Czech Republic has started a stabilization program in 1991 that contains the fixed exchange rate regime. In short time, the rate of inflation come down quickly to 10 percent, though not to level prevailing in developed economies. But the currency started to appreciate because of high domestic inflation and fixed exchange rate. The economy began to overheat and interest rates rose significantly, attracting more short term capital and again raising the inflation, and the current account deficit also widen (Jonas and Mishkin, 2003, 7).

With the deceleration of the economic growth and widening deficit, in 1997 the government and the Czech National Bank (CNB) decided to allow koruna to float freely. Possible inflationary effects of currency depreciation after the exit from the peg, together with the absence of alternative nominal anchor to guide inflation expectations, created a risk that inflation would increase significantly in the coming months. Therefore, after the koruna was allowed to float, the CNB issued a public statement expressing its expectation regarding the parity between the koruna and DEM. Furthermore, the CNB made it clear that in the future, monetary policy would be unambiguously focused on domestic price level stability and reduction of potential inflationary effects of the koruna's exchange rate movements. However the CNB left this policy at the end of 1997, putting forward the unsatisfaction as a rationale. And the CNB decided to formulate the monetary program on basis of inflation targeting (Jonas and Mishkin, 2003, 8).

The CNB introduced a new concept; net inflation. Net inflation measures changes in the consumer price index (CPI), excluding the movement in regulated prices and is further adjusted for the impact on the remaining items of changes in indirect taxes or subsidy elimination. Unlike many other inflation-targeting countries, the CNB did not exclude from net inflation changes in prices of energy and agriculture products (Jonas and Mishkin, 2003, 9).

While determining the target the CNB preferred a range target of 1 percentage instead of a point target. But in 2000 it widened the range to 2 percentages.

The CNB had an active role about inflation expectations. The bank realized that a more than expected decline in inflation, together with large degree of rigidity in nominal variables, could result undesirable developments in real variables, as real wages. In order to reduce the inflation expectations, the bank formed a meeting with the representatives of trade unions and employees regarding what inflation it expects in 1999.

In December 1999, the CNB approved Long-term Monetary Strategy which specified long-term inflation target for 2005. The objective was to make the inflation targeting strategy more forward-looking. As another important modification, the central bank had started to target headline inflation measured by the consumer price index, instead of net inflation with the rationale of disappearing of the advantages of targeting net inflation. And the CNB derived its targets for 2002-2005 from the trajectory of net inflation, specified in the “December 1999 Long-term Monetary Strategy”. Following this modification, the central bank put some other exceptions (Jonas and Mishkin, 2003, 11);

- major deviations in world prices of raw materials, energy-producing materials and other commodities;
- major deviations of the koruna's exchange rate that are not connected with domestic economic fundamentals and domestic monetary policy;
- major changes in the conditions for agricultural production having an impact on agricultural producer prices;
- natural disasters and other extraordinary events having cost and demand impacts on prices;
- changes in regulated prices whose effects on headline inflation would exceed 1-1.5 percentage points;
- step changes in indirect taxes

The Czech Republic experience presents significant results because of the fact that it is the first developing country applied this policy, and made important modifications as it faced difficulties.

2.2.1.5.2.3 Chile Experience

The central bank of Chile launched the inflation targeting story in 1990, following mostly the oil shock emanated from the Gulf War. The central bank gained independence and the price stability was determined as the primary goal of the central bank with the release of the new central bank legislation. The central bank announced annual targets between 1991 and 1999. However it revealed multiyear targets starting with 1999. Chile had the second highest starting inflation rate as 25%, following Israel (Trajabo, 2002, 4).

The central bank pursued a gradual approach to lowering the inflation targets, starting with over 20% in 1991 and lowering them slowly to 3.5% by the end of the decade. The central bank switched from target ranges to point targets in 1995 target.

From 1985 to 1999, Chile had experienced an exchanged rate band regime around a crawling peg. The central bank of Chile determined the crawling peg equal to the one period lagged rate of inflation. The inflation target was dominant in Chile's dual nominal anchor system throughout the 1990s, whenever a conflict arose between the inflation target and the exchange rate target, the Bank decided in favor of the inflation target. The inflation targets were important devices for the strengthening of the forward-looking inflation expectations, reducing the role of backward-looking mechanism prevalent in Chile. In 1999–2000 the Bank disposed the exchange rate band by adopting a dirty float, developing the Bank's modeling and forecasting capability, and adopting a comprehensive communications strategy to enhance policy transparency and credibility (Trajabo, 2002, 3).

As an earlier example of an developing market country adopting inflation targeting, the Chile experience suggests that the inflation targeting policy can be used as a successful strategy for disinflation, even with a 25% initial inflation rate.

2.2.1.5.2.4 Poland Experience

Poland was also applying fixed exchange rate, but it could not reach as successful results as the Czech Republic. The zloty was pegged to a basket of currencies in 1990. However the inflation did not declined significantly, so the central bank introduced a pre-announced crawling peg in the end of 1991 and this policy continued by a widening crawling exchange rate band.

As the first step to inflation targeting, the act of the National Bank of Poland (NBP) was redefined. This act specified that the primary objective of the NBP is to maintain a stable price level and simultaneously support economic policy of the government, provided that this does not constrain the execution of the primary target (Jonas and Mishkin, 2003, 12). Following this, the NBP officially announced the introduction of inflation targeting at the end of 1998. The central bank defined target as reduction to less than 4 percent. And two years later, in 2000, Poland abandoned exchange rate band, and let it float.

Looking at the application side, the NBP preferred the broad consumer price index to target. As in the Czech Republic case, the central bank determined a band target rather than a point target. In time, the NBP widened the band to 1.2 percentages from the initial just one half of percentage level. The NBP explains that before the introduction of inflation targeting, monetary targets in Poland were defined as fixed points, and a wider band could possibly signal to public a weaker commitment to reduce inflation. It could be argued that under such circumstances, a fixed point could be better than a narrow band, as both are unlikely to be hit, and the damage of missing a point could be less serious than the damage of missing a band (Jonas and Mishkin, 2003, 12).

The NBP did not define any exceptions for the inflation targeted. Notwithstanding, they calculate different measures of core inflation for research and analysis, and for decisions on monetary policy.

2.2.1.5.3 Review of Empirical Studies in Developing Countries

As mentioned above, several developing countries applied inflation targeting policy as their main monetary policy. Czech Republic, Poland, Brazil, Israel, Chile, South Africa are some of the developing countries those has chosen the inflation targeting to fight against the high inflation. Before starting the examination of the Turkey case, to glance some of the empirical studies that examine the applicability of the inflation targeting in any country, or those analyze the relation between the inflation rate and the monetary policy instrument, in a more general frame, may be helpful for further analysis in the rest of this thesis, especially in the data and model selection.

Table 2.1 shows some works on inflation targeting applicability in Poland and South Africa. Looking at the works, all empirical analysis in these works include exchange rate, interest rate and money supply as monetary policy instruments to examine the relation between them and the inflation rate, while some of them includes several additional variables as industrial production and labor market variables.

On the data selection side, all works have preferred monthly and quarterly data, depending on the macro data releasing frequency of the countries. Besides, using monthly or quarterly data enables to deal with a larger number of observations. Glancing at the empirical methodologies used in the works, all three of them has formed VAR model, as it is one of the best ways to investigate the relation between the macroeconomic variables.

In general words, most of the works reveal that the linkage between the inflation rate and the exchange rate is quite strong, with respect to the relation with other variables, as indicating the pass-through mechanism.

Table 2.1 Review of Empirical Studies on the Applicability of Inflation Targeting on Other Countries

ARTICLE	SUBJECT	DATA	METHOD	RESULTS
Gottschalk and Moore, (2001), Implementing Inflation Targeting Regimes: The Case of Poland	The paper investigates the relation between the instruments of monetary policy and inflation outcomes for Poland.	The model includes the nominal effective exchange rate and the three-month treasury bill rate, and it includes industrial production and the CPI between 1992-1999. German industrial output is also used as a proxy for activity in Poland's trading partners.	VAR	The paper highlights the important role of the exchange rate as an instrument of monetary policy in Poland. However, the direct linkages between the interest rate and inflation do not appear to be particularly strong and are less well understood.
Woglom, (2000), Inflation targeting in South Africa: a VAR analysis	He looks at the historical evidence to judge whether South Africa is a good candidate for an inflation target. The performance of the South African economy is compared to the pre-target performance of Canada and New Zealand.	The data sheet used by Woglom consists of the money supply, the exchange rate and the interest rate.	VAR	South Africa comes out in the middle between pre-target Canada and New Zealand. Relative to pre-target Canada the policy linkage is somewhat less strong and much less predictable. However the comparison is exactly reversed with pre-target New Zealand. He concludes that the small importance of money supply and unpredictability of CPI equation hinders the implementation of inflation targeting in South Africa.
Christoffersen and Wescott, (1999), Is Poland Ready for Inflation Targeting ?	The statistical linkages between monetary policy instruments and inflation are examined, as are the linkages between various so-called leading indicators of inflation and inflation.	The variables investigated include; monetary aggregates, interest rates, exchange rates, real activity variables, labor market variables, foreign price indices, and other financial market variables.	Granger Casualty Test and VAR	This paper suggests that, among monetary policy instruments, there is a reasonable linkage between the exchange rate and inflation and there is some evidence that movements in broad money also may influence inflation.

PART III

INFLATION TARGETING IN TURKEY

Turkey has been exposed to high level of inflation rates since the late 1970s. Especially starting with the liberalization efforts in 1980s, the price stability has become a crucial concept for the Turkish economy. The inflation rate exceeded even 100 percent in mid-1990s, when the Turkey encountered the first financial crisis of the near future. In order to fight with inflation, Turkey launched monetary targeting policy three times, respectively in 1990, 1992 and 1998. Additionally, the CBRT started the exchange rate targeting policy in January 2000 that finalized with the 2001 financial crisis, and consequently the CBRT let Turkish Lira to float.

3.1 A Glance at Turkey's Implicit Inflation Targeting Period

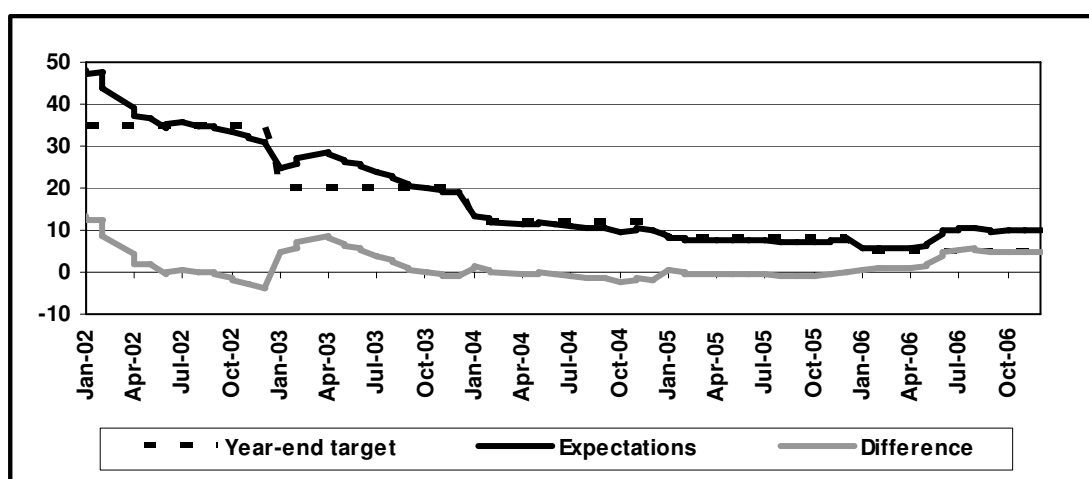
The CBRT maintained its floating exchange rate policy in 2002 and put a new three-year program into service in 2002, which includes a two-leg monetary policy. The central bank planned to target the money base and simultaneously the monetary policy would focus on the future inflation rate. The CBRT targeted an equal growth for money base with nominal national income. On the other hand, the CBRT disclosed its probability to intervene on short term interest rates, taking the possible future inflation rate into consideration.

The bank management obviously mentioned their plan to apply an explicit inflation targeting, following the implicit inflation targeting period, when the preconditions are met. (Monetary Policy and Exchange rate Policy in 2002 and Prospective Developments, 12).

As seen in figure 3.1, while the year-end inflation expectation in the beginning of 2002 was 48.3%, 13 points higher than the target, this difference had been retreated to 0.6 point in June. This fact is the most important indicator of the reliance on the new program. As a result of this recovery, the domestic investors tended to hold Turkish Lira and the real interest rate moved back to 13%. The upward tendency in interest rate and exchange rate, that came on the scene on May with the effects of the prevailing election

process, was stopped in short time. The CBRT lowered the interest rate 6 times in 2002 and the O/N interest rate had been retreated to 44% from 59%.

Figure 3.1
Year-end Inflation Targets and Inflation Expectations during the Implicit Inflation Targeting Period



Source: CBRT

Kara (2006, 4) lists several reasons for adopting an implicit inflation targeting in 2002, rather than an explicit one;

- the restructuring of the banking system in 2001 had increased the public debt burden to historically high levels, making the fiscal dominance a serious obstacle to inflation targeting.
- at the start of implicit inflation targeting, the monetary policy lacked control over long period because of the high public debt and short maturity.
- the economy was highly dollarized; in 2002, 40% of the total assets were denominated in foreign currency.

As these items show, the economy failed to procure the essential preconditions of inflation targeting. However, the Central Bank Law modified in 2001 was satisfactory on the subject of the central bank independence.

In “Monetary and Exchange Rate Policy for 2005” report, the CBRT obviously disclosed the date of commencement for inflation targeting as the beginning of 2006. In 2005 the prevailing program followed almost by the same token. But the central bank planned to focus on the transparency more intensively on the decision making process regarding interest rate. Additionally, it proposed to raise the communication with public in parallel with the advance of transparency and accountability concepts. As of starting 2005, the CBRT reshuffled interest rate adjustments with a view to rise transparency. Previously, the interest rate was adjusted whenever needed, but with the new form, any potential change in interest rate would be made following the MPC (Monetary Policy Committee) that arranged on 8th of every month.

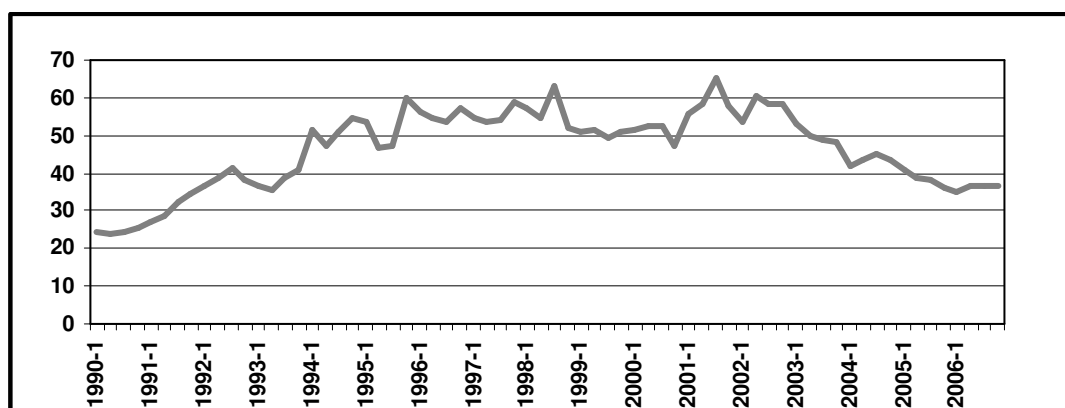
The CBRT planned the implicit inflation targeting process as an orientation period and majored on two subjects; communication and transparency. The central bank improved the communication by publishing more plain texts and increased the transparency by announcing specific dates for the MPC meetings.

During the implicit inflation targeting program, the plan was to reduce inflation to 35% in 2002, 20% in 2003, 12% in 2004 and 8% in 2005 in the consumer price index. Looking at the final point of implicit inflation targeting; inflation decreased from 68%, the year-end 2001 level, to 7.7% at the end of 2005.

3.2 Explicit Inflation Targeting Framework of Turkey

The CBRT successfully implemented the implicit inflation targeting process. All inflation targets have been achieved during this period and the inflation decreased to lowest level of the past thirty years. Dollarization, another important matter of Turkey, regressed and moreover a reverse-dollarization trend appeared (Figure 3.2). On the other hand, the CBRT clarified its communication policy. All this developments laid the groundwork for the transition to an explicit inflation targeting policy.

Figure 3.2
The Dollarization Ratio in Turkey



Source: CBRT

Here, the basic principles of inflation targeting program that disclosed at the end of 2005 (General Framework of Inflation Targeting Regime and Monetary and Exchange rate Policy for 2006) are examined in the context of inflation targeting specification;

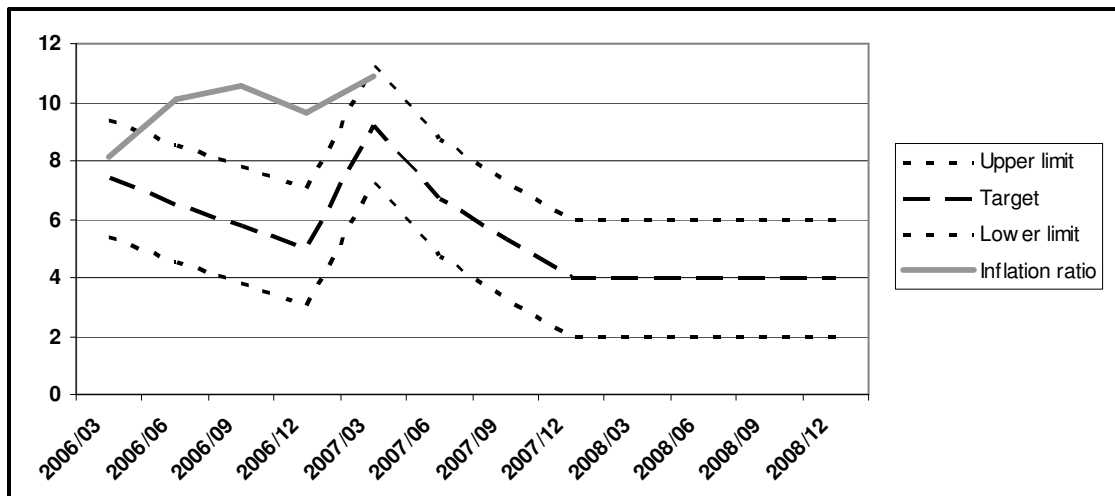
The CBRT sets the inflation target as a point target, rather than a range one. The year-end inflation targets for 2006, 2007 and 2008 are %5, %4 and %4, respectively. A point target has an advantage of being easily understood by the public, as well as its communication advantage. However, it lessens the probability of hitting the target, and limits the freedom of monetary policy to manipulate the economy through monetary instruments. Despite all these disadvantages of point target, the CBRT has designated the target as a point one, because of its need to strengthen its credibility.

The CBRT determined the CPI as the target criteria. Headline inflation is typically decomposed into core inflation and the inflation of volatile and other non-core items, which may include perishables, oil products, consumer taxes, and interest payments. These volatile items lead significant fluctuations in consumer price index. However, the CPI has some advantages as being easily followed by public and an effective way of measuring the cost of daily life. As for Turkey, it is a petroleum importer country and the petroleum products hold a significant share in both semi and final goods as an input. Considering further the high pass through effect in Turkey, it is

obvious that the Turkish economy is quite vulnerable for oil shock. However, the CBRT selected the headline inflation as the target criteria because of larger public confidence in the headline inflation measure.

The CBRT announced that if the inflation rate significantly deviates from its target level, the bank will disclose the reasons behind this divergence to the public via inflation reports. The Central Bank determined the uncertainty band as 2 bps in both directions. Besides, in order to achieve a better understanding of the inflation trend, the CBRT formed special CPI aggregates that exclude the items which are out of control of the monetary policy. The CBRT determined the “inflation report” as its main communication instrument, which contains the inflation forecasts of the CBRT. Additionally, the CBRT lists the other communication instruments as; the notes of the MPC, press conferences and presentations.

Figure 3.3
The Explicit Inflation Targeting History of Turkey



Source: CBRT

Although the inflation targeting policy has not fulfilled even its first two years, it may be appropriate to glance to the accordance between the target and realized inflation data. Figure 3.3 summarizes Turkey’s explicit inflation targeting history. The downtrend prevailed during the implicit inflation targeting period started to decelerate in the first quarter of 2006, and the inflation rate exceeded the path consistent with the year-end target, during the rest of the year.

In the parallel of the largely accepted opinion that the monetary policy instruments shows their effects on the inflation rate with a lag, the CBRT expects the inflation rate to commence to converge to the target level in the near future (CBRT Inflation Report 2006-IV, 60). However, taking the biases from the uncertainty bands of the inflation target into account, this thesis tries to examine the success chance of Turkey for inflation targeting, emphasizing on to the prerequisites of the policy.

3.3 Prerequisites of Inflation Targeting for Turkey

Under this section, two of three main preconditions of the inflation targeting will be examined for the Turkey case; “the central bank independence” and “the having a sole target”. On the other hand, the third one; the strong linkage between monetary policy instruments and inflation rate, will be examined in the following section.

3.3.1 The Central Bank Independence

The central bank law, amended in 2001, consists some articles those give instrumental independence to CBRT. Especially articles 4 and 22A emphasizes on the central bank independence concept;

Article 4- *(As amended by Law No. 4651 of April 25, 2001)*

“The primary objective of the Bank shall be to achieve and maintain price stability. The Bank shall determine on its own discretion the monetary policy that it shall implement and the monetary policy instruments that it is going to use in order to achieve and maintain price stability....”

By this article, the emphasis on the price stability is raised. On the other hand, “article 4” allows the central bank to choose its monetary policy and the policy instrument to use to reach the price stability target. This article is a crucial landmark for the inflation targeting in Turkey, especially within the central bank independence context.

Article 22/A- (Annexed by Law No.4651 of April 25, 2001)

“The Monetary Policy Committee shall have the following duties and powers:

..... b) to determine the inflation target together with the Government within the framework of the monetary policy strategy,”

Examining this article, it is easy to mention that the law does not allow a fully independence to the CBRT. Although the “article 4” acted free the CBRT within several subjects, this article restricts the independence of the bank in “determining the inflation target” terms. In conclusion, the Central Bank of Turkey has instrument independence within the central bank law context.

However, the fact that the central bank has reached the independence within a law context is not sufficient for a successful inflation targeting policy. For the central bank independence to be functional, a country will have to exhibit no significant symptoms of fiscal dominance. As mentioned above, Masson, Savastano and Sharma (1997) alleges three factors that restrict the central bank independence in developing countries; heavy reliance on seigniorage, shallow capital markets and fragile banking systems. The central bank independence in Turkey is examined by analyzing these three conditions below.

3.3.1.1 Fiscal Dominance

The literature frequently uses the seigniorage ratio, fiscal dominance ratio and the public debt/GNP ratio to gauge the fiscal dominance level in an economy. In this section, the fiscal dominance level of Turkey is examined by comparing with some other countries.

Looking at Table 3.1, the seigniorage ratios, which defined as the annual change in the monetary base divided by nominal GDP, are higher in developing countries than advanced countries. The dependence to the seigniorage started to decrease since the 1980’s in Turkey. The seigniorage ratio has retreated to 1,93 in 2002-2006 period, from 3,14 during 1992-1995 time frame. However, it still remains above the advanced countries’ level. Although the figure is higher than most advanced economies,

it is moderate with respect to the standards of developing countries which applied the inflation targeting policy.

Table 3.1
The Seignorage Ratios of Some Selected Countries

	IT Starting date	Seignorage ratio⁽²⁾	Period⁽¹⁾
New Zealand	Mar 90	0,12	1980-95
Canada	Feb 91	0,19	1980-95
England	Jan 92	0,20	1980-95
Sweden	Jan 93	0,65	1980-95
Australia	April 93	0,42	1980-95
Israel	Jan 92	1,57	1980-95
Chile	Jan 91	1,53	1992-95
Brazil	Jun 99	7,46	1992-95
Poland	Nov 98	2,23	1992-95
Czech Republic	Jan 98	5,9	1997
Turkey	Jan 06	2,98	1980-91
		3,14	1992-95
		1,93	2002-06
		2,85	2005
		0,47	2006

(1) Period averages, in percent.

(2) Defined as the annual change in the monetary base divided by nominal GDP, except for Chile and Israel (see footnote3).

(3) Due to the presence of indexed and/or renumarated deposits in the monetary base, seignorage defined as the annual change in M1 divided by nominal GDP in Chile , and as the change in monetary base excluding foreign currency deposits divided by nominal GDP in Israel.

Source: www.dpt.gov.tr , Masson, Savastano, Sharma (1997) - pages: 25,26, and Jonas (2000) - page:22

Table 3.2
Some Economic Indicators of Pre-Inflation Targeting Periods of Selected Countries
(%)

	IT Starting Date	Data Year	Public Debt/GNP	Fiscal Dominance Ratio (Budget Balance/GNP)	Financial Depth Ratio (M2/GDP)
New Zealand	Mar 90	1989	61,9	4,0	32,0
		1990-1994	61,9	0,9	n.a.
		1995-2000	40,9	2,0	35,0
Canada	Feb 91	1990	65,0	-3,8	55,0
		1991-1995	75,0	-5,1	56,0
		1996-2003	67,0	0,0	49,0
England	Jan 92	1991	34,4	-1,2	93,0
		1992-1996	42,4	-5,4	67,0
		1997-1999	n.a.	-0,5	95,2
Sweden	Jan 93	1992	63,3	-7,8	45,4
		1993-1997	65,0	-7,4	44,4
		1997-2002	53,1	-2,3	44,6
Australia	April 93	1992	19,0	-3,6	14,0
		1993-1997	21,7	-1,9	17,8
Israel	Jan 92	1991	140,5	-6,2	64,1
		1992-1996	126,6	-3,7	73,5
		1997-2002	106,3	-1,2	91,8
Chile	Jan 91	1990	50,1	0,8	40,7
		1991-1995	31,9	2,1	37,2
		1996-2001	14,2	0,6	41,6
Brazil	Jun 99	1993-1997	n.a.	-7,7	38,0
		1998	42,2 ⁽¹⁾	-7,5	27,9
		1999-2003	n.a.	n.a.	27,4
Poland	Nov 98	1993-1996	n.a.	-1,8	21,4
		1997	46,0	-1,2	25,3
		1998-2001	n.a.	-1,5	29,4
Czech Republic	Jan 98	1993-1996	12,3	0,3	70,7
		1997	9,5	-0,9	65,8
		1998-2002	13,6	-0,2	66,1
Turkey	Jan 06	2005	71,6	-2,0	26,6
		2006	63,1	-0,7	30,9

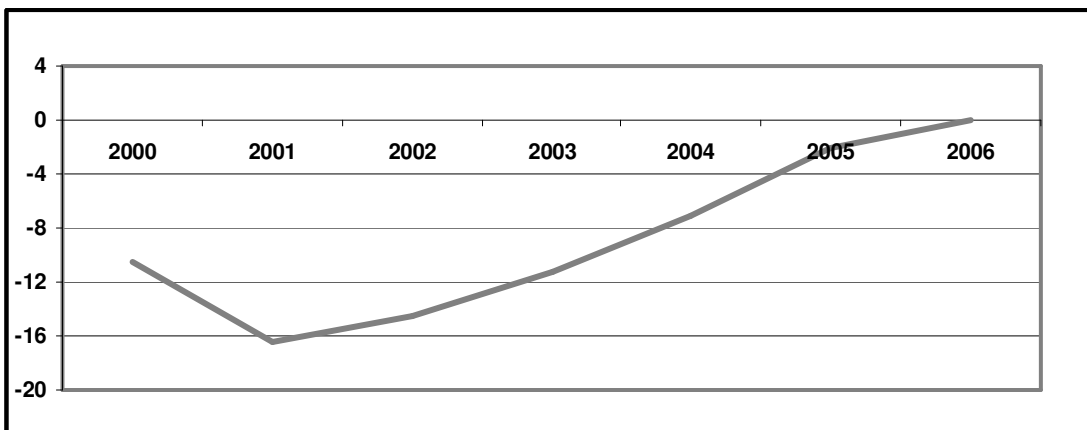
Source: IFS December 2005, www.cbirt.com.tr, and Örneç (2004) – page: 20

Table 3.2 shows some economic indicators for several developing and advanced countries, relating to the year before they launched inflation targeting as their monetary policy. “The fiscal dominance ratios” of countries take place in a broad range between “4” and “-7.8”, for the year before they launched inflation targeting as their monetary policy. Comparing with other countries, Turkey’s figure of -2% looks acceptable.

The table includes also data on pre-targeting and targeting periods for the countries. These data enable us to observe any significant change in the economies, following the application of the inflation targeting policy. The recovery in the public debt/GNP ratios looks significant for several countries. However, the “fiscal dominance” and “financial depth” ratios have not indicate to meaningful changes.

Additionally, the Figure 3.4 shows the near history data on the fiscal dominance ratio in Turkey. In past four years, Turkey has covered a significant route in fiscal discipline field. With the effect of a strict fiscal policy and strong privatization process, the budget deficit has regressed to 3.9bn TRY in 2006, from 40bn TRY in 2002.

Figure 3.4
The Fiscal Dominance Ratio of Turkey



Source: CBRT

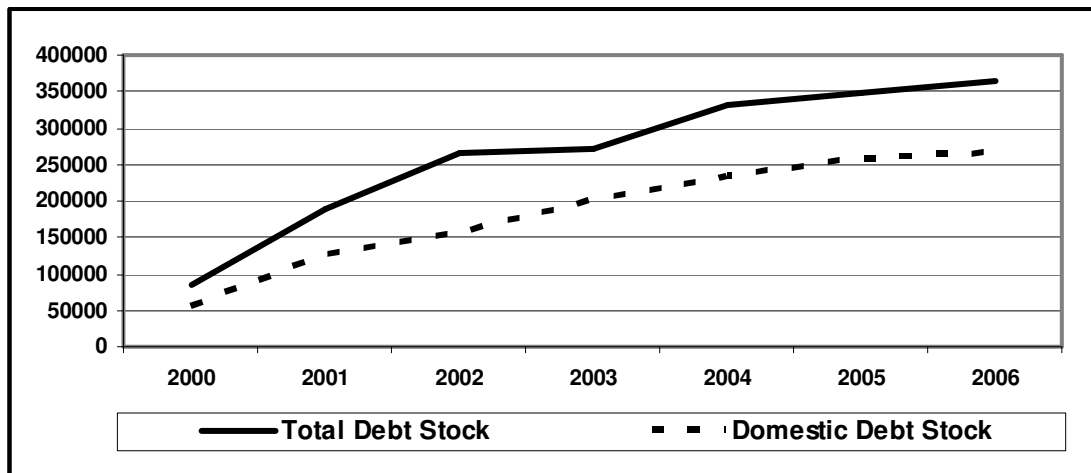
High level of public debt is another catalyst that stimulates the fiscal dominance. In this context, it is crucial to touch to the “article 56” of the central bank law. The article aims to restrict the loan relation between the CBRT and the Treasury.

Article 56- (As amended by Law No. 4651 of April 25, 2001)

“The Bank shall not, grant advance and extend credit to the Treasury and to public establishments and institutions, and shall not purchase debt instruments issued by the Treasury and public establishments and institutions in the primary market.”

Turkey’s both domestic and foreign borrowings continue at high levels. Its total debt amount has jumped by more than three-fold within a 5 year period, since the end of 2000, while the domestic debt stock has reached to 265bn TRY, bouncing almost by four-fold. The literature uses also the public debt/GNP ratio as a considerable measure of the fiscal dominance level for a country. The fourth column of table 3.2 presents the “Total Public Debt/GNP” ratios of countries, relating to the year before they launched inflation targeting as their monetary policy. Turkey’s total debt to GDP ratio for 2005 is 71,6%, significantly above many of other countries’ figures. The mentioned ratio has retreated to 63.1% in 2006, however, is still unable to point a low fiscal dominance.

Figure 3.5
Debt Stock of Turkey



Source: CBRT

Çolakoğlu (2002, 24) asserts that some of the Maastricht Criteria are important thresholds for the fiscal dominance. Looking at Maastricht Criteria, “The government deficit convergence criterion” requires that the ratio of government deficit to GDP does not exceed 3%. Under the present public finance parameters, Turkey is able to fulfill the general government deficit criterion. Another criteria of the Maastricht Treaty is the “government debt convergence criterion” which stipulates that the ratio of government debt to GDP should not exceed 60%. Given the still high level of government debt, Turkey has problem in fulfilling this criterion.

3.3.1.2 Shallow Capital Markets

As a measure of the financial depth, the share of the Turkish financial sector within the economy is estimated as the ratio of total assets of the sector to gross domestic product, as 98%. When the institutions within the financial sector are analyzed, it is observed that the banking sector constitutes the majority of the sector with its 86.7% of share within the GDP. Securities investment funds and insurance companies (including private pension companies) follow the banking sector, by 4.9% and 2.9 %, respectively. Generally, the size of the Turkish financial sector is currently regarded as relatively small when compared to the developed countries, mainly EU countries, which have financial sectors 3 times bigger than their respective national incomes (BRSA, 2006, 27).

3.3.1.3 Fragile Banking Systems

Steinherr, Tükel and Üçer (2006, 20) lists the main obstacle for a tough banking system as the dominance of the state banks. Although the state banks have advantages on some fields as “small and medium size enterprises” (SMEs), they fall astern on the private banks in management and infrastructure quality. Furthermore, the fact that the public bodies are prohibited from opening an account in private banks positions the state banks as monopoly in the banking services for public enterprises.

Following the takeover of 21 banks by the Saving Deposit Insurance Fund (SDIF), it is hard to say that the Turkish banking sector contains overmuch banks. Comparing the Turkish banking system with five countries; (the Czech Republic,

Hungary, Poland, Slovakia and Slovenia) two main differences stand out. The first one is about the share of state banks in total sector. The mentioned ratio is 5% in Hungary and 23% in Poland, while there is no state bank in the Czech Republic. On the other hand, 27% of the banking sector is covered by state banks in Turkey. The second one is that while average 77% of the banking sector assets in the above five countries is owned by foreign banks, Turkey remains below in the said ratio. It was only 5% in 2003 for Turkey, however, with the establishment of the partnerships with foreign banks (as Fortis, Dexia), the share has reached 24% in 2006.

Consequently, comparing with the developing countries those launched inflation targeting policy, Turkey comes up at some acceptable levels in both seignorage revenues and budget deficits. However, Turkey has a high level of public debt, especially domestic debt stock, compared with other countries. Considering that the CBRT has determined the short-term interest rates as the main monetary policy instrument, the mentioned high level debt stock may partially restrict the CBRT's decisions on the interest rate. On the other hand, Turkey still remains below the inflation targeting developing countries both in financial deepness and tough banking system.

3.3.2 Having a Sole Target

As mentioned in section 2.1.5.1, there must not be any other goal other than the price stability, which is inconsistent with it.

Article 4- (As amended by Law No. 4651 of April 25, 2001)

"...The Bank shall, provided that it shall not be in confliction with the objective of achieving and maintaining price stability, support the growth and employment policies of the Government."

As can be seen from this article, the requirement for a sole target is satisfied in the legal side. However, the article allows the establishment of another target that subordinate with the price stability objective. Sometimes when the inflation targeting regime is implemented, some other goals can not be reached. There may be some goals

which are inconsistent with inflation targeting: for example fixed exchange rate policy can not be applied simultaneously with inflation targeting, because in this regime the country's inflation would be strictly dependent on the inflation rate of the anchor country, hindering targeting the inflation. Considering the fact that Turkey has left the exchange rate targeting policy, it can be easily asserted that Turkey satisfies the "having a sole target" condition.

PART IV

SUCCESS CHANCE OF TURKEY IN INFLATION TARGETING: AN EMPIRICAL ANALYSIS

4.1 Literature Survey

The economy literature includes several theoretical and empirical works on the inflation targeting. However, this thesis deals with only empirical analysis those examine the applicability of the inflation targeting in any country, or with those analyze the relation between the inflation rate and the monetary policy instrument, in a more general frame. It is obvious that these works show significant differences on their empirical methods and data periods. Some analysis those investigate the Turkey case are glanced in this section (Table 4.1), in order to detect some comparable general acceptances about Turkey.

In general words, it can be seen that the VAR and Vector Error Correction models are used by all the works. Both methods are defined in the econometric literature as the best way to investigate the relation between the macroeconomic variables. Although some of them deal with monthly data, most of the analysis uses quarterly data, emanating from the releasing frequency of the macro data. Considering the main differences between the econometric methods, this thesis tries to reach general results taking the used methods into account. In other words, the works are grouped by their empirical methods as VAR and VEC model.

Firstly glancing at the works those use VAR model, they mostly conclude that the past values of inflation is a significant determinant of the inflation rate. Additionally, some of the works accept the interest rate as a determinant of the inflation rate, while the works give challenging results about the effect of the exchange rate on the inflation rate. The analyses those used cointegration and VEC model are also give conflicting results. They usually accept that money supply and the exchange rate have a positive relation with the inflation rate. Additionally, some of them assert that the interest rate has a moderate effect on inflation. On the other hand, examining the short term dynamics, some works reveals that inflation level depends on the supply shocks and exchange rate.

Table 4.1 Review of the Empirical Studies on the Relation Between the Inflation and the Monetary Policy Instruments in Turkey

ARTICLE	SUBJECT	DATA	METHOD	RESULTS
Alper and Ucer, (1998), Some Observations on Turkish Inflation : A "Random Walk" Down the Past Decade	They try to explore the impact of inertia and public sector prices on inflation rate in Turkey.	The analysis includes monthly percentage changes in the price level, exchange rate basket, various measures of money and more traditional aggregates. The sample covers the period 1985:01-1997:09.	VAR	In conclusion, they asserts that inflation is almost completely an inertial phenomenon. While they reach some evidence that the central bank money has some predictive power, but the exchange rate has virtually no impact.
Çiçek, (2005), The Modeling of the Short and Long Term Dynamics of the Inflation in Turkey in the Disinflation Process	The paper models the long run and the short run dynamics of inflation in the disinflation process of Turkey, investigating the link between inflation and some other variables.	She uses inflation and unit labor costs, output gap (proxy for demand shocks), real exchange rate (proxy for supply shocks) and price expectations for Turkey using monthly data from 2000:01 to 2004:12.	Cointegration and VECM	She finds that in the long run, mark-up behavior of output prices over unit labor costs is the main cause of inflation. The real exchange rate has a rather big impact on reduced inflation while the demand shocks do not led to an increase in prices. The short run dynamics of the inflation equation indicate that supply shocks are the determinant of inflation in the short run. It is also found that exchange rate is the variable that triggers an inflation adjustment the most rapidly in the short run.
Tutar, (2002), Inflation Targeting in Developing Countries and Its Applicability to the Turkish Economy	The paper examines the applicability of inflation targeting to Turkey by analyzing the preconditions.	She forms several models which include money supply, CPI, nominal exchange rate, real gross domestic product and the interest rate. While, the first VAR models includes money supply and prices, the others formed by adding other variables step by step.	VAR	She concludes that, the inflationary expectations are the major causes of the high inflation in Turkey and furthermore she asserts that the monetary authorities have to decrease the influences of inflationary expectations by pursuing more transparent policies.

Table 4.1 (continues)

ARTICLE	SUBJECT	DATA	METHOD	RESULTS
<p>İşık, (2003), Policy Instrument Selection in Fight against Inflation – A VAR Analysis</p>	<p>This study examines the relationship between inflation and some other macro variables to investigate whether these variables can be used as policy tools to control inflation.</p>	<p>The paper examines the relationship between inflation, interest rates, exchange rates, output, and money supply on quarterly time series data for 1987:01-2002:04 period.</p>	<p>VAR</p>	<p>The interest rate is a critical variable affecting exchange rate, money supply, and inflation. However the money supply affects inflation directly while the exchange rate does the same thing indirectly. According to variance decomposition results, two variables that affect inflation most are exchange rate and interest rate. Impulse-response functions show that keeping interest rates under control would be a better policy tool than fixing exchange rates.</p>
<p>Lim and Papi, (1997), An Econometric Analysis of the Determinants of Inflation in Turkey</p>	<p>He tries to find the determinants of inflation in Turkey.</p>	<p>The whole-sale price index, wages, M2, nominal exchange rate are used in the empirical analysis, for the 1970-1995 period.</p>	<p>Cointegration and VECM</p>	<p>The main findings are that the monetary variables (initially money, more recently the exchange rate) play a central role in the inflationary process; inertial factors are quantitatively important; and public sector deficits are found to have an important direct effect on inflation. Policymakers' commitment to active exchange rate depreciation on several occasions in the past 15 years has also contributed to the inflationary process.</p>
<p>Örnek, (2003), Can the Inflation Targeting Be Applied in Turkey</p>	<p>This work analysis the applicability of the inflation targeting policy in Turkey.</p>	<p>He uses quarterly data on inflation rate, money base, short term interest rate and the exchange rate, between 1989 and 2002.</p>	<p>Cointegration and VECM</p>	<p>He finds that the inflation rate may be decreased by using the money base and the interest rate. However, he defines the strong relation between the exchange rate and inflation as the main threat on the program.</p>

Table 4.1 (continues)

ARTICLE	SUBJECT	DATA	METHOD	RESULTS
Şanlı, (2006), Inflation Targeting Practices and the Applicability in Turkey	This paper evaluates inflation targeting policy considering its preconditions and Turkey's dynamics.	-	-	She concludes that the applicability of inflation targeting is conditional upon the completion of the banking sector reforms, weakening of the relation between the exchange rate and the inflation rate, deterioration of the fiscal dominance and enlargement of the financial depth.
Çolakoğlu, (2002), The Independence of the CBRT in the Context of the Transition to the Inflation Targeting Strategy	He examines the "Having a Sole Target" and "Central Bank Independence" preconditions of inflation targeting.	-	-	Çolakoğlu asserts that the CBRT ensures the first preconditions, however, the fiscal dominance is at high levels in the Turkish economy and the Turkish financial market is not so developed.
Büyükkam and Erarslan, (2004), Inflation Targeting and the Evaluation of the Applicability in Turkey	This work try to gauge the applicability of the inflation targeting policy in Turkey.	-	-	They asserts that the Turkish economy needs a wide financial sector reform which will strengthen the financial sector and reduce the fiscal dominance.

4.2 Examination of the Success Chance of Turkey in Inflation Targeting

Following the examination of the two of three main preconditions of the inflation targeting for the case of Turkey discussed in section 3.3, the third one, strong linkage between monetary policy instruments and inflation rate will be examined in this section. As mentioned above, Debelle (1997, 6) suggests that the linkage must be strong between the instrument of monetary policy and the inflation rate. In this context, investigating the relation between the inflation rate and the monetary policy instruments is a common way of examining the applicability of inflation targeting in any countries. The success chance of Turkey in applying the inflation targeting policy will be examined, by using OLS, VAR and VEC models. Lim and Papi's "An Econometric Analysis of the Determinants of Inflation in Turkey" (1997) paper is one of the guide while picking the variables.

Glancing at the theoretical basis of the relations between the inflation rate and the monetary policy instruments, the relation between the inflation rate and the money supply extends as far as the quantity theory of money, which proposes a positive relationship between the changes in the money supply and the long-term price of goods. This means that any increase in the amount of money in the economy will eventually lead to an equal percentage rise in the prices of products. This thesis uses M1 money supply since it is the most appropriate proxy for consumer demand. On the other hand, the relation between the inflation rate and the exchange rate takes roots mostly from the exchange rate pass-through mechanism. In countries where the dependence on imported intermediate goods in the production process is high, a change in the exchange rate will be reflected to the prices of domestic goods. Additionally, the depreciation in the exchange rate increases the domestic currency value of the imported goods and hence the consumer price index. Although Turkey's foreign trade partners compose a long list, taking the transition period to euro into account, dollar price is used in this thesis as exchange rate. Additionally, considering the relation between the inflation rate and the interest rate, the Taylor Rule forms the basis by recommending a relatively tight monetary policy (a relatively high interest rate) to decrease the inflation rate. Since the CBRT has chosen the short term interest rate as its main monetary policy instrument,

the interest rate on three-month deposits is employed in this thesis. The foresight for the direction of the relation between the inflation and the interest rate is negative. On the other hand, the GDP growth rate is added the model as a proxy of the output growth, and since any increase in the output level lowers the demand-pull inflation pressure, a negative relation between the GDP growth and inflation is expected.

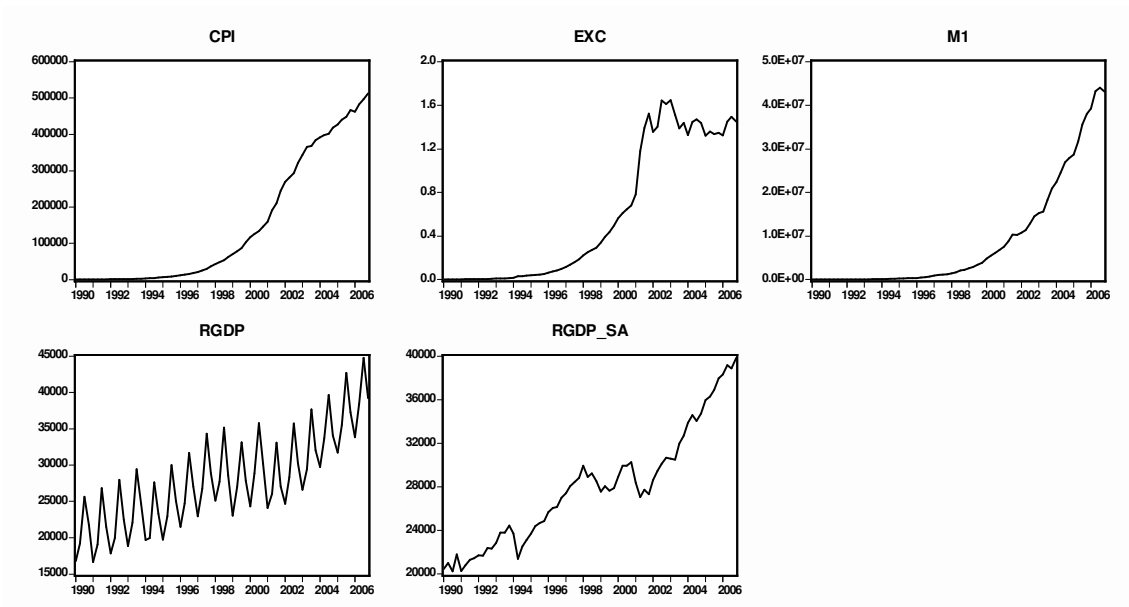
4.3 Data Analysis

The aim of this thesis is to examine the presence of any strong relation between monetary policy instruments and inflation. In the analysis, quarterly data from 1990:1 through 2006:4 is used. The inflation rate (INF), the percentage change of the exchange rate index (pc_EXC), the growth rate (GROWTH) and the percentage change of the money supply (pc_M1) and finally the interest rates on 3-month deposit (R) are used in the empirical part. The series are transformed to the percentage changes of consumer price index, exchange rate index (US\$), the real gross domestic products, and money supply (M1), respectively. All data is obtained from the CBRT except the data on consumer price index (CPI) that have been taken from Turkish Statistical Institute. The base period for CPI is 1987. Since the 1987=100 CPI data ceased in 2005 year-end, the 2006 data obtained by carrying the 1987 based CPI data using growth rates of the new series. The list of the variables is as follows:

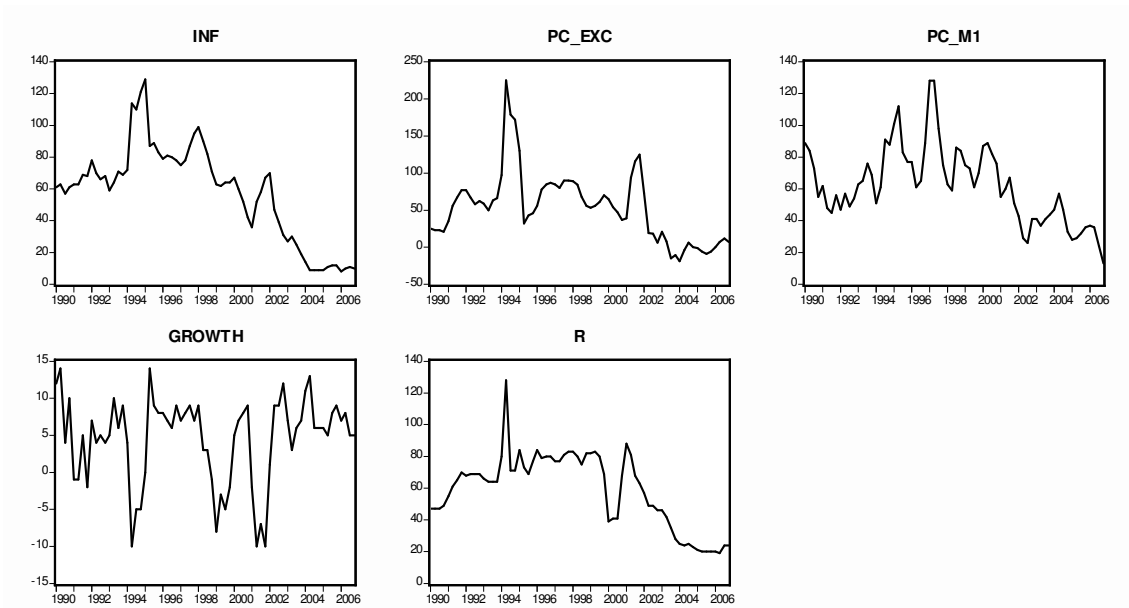
INF	the inflation rate
GROWTH	the growth rate of GDP
pc_M1	the percentage change of the money supply
pc_EXC	the percentage change of the exchange rate index (US\$)
R	the interest rates on 3-month deposit

Figure 4.1
Variables of Interest

(a) Levels



(b) Rates



The graphs of the series present basic information about the data generating process of the series. All variables exhibit very sharp changes in the second quarter of 1994 and a smoother one in the first quarter of 2001. All variables mirror the effects of two crises those were experienced in these years. The effects of the crises are seen more clearly especially in GDP, the exchange rate and the interest rate graphs. Additionally the graphs of all variables give visual hints about the non-stationarity of the variables.

Table 4.2
Correlation Matrix (1990:01 – 2006:04)

	INF	pc_EXC	pc_M1	GROWTH	R
INF	1	-	-	-	-
pc_EXC	0.83	1	-	-	-
pc_M1	0.68	0.48	1	-	-
GROWTH	-0.29	-0.59	0.00	1	-
R	0.84	0.78	0.55	-0.43	1

Table 4.3
Correlation Matrix (2002:01 – 2006:04)

	INF	PC_EXC	PC_M1	GROWTH	R
INF	1	-	-	-	-
PC_EXC	0.78	1	-	-	-
PC_M1	0.06	-0.07	1	-	-
GROWTH	-0.26	-0.48	0.35	1	-
R	0.92	0.69	0.09	-0.14	1

The correlation table for 1990-2006 period (Table 4.2) includes some significantly high figures. The inflation rate is highly positively correlated with the percentage change of the exchange rate and the percentage change of the money supply. The table indicates another positive high correlation between the inflation rate and the interest rate, which takes roots from a positive relation between the interest rate and the exchange rate, which conflicts with the general acceptances.

The exchange rate has two ways to be effective on the inflation rate; direct exchange rate transmission and relative prices. The direct exchange rate transmission works strictly in Turkey. Any rise on the exchange rate affects the inflation rate through

the imported products in the price indexes. Moreover, since the imported entries hold a high share in production costs in Turkey, high exchange rate is effective on inflation also by a supply push inflation mechanism. Furthermore, any appreciation in the Turkish lira causes a shift in demand from domestic products to imported ones, causing a retreat in the domestic demand.

Looking at the interest rate and exchange rate relation, in general acceptance, any rise in the interest rate causes foreign capital inflows to the country and a depreciation in the exchange rate. However, the table shows a positive high correlation between the interest rate and the exchange rate in Turkey. Although the relation between these two monetary variables still keeps a remarkable place in the recent economic literature, this positive relation is partially originated from Turkey's peculiar reasons. While a rise in the interest rate tends the domestic and foreign investors to exchange their assets with YTL and appreciate it, this ascent in the interest rate creates also concerns about the debt payment and the general economic picture. Taking Turkey's high debt stock into consideration, the capital starts to outflow from the country, creating an upsurge in the exchange rate. Under these circumstances, the positive correlation figure between the interest rate and the exchange rate looks more acceptable for Turkey. The positive correlation between the interest rate and the inflation rate may also partially explained by this positive relation.

Table 4.2 shows also a high positive correlation between the percentage change in the money supply and the inflation rate. This figure is as expectedly positive, taking roots from the quantity theory.

Table 4.3 discloses the relations between the variables in 2002-2006 period, which covers Turkey's implicit and explicit inflation targeting processes. The table shows mostly parallel figures with Table 4.2, however it indicates a significantly poorer relation between the percentage change in the money supply and the inflation rate.

Table 4.4
Covariance Matrix (1990:01 – 2006:04)

	INF	pc_EXC	pc_M1	GROWTH	R
INF	+				
PC_EXC	+	+			
PC_M1	+	+	+		
GROWTH	-	-	0	+	
R	+	+	+	-	+

Table 4.5
Covariance Matrix (2002:01 – 2006:04)

	INF	PC_EXC	PC_M1	GROWTH	R
INF	+				
PC_EXC	+	+			
PC_M1	+	-	+		
GROWTH	-	-	+	+	
R	+	+	+	-	+

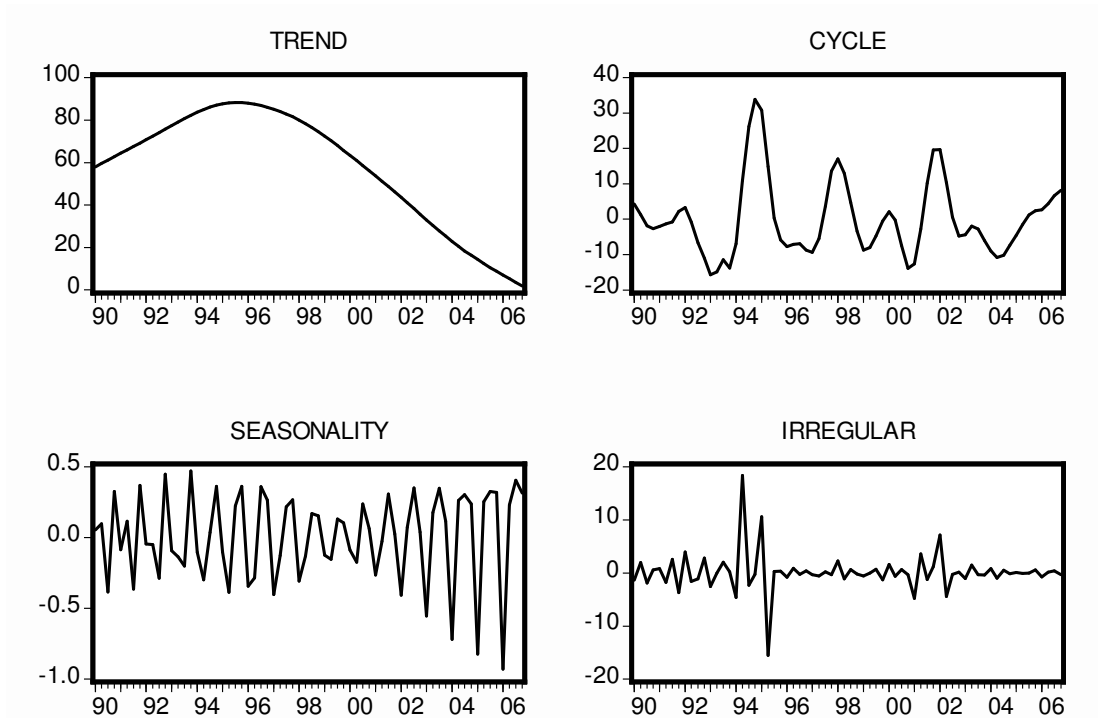
The above tables 4.4 and 4.5 present the covariations between the variables for 1990-2006 and 2002-2006 periods. Mostly both tables show parallel relations. Although there are no positive covariance relations between the inflation rate and the growth rate, the co-variations between inflation and other variables are positive. In other words, while inflation and growth move on the opposite directions, all the other variables move in the same direction with the inflation.

4.3.1 Data Components

The data that used in the econometric analysis are examined in details in this section. Before constructing the models, to analyze the data enables to form more expressive models and eases to interpret the results attained from the models. The data is decomposed into the components. Time series can be decomposed into four main components: a cyclical component (short run regular or irregular fluctuations), - a trend component (long term tendency), - a seasonal component (seasonal effects), - an irregular component (shocks). Here the data is decomposed by using e-views-Census X12.

Inflation Rate (INF)

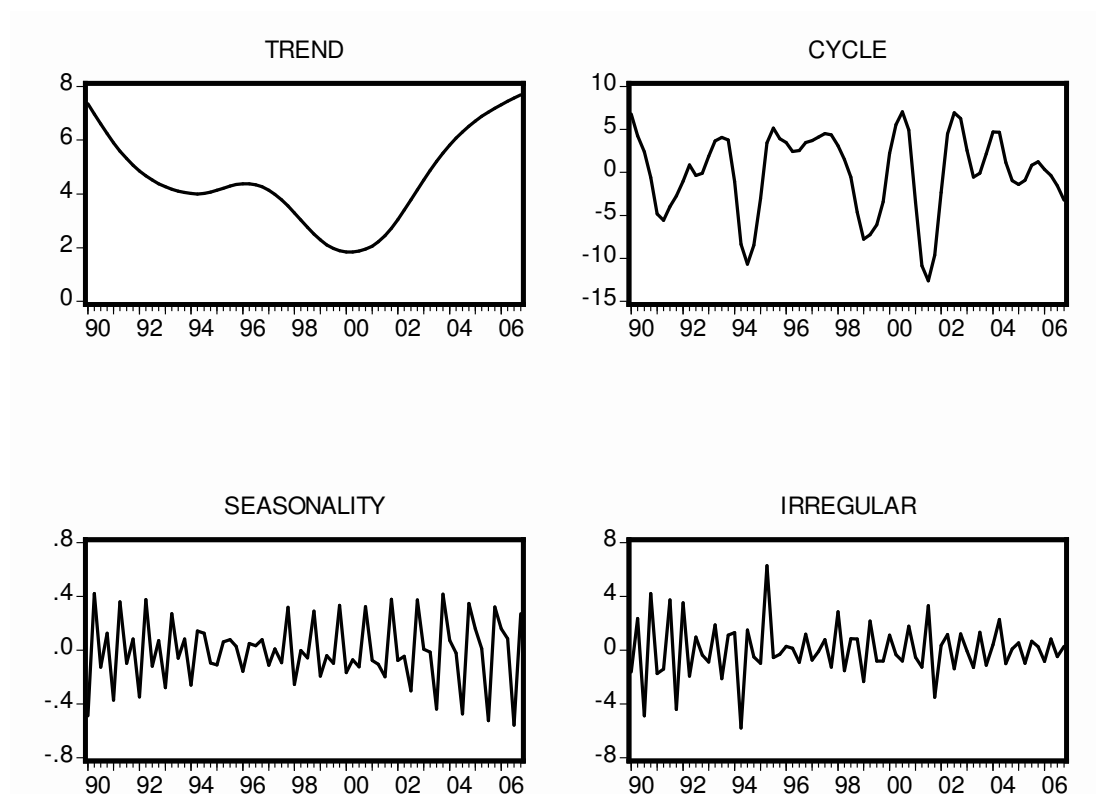
Figure 4.2
Data Components of INF



As a continuation of the high inflation process that started in 1970's and accelerated in 1980's with the impacts of the liberalization, the inflation depicted an upward trend until the middle of the last two decades. Reaching a turning point in 1995, the trend has diverted to a downward movement. The above graph indicates three significant cyclical movements in the inflation rate series. The first one materialized in 1994, proving the negative impact of the crisis in the beginnings of the year. The second and the third ones are coincides with the Russian (1998) and Turkish banking sector crises (2001), respectively. The irregular component presents the 1994 crisis more obviously.

Growth Rate (GROWTH)

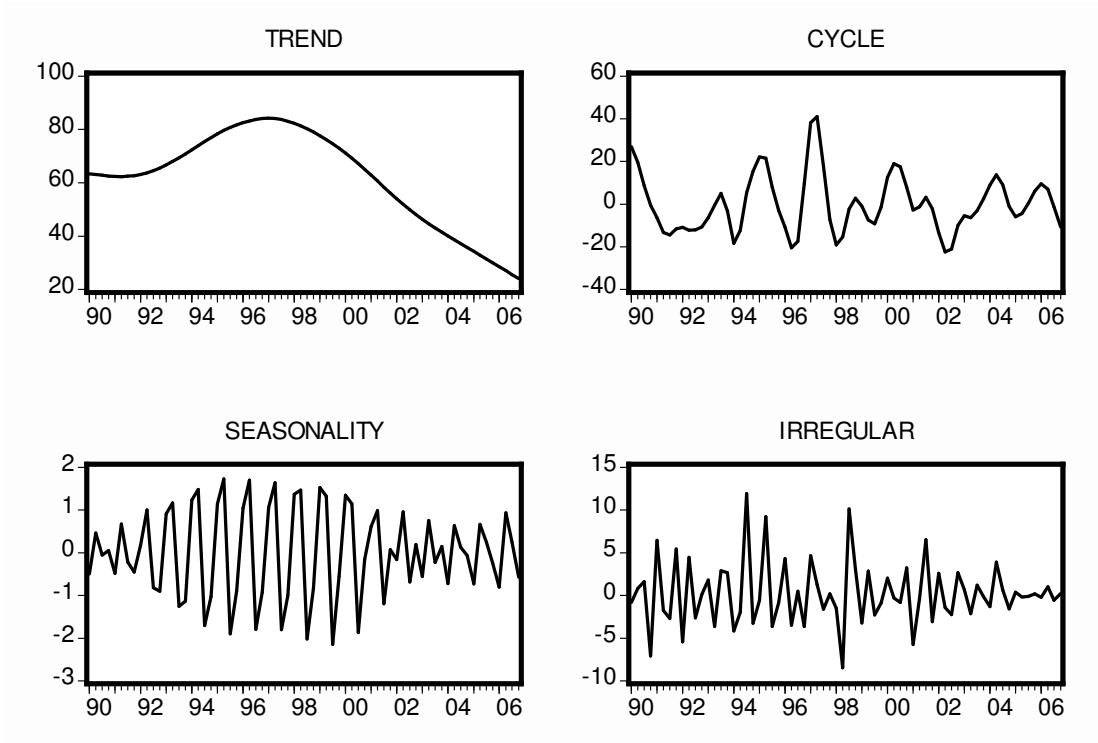
Figure 4.3
Data Components of GROWTH



The growth rate shows long oscillations during the time frame between 1990 and 2006. However, in a more cursory glance, the growth rate presents a slight downtrend until 2001 and turns up its way for the following period. As in the inflation series, three main cycles leaps to the eye in the growth data. As expected, the graph discloses the negative impacts of the crisis on the growth rate.

Percentage Change of the Money Supply (pc_M1)

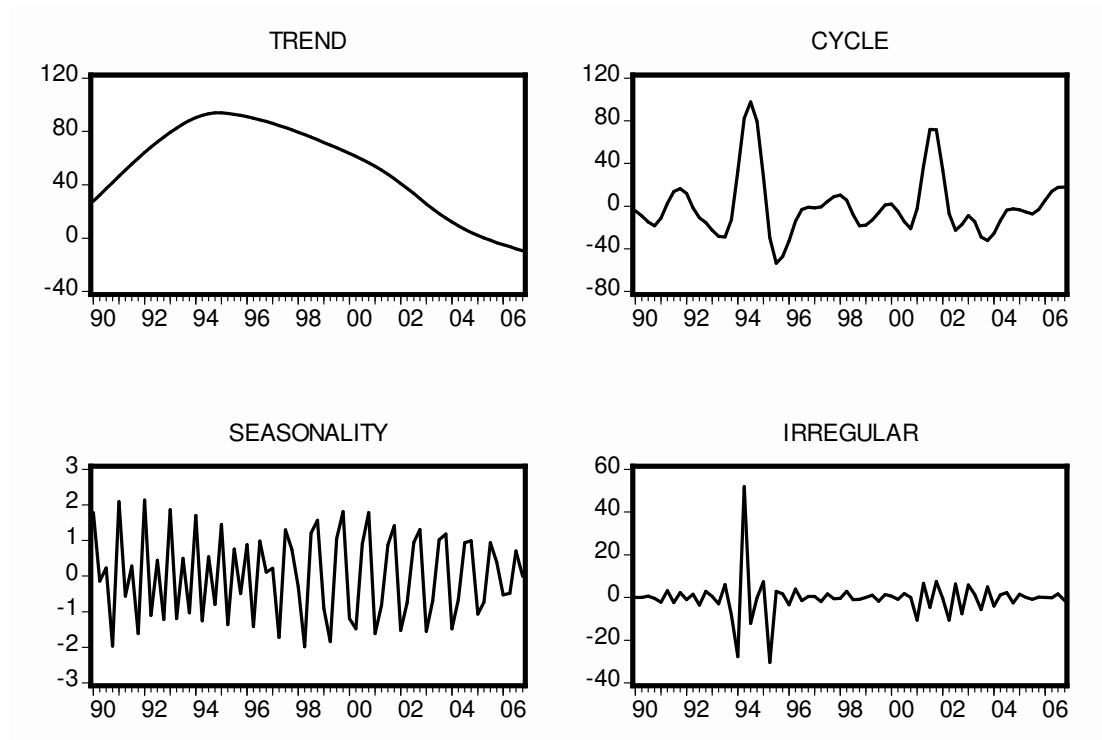
Figure 4.4
Data Components of pc_M1



The percentage change of money supply graph shows the characteristics of the period. The series includes a trend line that looks like a compressed bell. Looking at the sources of this shape, with the effect of high interest rates, those kept high to attract the foreign currencies, the 1990-1993 period witnessed a remarkable rise. As a result of several programs that designed to fight with high inflation, the money supply growth has gotten into a downtrend. The volatile cycles demonstrates the financial crisis and the CBRT's shock interventions on money supply to help the liquidity crisis.

Percentage Change of the Exchange Rate (pc_EXC)

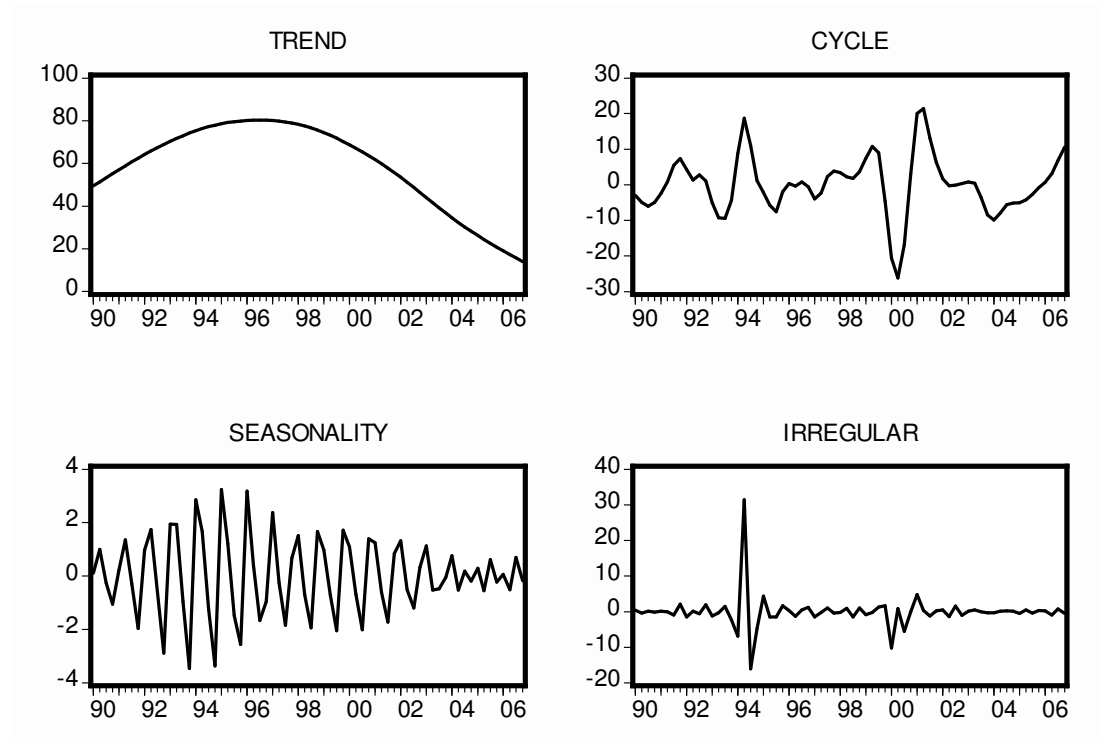
Figure 4.5
Data Components of pc_EXC



The trend line of pc_EXC looks like a leftward gong, reaching the top in 1994. With the Decree No. 32, the foreign exchange operations and international capital movements were liberalized in 1989 and Turkey has become a magnet for hot money. In 1994 the hot money began to give up Turkey quickly, causing a rapid ascension in the Exchange rate. The second significant cycle leaps to the eyes in 2001 crisis.

Interest Rate (R)

Figure 4.6
Data Components of R



The interest rate series depicts a smoother trend line between 1990 and 2006, with respect to other series. With the effect of high fiscal deficits, the interest rate got into an uptrend to meet the need for borrowing. Following the uptrend period, as a result of programs that designed to fight with high inflation, the interest rate has gotten into a downtrend. As other series' graphs, interest rate also includes circle components in 1994 and 2001, bearing the traces of financial crisis.

4.3.2 Unit Root Tests:

Following the decomposition of the data, unit root tests are employed to examine the stochastic trend for all variables;

$$\Delta y_t = \alpha_1 + \alpha_1 y_{t-1} + \alpha_2 t + \epsilon_{yt}$$

$$H_0: \alpha_1 = 0$$

$$H_1: \alpha_1 < 0$$

The null hypothesis of ADF indicates that the variable has a unit root, while the alternative hypothesis is that the series is stable. Table 4.5 reports the results of the unit root tests for all variables using the ADF test. As it can be seen in Table 4.6, the null hypothesis of a unit root cannot be rejected at both 0.01 and 0.05 levels for all variables. Applying the test to the 1st differences of the series, we can reject the null hypothesis for all variables. Consequently, the Dickey Fuller test asserts that all variables are I(1).

Additionally, the Philips-Perron and the KPSS tests are also used for testing unit roots, as in Table 4.7 and Table 4.8. The PP test results a different conclusion only for the growth rate, indicating that the growth rate is I(0). On the other hand, the KPSS test indicates the fact that the percentage change in the exchange rate and the growth rate are I(0).

Table 4.6
Dickey Fuller Test

Dickey Fuller Test

ADF Test Results		INF	PC_EXC	PC_M1	GROWTH	R
Level	ADF Test Statistic	*-1.9945	*-2.6791	-0.5855	-2.5078	*-2.9735
	Critical 1%	-4.1104	-4.1104	-3.5383	-3.5383	-4.1009
	Values 5%	-3.4827	-3.4827	-2.9084	-2.9084	-3.4783
	Lags included	4	4	4	4	0
<hr/>						
1st Difference	ADF Test Statistic	-6.0885	-7.3617	-7.3544	-8.7602	-7.361
	Critical 1%	-3.5383	-3.5383	-3.5383	-3.5383	-3.5348
	Values 5%	-2.9084	-2.9084	-2.9084	-2.9084	-2.9069
	Lags included	3	3	3	3	1

Due to Akaike (AIC) criteria, (max lag 4)

** With trend*

Table 4.7
Philips Perron Test

Philips Perron Test

PP Test Results		INF	PC_EXC	PC_M1	GROWTH	R
Level	PP Test Statistic	*-2.3431	-2.2483	-1.8984	-4.2704	*-2.8156
	Critical 1%	-4.1009	-3.5315	-3.5315	-3.5315	-4.1009
	Values 5%	-3.4783	-2.9055	-2.9055	-2.9055	-3.4783
	Bandwidth	3	0	4	3	3
<hr/>						
1st Difference	PP Test Statistic	-7.6969	-6.8147	-6.5438		-10.2201
	Critical 1%	-3.5332	-3.5332	-3.5332		-3.5332
	Values 5%	-2.9062	-2.9062	-2.9062		-2.9062
	Bandwidth	3	2	9		7

Due to Akaike (AIC) criteria, (max lag 4)

** With trend*

Table 4.8
KPSS Test

KPSS Test

KPSS Test Results		INF	PC_EXC	PC_M1	GROWTH	R
Level	KPSS Test Statistic	*0.2294	*0.1848	*0.2335	0.0916	*0.2541
	Critical 1%	0.216	0.216	0.216	0.739	0.216
	Values 5%	0.146	0.146	0.146	0.463	0.146
<hr/>						
1st Difference	KPSS Test Statistic	0.1411		0.123		0.3032
	Critical 1%	0.739		0.739		0.739
	Values 5%	0.463		0.463		0.463

** With trend*

However, to overcome the inconsistent results of the three tests, the ARMA processes of the series are estimated to examine the nearly stationarity. Perron (1988) presents another way to examine the stationarity of the series. Accordingly, the AR and MA processes are examined as follows;

$$y_t = \alpha y_{t-1} + e_t + \Phi e_{t-1}$$

He asserts that if the $\Phi = -1$ and $\alpha = 1$, then the process is almost same with the stationary process. As can be seen from Table 4.9, the nearly stationary examination concludes that all variables are I(1).

Table 4.9
AR and MA Roots

	INF	PC_EXC	PC_M1	GROWTH	R
AR (1)	0.9873	0.9854	1,2732	0.9901	0.8233
AR (2)	-	-	-0.8185	-	-
AR (3)	-	-	0.5329	-	-
AR (4)	-	-	-	-0.3262	-
AR (5)	-	-	-	0.3395	0.1595
MA (1)	-	-	-	-	-
MA (2)	0.2849	-	0.171	-	-
MA (3)	0.158	-	0.2465	-	-
MA (4)	-0.7204	-0.6979	-0.7614	-0.9206	-
MA (5)	-	-	-	-	-

4.4 ECONOMETRIC MODELS

4.4.1 Static Model

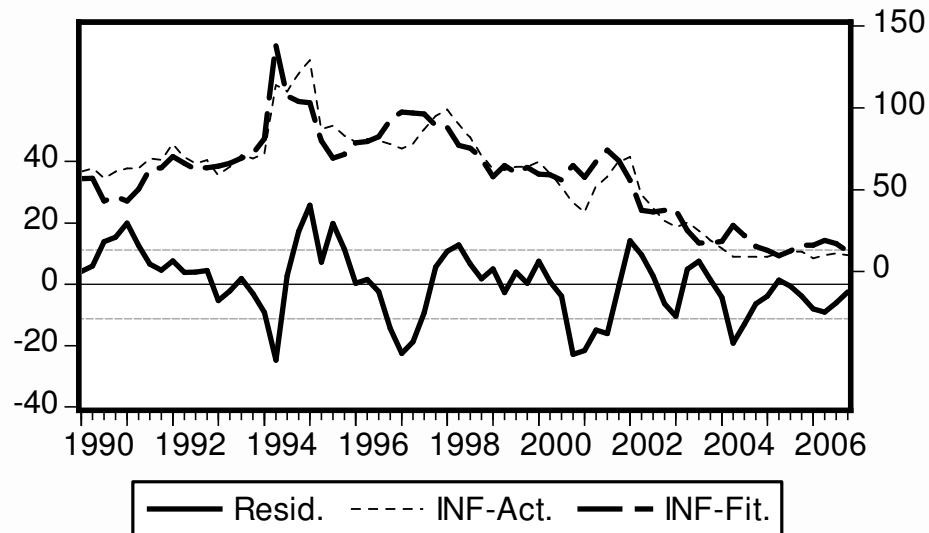
To examine the long run relation between the variables, the OLS regression model is formed. The model defines the inflation rate as a function of the other variables.

Table 4.10
Static Model Output

Dependent Variable: INF				
Method: Least Squares				
Sample: 1990Q1 2006Q4				
Included observations: 68				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-10.50130	4.935440	-2.127734	0.0373
GROWTH	1.130175	0.318511	3.548306	0.0007
PC_EXC	0.374008	0.055007	6.799241	0.0000
PC_M1	0.245078	0.074854	3.274091	0.0017
R	0.479965	0.100549	4.773430	0.0000
R-squared	0.869822	Mean dependent var	58.07353	
Adjusted R-squared	0.861556	S.D. dependent var	30.20444	
S.E. of regression	11.23847	Akaike info criterion	7.747249	
Sum squared resid	7957.107	Schwarz criterion	7.910448	
Log likelihood	-258.4065	F-statistic	105.2378	
Durbin-Watson stat	0.627540	Prob(F-statistic)	0.000000	

The regression results indicate statistically significant relations between the inflation rate and the monetary policy instruments. However, taking the assumptions of the classical regression model, which necessitates all series to be stationary, into account and further considering the unit root test results for the series used in this thesis, the OLS model results must be re-controlled under a spurious regression concern. High R^2 , t values and F value, but low level of DW statistic are accepted as the main indicators of the spurious regression.

Figure 4.7
Residual-Actual-Fitted Graph of the Static Model



The Jarque Bera test is employed for the examination of the normality of the equation disturbance terms. The null hypothesis of the test asserts that the disturbance terms are normally distributed. Taking the probability figure in the table 4.11, the null hypothesis is accepted, indicating the normality of the disturbance terms.

Following the normality examination, the constancy of the disturbance variance is tested by using the White Heteroskedasticity test. If the test results indicate that the disturbance terms are heteroskedastic, then the t and F tests will become invalid. Table 4.11 reveals a probability figure of 0.008 for the White Heteroskedasticity test, indicating that the null hypothesis of homoskedasticity is rejected.

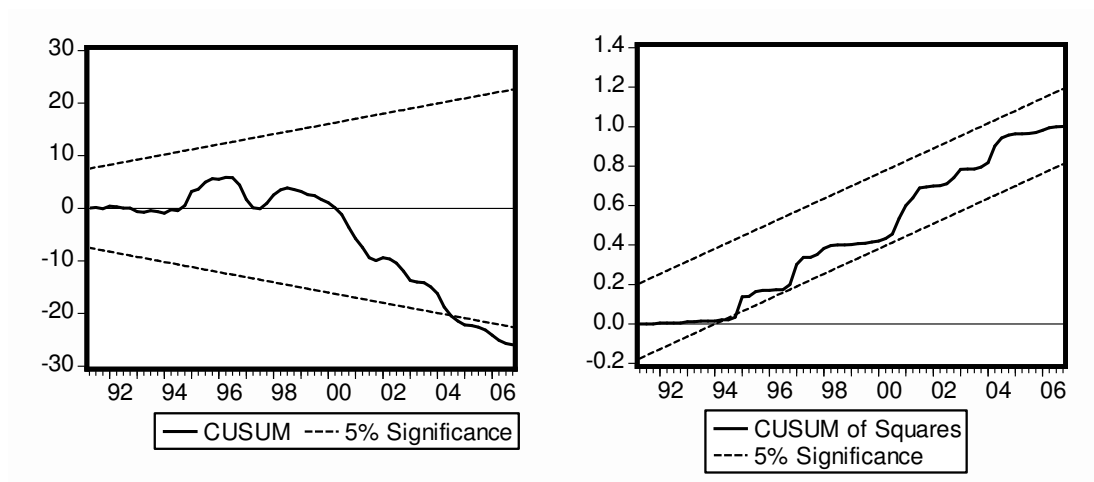
The next assumption of the OLS that examined is the absence of the serial correlation between the residuals. In the case of the presence of serial correlation, that is the error term is determined systematically by the previous periods' error terms, the t and F test again become misleading. The Durbin-Watson test is used to examine the serial correlation. The DW statistic in Table 4.11 indicates the presence of autocorrelation.

Table 4.11
Diagnostic Tests of the Static Model

White Heteroscedasticity	Obs*R-squared	Probability
	20.4785	0.00867
Normality	Jarque-Bera statistic	Probability
	0.7488	0.68770
Durbin-Watson	DW statistic	
	0.627540	

CUSUM and CUSUM SQ tests are employed to examine the stability of the model parameters. If there is any structural break, the stability of the parameters is distorted. Any deviation from the critical limits means that the coefficients are instable. However, both lines fluctuate within the 5% confidence interval.

Figure 4.8
Cusum and Cusum SQ Tests for the Static Model



The above static model was formed to examine the long-run relation between the variables and compare the results with the empirical results that will be attained in the rest of this thesis. However, the basic OLS assumptions were not fully satisfied in this model.

4.4.2 Dynamic Model

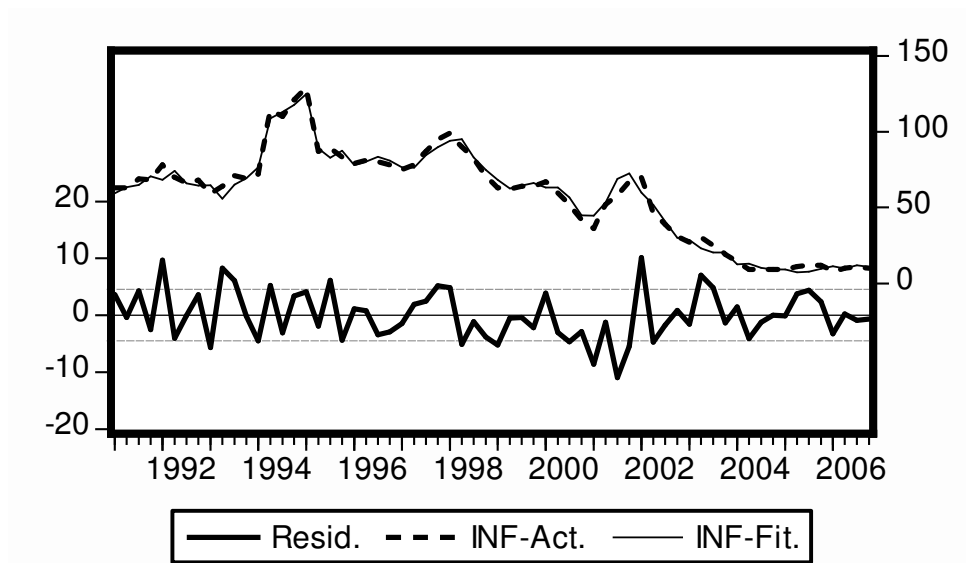
The autoregressive Distributed Lag Model has been constructed in order to analyze the short run dynamics between the inflation and the monetary policy instruments. The modeling methodology is the LSE approach that is based on the general to specific approach that takes the significance of the estimated coefficients into consideration and omits the insignificant ones. Using the general to specific approach, the following model is formed. Since the model is constructed by using quarterly data, four lags for each variable are included in the dynamic model.

Table 4.12
Dynamic Model Output

Dependent Variable: INF				
Method: Least Squares				
Sample (adjusted): 1991Q1 2006Q4				
Included observations: 64 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.201544	2.038973	-0.589288	0.5580
INF(-1)	0.788905	0.055023	14.33774	0.0000
PC_EXC	0.263739	0.024690	10.68218	0.0000
PC_EXC(-1)	-0.119675	0.031496	-3.799689	0.0004
PC_M1(-2)	0.077337	0.034704	2.228504	0.0298
R(-3)	0.203298	0.059035	3.443693	0.0011
R(-4)	-0.201727	0.061788	-3.264822	0.0019
R-squared	0.980956	Mean dependent var	57.92188	
Adjusted R-squared	0.978952	S.D. dependent var	31.13733	
S.E. of regression	4.517392	Akaike info criterion	5.956665	
Sum squared resid	1163.189	Schwarz criterion	6.192793	
Log likelihood	-183.6133	F-statistic	489.3575	
Durbin-Watson stat	2.109018	Prob(F-statistic)	0.000000	

As shown in Table 4.12, in contrast of the static model, the dynamic model gives no rooms for doubt.

Figure 4.9
Residual-Actual-Fitted Graph of the Dynamic Model



The table 4.13 shows the diagnostic test results for the dynamic model. The Jarque-Bera statistic indicates to the normality of the residuals, accepting the null hypothesis. Besides, the probability figure reveals that the alternative hypothesis of heteroskedasticity is accepted, meaning the invalidity of the t and F tests.

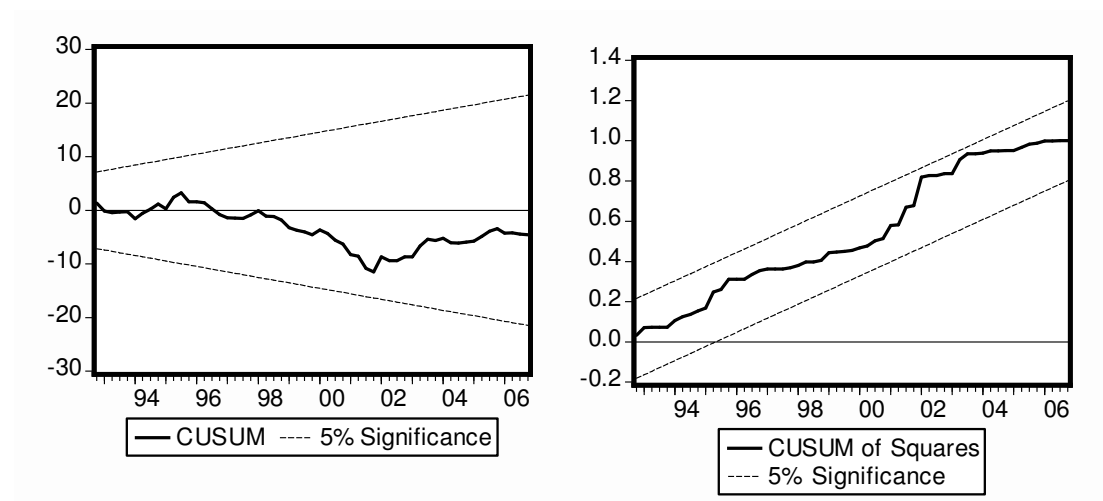
The next assumption of OLS is the absence of a serial correlation between the residuals. Table 4.13 shows the DW test statistic that supports the null hypothesis of no autocorrelation.

Table 4.13
Diagnostic Tests

Normality	Jarque-Bera	Probability
	0.448109	0.799272
White Heteroscedasticity	Obs*R-squared	Probability
	24.21473	0.019015
Durbin-Watson	DW Statistic	
	2.10	

The plots of the CUSUM and CUSUM SQ tests are presented in figure 4.10. Both lines fluctuate within the 5% confidence interval, signaling to the absence of any structural change.

Figure 4.10
Cusum and Cusum SQ Tests for the Dynamic Model



The dynamic model has formed to examine the relation between the monetary policy instruments and the inflation rate. However, the crucial OLS assumptions are not satisfied, disabling to analyze the relation via a dynamic model.

4.4.3 Granger Causality Test:

Although the above table 4.2 signals to several correlation relationships, correlation does not necessarily imply causation. So the Granger Causality test is applied for four times altering the lag value to detect the causality relationships between the variables. Table 4.14 presents the causality relations between the variables according to the results of four different causality tests. The stability of the causality relation is considered with respect to the lags.

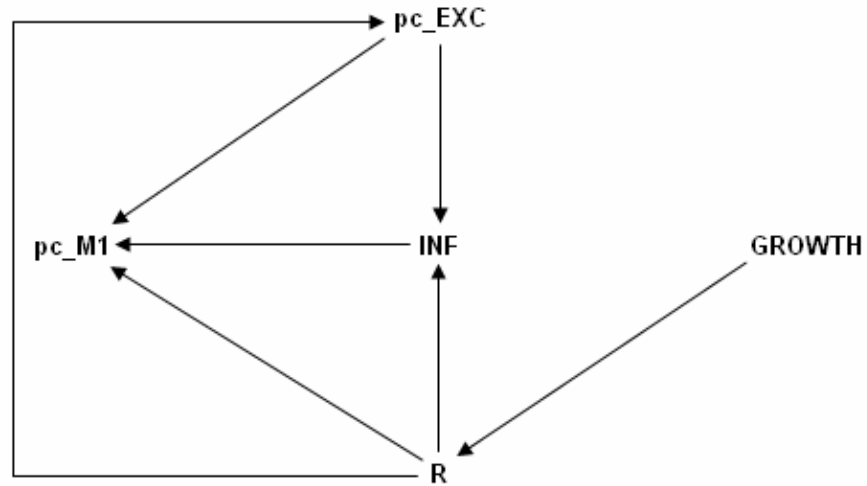
Table 4.14
Granger Causality Test

Pairwise Granger Causality Tests

Sample: 1990Q1 2006Q4				
Null Hypothesis:	Lags: 1 Probability	Lags: 2 Probability	Lags: 3 Probability	Lags: 4 Probability
INF does not Granger Cause GROWTH	0.82615	0.96384	0.42235	0.05735
GROWTH does not Granger Cause INF	0.18921	0.07705	0.09384	0.00664 *
PC_EXC does not Granger Cause GROWTH	0.69874	0.38068	0.86163	0.51811
GROWTH does not Granger Cause PC_EXC	0.58619	0.41659	0.42113	0.13263
PC_M1 does not Granger Cause GROWTH	0.93888	0.51049	0.62828	0.1487
GROWTH does not Granger Cause PC_M1	0.12886	0.32553	0.66112	0.60787
R does not Granger Cause GROWTH	0.08181	0.20589	0.26005	0.00825 *
GROWTH does not Granger Cause R	0.01282 *	0.03374 *	0.05441	0.05631
PC_EXC does not Granger Cause INF	0.01253 *	0.00032 *	0.00119 *	0.00011 *
INF does not Granger Cause PC_EXC	0.7603	0.00273 *	0.0028 *	0.0025 *
PC_M1 does not Granger Cause INF	0.60595	0.25838	0.15152	0.08325
INF does not Granger Cause PC_M1	0.00091 *	0.000095 *	0.00001 *	0.000077 *
R does not Granger Cause INF	0.01197 *	0.00869 *	0.02263 *	0.0000089 *
INF does not Granger Cause R	0.10821	0.00484 *	0.01432 *	0.01471 *
PC_M1 does not Granger Cause PC_EXC	0.79971	0.21143	0.14723	0.03719 *
PC_EXC does not Granger Cause PC_M1	0.00089 *	0.00135 *	0.0007 *	0.00358 *
R does not Granger Cause PC_EXC	0.00775 *	0.00456 *	0.00883 *	0.00059 *
PC_EXC does not Granger Cause R	0.50074	0.12876	0.28665	0.33814
R does not Granger Cause PC_M1	0.00187 *	0.00068 *	0.00098 *	0.00343 *
PC_M1 does not Granger Cause R	0.05952	0.00299 *	0.01692 *	0.03497 *

Considering the Schwarz (SIC) coefficient, and saving the d.o.f, the one-lag version of the causality test is preferred to determine the ordering of the variables. According to one-lag graph, the following results have been found:

Figure 4.11
Granger Causality Test



Lags: 1
Ordering: GROWTH R pc_EXC INF pc_M1
Akaike: 35,75108
Schwarz: 36,73826

- The above figure depicts no causality relation from the money supply to the inflation rate. As the CBRT desisted from funding the budget deficits by the monetary expansion, and the borrowing has been used as an alternative policy, the monetary expansion is no more a source of the inflation.
- The interest rate and the percentage changes in the exchange rate cause inflation rate. While the effect of the exchange rate emanates from the pass-through mechanism, the effect of the interest rate arises through the monetary transmission mechanism, by acting as a determinant of domestic demand.
- The interest rate also has an indirect effect on the inflation rate through the exchange rate. Any increase in the interest rate causes a significant short term capital stream which flows to any market for higher yield. As a remarkable magnet for short term capital, Turkey faces up strong hot money accessions, increasing the demand for domestic currency, in this way, creating a depreciation on the exchange rate. The aforementioned depreciation on the

exchange rate affects the inflation rate through the imported products in the price indexes. Moreover, in countries where the imported entries holds a high share in production costs, as Turkey, high exchange rate is effective on inflation also by as supply push inflation mechanism.

4.4.4 VAR Model

In this section, the success chance of Turkey in applying the inflation targeting policy is examined by using VAR modeling. The VAR models, built by Sims (1980), are generally used to discover evolution and interdependence between time series, when it is not clear whether a variable is exogenous or endogenous. In economics, the VAR models preferred to examine the relationship especially between the macroeconomic variables.

$$y_{1t} = m_1 + \alpha_{11}y_{1, t-1} + \alpha_{12}y_{2, t-1} + \epsilon_{1t}$$

$$y_{2t} = m_2 + \alpha_{21}y_{1, t-1} + \alpha_{22}y_{2, t-1} + \epsilon_{2t}$$

In a VAR model, each variable is expressed as a linear combination of lagged values of itself and lagged values of all other variables in the group (Johnston and DiNardo, 1997, 289). This thesis employs the VAR modeling to test the relation between the inflation and the monetary policy instruments.

According to Table 4.15, most of the coefficients are not significant at the 5 percent significance level in the unrestricted VAR model, however the diagonal members of the table reinforce the results of the unit root tests, as revealing the significant dependence to their own past values, except growth.

Table 4.15
VAR Model Output

Vector Autoregression Estimates					
Sample (adjusted): 1990Q2 2006Q4					
Included observations: 67 after adjustments					
Standard errors in () & t-statistics in []					
	INF	GROWTH	R	PC_M1	PC_EXC
INF(-1)	0.643477 (0.10202) [6.30718]	0.135573 (0.04809) [2.81902]	0.119874 (0.12511) [0.95815]	0.044236 (0.13276) [0.33320]	-0.705663 (0.25996) [-2.71451]
GROWTH(-1)	0.239580 (0.28246) [0.84819]	0.384634 (0.13315) [2.88877]	0.445597 (0.34638) [1.28645]	0.295538 (0.36756) [0.80404]	1.288948 (0.71972) [1.79089]
R(-1)	0.204762 (0.09512) [2.15277]	-0.161149 (0.04484) [-3.59417]	0.834169 (0.11664) [7.15173]	0.107049 (0.12377) [0.86488]	0.951640 (0.24236) [3.92657]
PC_M1(-1)	0.063622 (0.06631) [0.95942]	7.00E-05 (0.03126) [0.00224]	0.056783 (0.08132) [0.69827]	0.687810 (0.08629) [7.97062]	0.040219 (0.16897) [0.23802]
PC_EXC(-1)	0.130522 (0.05874) [2.22221]	-0.030618 (0.02769) [-1.10587]	-0.037208 (0.07203) [-0.51659]	0.095346 (0.07643) [1.24746]	0.947434 (0.14966) [6.33054]
C	-4.109221 (4.26278) [-0.96398]	5.920476 (2.00942) [2.94636]	-1.102194 (5.22738) [-0.21085]	3.101826 (5.54714) [0.55918]	-20.85689 (10.8618) [-1.92021]
R-squared	0.917403	0.498332	0.790287	0.776546	0.777714
Adj. R-squared	0.910633	0.457211	0.773097	0.758230	0.759494
Sum sq. resids	5047.964	1121.686	7590.990	8548.084	32774.24
S.E. equation	9.096896	4.288157	11.15538	11.83776	23.17936
F-statistic	135.5060	12.11885	45.97475	42.39727	42.68420
Log likelihood	-239.8575	-189.4684	-253.5247	-257.5027	-302.5245
Akaike AIC	7.339029	5.834877	7.747006	7.865751	9.209687
Schwarz SC	7.536464	6.032312	7.944441	8.063187	9.407122
Mean dependent	58.02985	4.388060	59.11940	61.89552	53.71642
S.D. dependent	30.43023	5.820432	23.41880	24.07509	47.26483
Determinant resid covariance (dof adj.)	1.51E+09				
Determinant resid covariance	9.45E+08				
Log likelihood	-1167.661				
Akaike information criterion	35.75108				
Schwarz criterion	36.73826				

Moreover, the measure of correlations of the residual returns in the VAR system provides some indications of how much a shock in one variable will produce a residual return in another one, based on its own past returns. Table 4.16 reports the residual correlation matrix for the VAR model that shows the interaction of the variables in the system. The results indicate that during the full sample period of 1990-2006, the highest positive correlation arises between the inflation rate and the percentage change in the exchange rate, while the correlation of the inflation rate with the interest rate has stayed at a moderate level. The residual correlations reveal the high level of pass-through effect in Turkey. As mentioned above, the imported entries hold a high share in production costs, and any fluctuation in the exchange rate has an impact on inflation through a supply push inflation mechanism, in Turkey, although, the imported goods also keep a moderate share in the inflation indexes.

In Table 4.16, a positive relationship between the interest rate and the exchange rate, in contrast to widely-known negative relation, can be explained in terms of the transmission mechanism. An upswing in the interest rate causes to a short term capital inflow to the country. The demand for the domestic currency appreciates it and causes the exchange rate to fall. However, since Turkey is a highly indebted country, any upside movement in the interest rate creates a change on the risk perception and raises concerns about the debt payments. This engenders a short-term capital outflow from Turkey that further elevates the exchange rate, and affects the inflation rate through the pass-through mechanism.

Table 4.16
Residual Correlation Matrix

Residual Correlation Matrix					
	INF	GROWTH	R	PC_M1	PC_EXC
INF	1,0000000	-	-	-	-
GROWTH	-0,3705840	1,0000000	-	-	-
R	0,5043510	-0,4837220	1,0000000	-	-
PC_M1	-0,1621020	0,1558090	-0,2156440	1,0000000	-
PC_EXC	0,8289750	-0,5606820	0,6384830	-0,0891610	1,0000000

4.4.5 VEC Model

The relation between the inflation rate and the monetary policy instruments is examined in this section via the cointegration analysis and vector error correction model. The purpose of the cointegration test is to determine whether the above specified non-stationary time series are cointegrated. That means whether or not there is a long-run equilibrium relationship among them.

Two widely-used tests are employed for the cointegration analysis. The results for the Trace test and Maximum Eigenvalue test appear on Table 4.17. The null hypothesis is that there is no cointegration relationship. It is clear from Table 4.17 that the null hypothesis is rejected at 5% level. The trace statistics suggests that there are three cointegration vectors. But the Maximum Eigenvalue test indicates only one cointegration relationship. Considering Johansen and Juselius' (1990) suggestion that the maximal eigenvalue test has a greater power than the Trace test, this thesis progresses on the acceptance of only one cointegration vector.

Table 4.17
Cointegration Tests

Sample (adjusted): 1990Q3 2006Q4 Included observations: 66 after adjustments Trend assumption: Linear deterministic trend Series: INF GROWTH R pc_M1 pc_EXC Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.500782	104.0784	69.81889	0,0000
At most 1 *	0.316744	58.22739	47.85613	0.004
At most 2 *	0.262907	33.08891	29.79707	0.0202
At most 3	0.178211	12.95622	15.49471	0.1164
At most 4	0.0000346	0.002283	3.841466	0.9599
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.500782	45.85096	33.87687	0.0012
At most 1	0.316744	25.13848	27.58434	0.0996
At most 2	0.262907	20.13269	21.13162	0.0685
At most 3	0.178211	12.95394	14.2646	0.0797
At most 4	0.0000346	0.002283	3.841466	0.9599
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				

By imposing restriction on the cointegration vector in Table 4.18, the following normalized parameter estimates are reached;

$$\text{INF} = -1.8857 \text{ GROWTH} - 13.0529 \text{ R} + 4.2061 \text{ pc_M1} + 6.9523 \text{ pc_EXC}$$

t values **(0.3302)** **(6.6599)** **(-3.1226)** **(-6.3189)**

The normalized parameter estimates show the significant and positive effects of the money supply change and the percentage change of the exchange rate on the

inflation rate. On the other hand, the interest rate has a negative and significant effect on the inflation rate. The growth rate has no significant influence on the inflation rate. The above results indicate two different facts in Turkey. First of all, the percentage change of the exchange rate has a significant and great effect on the inflation level. Since the imported goods keep a remarkable share in price indexes and they also widely used as inputs in domestic production, the exchange rate has a direct and an indirect effect on the inflation rate. Separately, the results obtained from the cointegration test also reveal the powerful monetary transmission mechanism in Turkey. The figure shows that the money supply has a significant effect on inflation, in the long term. Additionally, in contrast with the VAR model, the cointegration analysis indicates a negative relation between the interest rate and the inflation, implying that in the long run interest rates must fall at a considerable rate in order to achieve equilibrium relationship.

Table 4.18
Cointegration Equation

Unrestricted Cointegrating Coefficients (normalized by $b^*S11^*b=l$):					
	INF	GROWTH	R	pc_M1	pc_EXC
	-0.006144	-0.011585	-0.080193	0.025841	0.042713
	0.103707	-0.124936	-0.082205	-0.011201	-0.038622
	0.022531	-0.048806	-0.007827	-0.051197	0.014391
	-0.001056	-0.266386	-0.003627	0.028645	-0.023171
	0.036506	-0.023872	0.01125	0.012333	-0.014548
Unrestricted Adjustment Coefficients (alpha):					
D(INF)	1.444236	-3.447651	-0.110304	-0.170384	0.030213
D(GROWTH)	0.474334	1.186335	1.098826	1.398166	-0.000535
D(R)	3.037123	1.134046	-2.020132	-2.320681	0.038513
D(pc_M1)	-3.067472	1.04091	4.941812	-2.012577	0.008217
D(pc_EXC)	-4.3408	-5.033096	-3.781116	-2.302316	0.092356
1 Cointegrating Equation(s):			Log likelihood	-1150,79	
Normalized cointegrating coefficients (standard error in parentheses)					
	INF	GROWTH	R	pc_M1	pc_EXC
1	1	1.885754 (5.71027) [0.33023]	13.05295 (1.95992) [6.65994]	-4.206104 (1.34697) [-3.12264]	-6.952334 (1.10024) [-6.31892]

Following the static long term analysis via the cointegration tests, the short term dynamics of the variables are analyzed by the Error Correction Model (ECM). As seen in below equations, in the ECM each variable is modeled via the first differences

of the lagged values of itself and lagged values of all other variables, accompanied by the previous period's deviation from the long run equilibrium. In other words, an error correction model may be defined as a VAR model in first differences augmented by the error correction terms (Walter Enders, 1995, 367).

$$\Delta Y_t = \alpha_1 + \Phi_1 (Y_{t-1} + \gamma_1 X_{t-1}) + \beta_1 \Delta X_{t-1} + \vartheta_1 \Delta Y_{t-1} + \epsilon_1$$

$$\Delta X_t = \alpha_2 + \Phi_2 (Y_{t-1} + \gamma_2 X_{t-1}) + \beta_2 \Delta X_{t-1} + \vartheta_2 \Delta Y_{t-1} + \epsilon_2$$

Table 4.19 shows the ECM results. The size of the error correction term shows the speed of adjustment of any disequilibrium towards a long term equilibrium state. The error correction coefficient for the inflation rate is negative, however it is not statistically significant. So, if any deviation occurs from the equilibrium, the system will not be able to converge to the equilibrium via inflation rate.

However, the error correction coefficient for both the interest rate and the percentage change in the money supply are statistically significant. But, the speeds of adjustments are rather small, suggesting a slower pace in adjustment process. The rates of adjustment towards the long-run equilibrium of the interest rate and the percentage change in the money supply show about only 1.9% correction in the current quarter. In other words, almost 2% of the disequilibrium will be adjusted in one quarter, indicating a 50 quarter time period to reach the equilibrium.

The error correction model for inflation rate reveals that it is affected by percentage change in the exchange rate, the percentage change in the money supply and itself. While its relation with the exchange rate is in-line with the general acceptances, the relation between the inflation rate and the money supply is negative, conflicting with the quantity theory of money.

Table 4.19
Error Correction Model

Error Correction:	D(INF)	D(GROWTH)	D(R)	D(PC_M1)	D(PC_EXC)
CointEq1	-0.008873 (0.00651) [-1.36335]	-0.002914 (0.00360) [-0.80990]	-0.018659 (0.00807) [-2.31118]	0.018846 (0.00913) [2.06355]	0.026669 (0.01658) [1.60883]
D(INF(-1))	-0.587872 (0.20330) [-2.89165]	0.265984 (0.11240) [2.36642]	-0.721450 (0.25219) [-2.86068]	0.563146 (0.28528) [1.97401]	-1.760179 (0.51780) [-3.39932]
D(GROWTH(-1))	-0.169813 (0.28416) [-0.59760]	-0.410297 (0.15710) [-2.61164]	0.127909 (0.35250) [0.36286]	0.201511 (0.39875) [0.50536]	0.565886 (0.72375) [0.78188]
D(R(-1))	-0.230373 (0.11864) [-1.94176]	-0.036455 (0.06559) [-0.55577]	0.058154 (0.14718) [0.39513]	-0.064838 (0.16648) [-0.38945]	-0.526261 (0.30218) [-1.74155]
D(PC_M1(-1))	-0.212456 (0.09163) [-2.31858]	0.054678 (0.05066) [1.07930]	-0.356795 (0.11367) [-3.13887]	0.339482 (0.12858) [2.64019]	-0.389372 (0.23339) [-1.66836]
D(PC_EXC(-1))	0.291037 (0.08315) [3.50018]	-0.113402 (0.04597) [-2.46682]	0.048697 (0.10315) [0.47211]	0.060910 (0.11668) [0.52203]	0.827511 (0.21178) [3.90739]
C	-1.498591 (1.07555) [-1.39332]	0.040432 (0.59464) [0.06799]	-1.203003 (1.33423) [-0.90165]	-0.304018 (1.50927) [-0.20143]	-1.919747 (2.73943) [-0.70078]
R-squared	0.291825	0.231375	0.266612	0.230130	0.367868
Adj. R-squared	0.219807	0.153209	0.192030	0.151838	0.303583
Sum sq. resids	4369.750	1335.696	6724.422	8604.548	28347.42
S.E. equation	8.606019	4.758037	10.67583	12.07642	21.91950
F-statistic	4.052127	2.960070	3.574761	2.939382	5.722483
Log likelihood	-232.0125	-192.8992	-246.2369	-254.3729	-293.7169
Akaike AIC	7.242805	6.057551	7.673845	7.920390	9.112635
Schwarz SC	7.475041	6.289787	7.906081	8.152626	9.344871
Mean dependent	-0.803030	-0.136364	-0.348485	-1.075758	-0.242424
S.D. dependent	9.743194	5.170587	11.87692	13.11290	26.26613
Determinant resid covariance (dof adj.)	1.68E+09				
Determinant resid covariance	9.61E+08				
Log likelihood	-1150.791				
Akaike information criterion	36.08457				
Schwarz criterion	37.41163				

Although the error correction model gives hints about the short-term adjustment relations between the variables, the impulse response functions and the variance decompositions of the variables are more useful to investigate the relation between them.

The impulse response function is a widely used way to present the results of a VEC model. An impulse response function presents the response of the endogenous variables to one standard deviation shock to disturbance terms. Looking at the responses of the inflation rate in Figure 4.12, it gives the strictest response to one standard deviation innovation in the exchange rate. The inflation rate shows a rapid reaction within a two or three quarters and then it reaches its new level approximately in the following nine quarters.

The figure 4.13 shows that the exchange rate is mostly affected by its past values and the interest rate. According to the figure 4.13, the interest rate does not show its generally accepted negative effect on the exchange rate in Turkey. Under usual conditions, any rise in the interest rate affects the exchange rate negatively. However, as mentioned above, because of the fact that Turkey is an indebted country, high interest rate gives rise to anxiety regarding the debt payments. Under these circumstances, the Turkish Lira starts to depreciate. As the figure 4.12 reveals, the CBRT have to affect the exchange rate in order to control the inflation rate. However, since the interest rate, which is the CBRT's main policy instrument in the inflation targeting period, is not able to show its widely-known effect on the exchange rate, in other words since the policy of high interest rates and low exchange rates does not work in Turkey, the CBRT loses its controlling power on the inflation rate. This means that the CBRT does not have the required abilities to control the inflation via its policy instrument.

Figure 4.12
Responses of INF

Response to Cholesky One S.D. Innovations

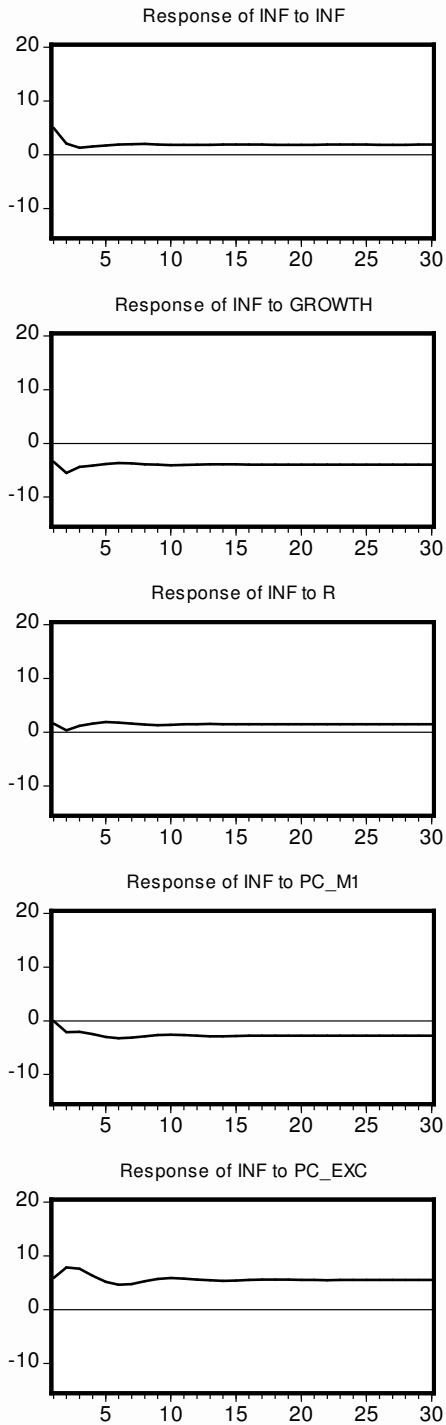


Figure 4.13
Responses of pc_EXC

Response to Cholesky One S.D. Innovations

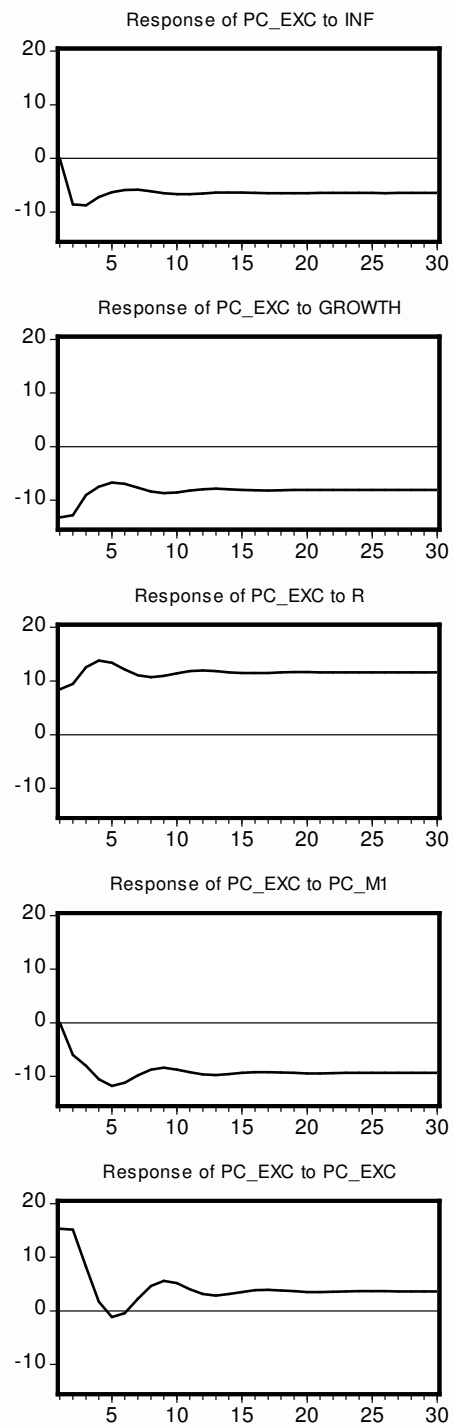


Figure 4.14
Responses of R

Response to Cholesky One S.D. Innovations

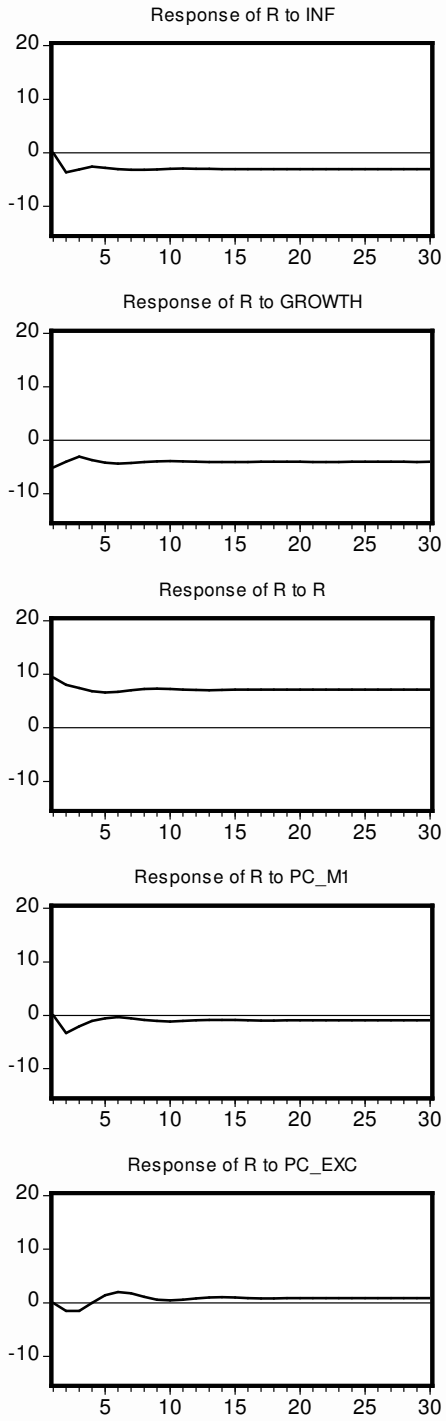


Figure 4.15
Responses of pc_M1

Response to Cholesky One S.D. Innovations

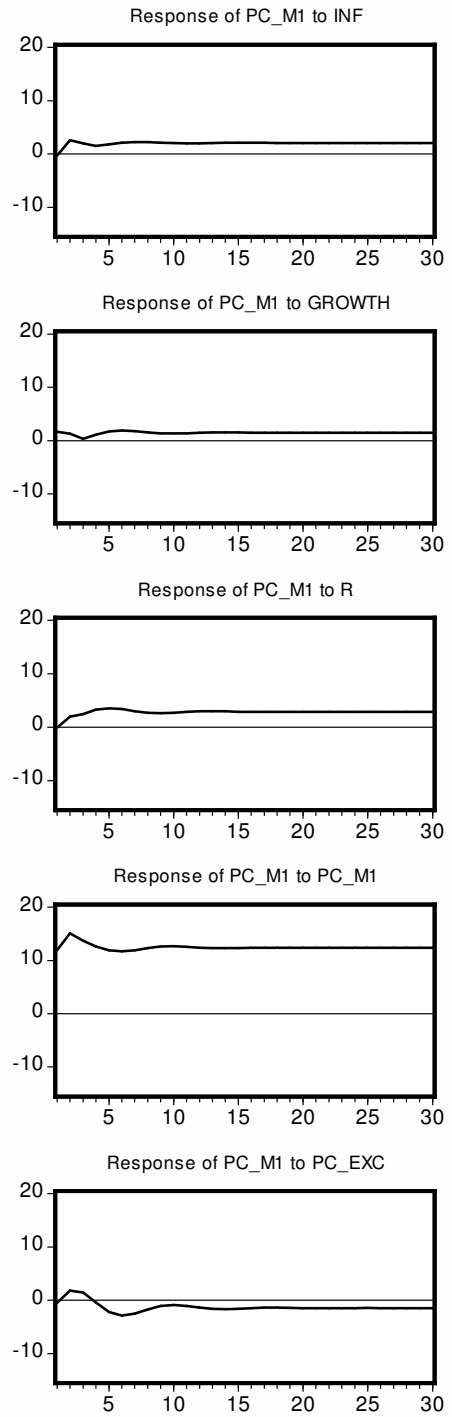
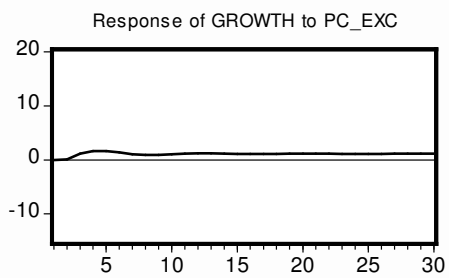
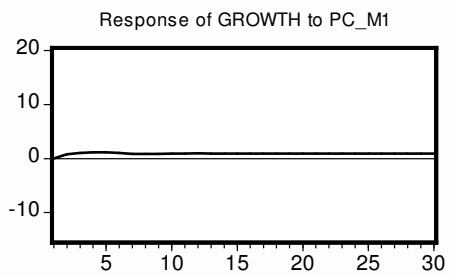
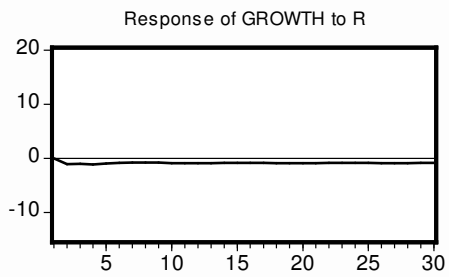
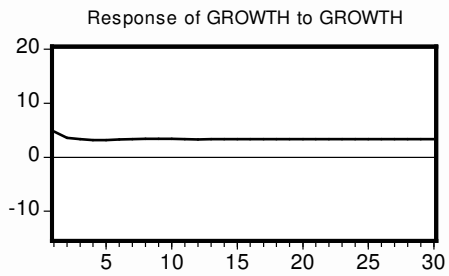
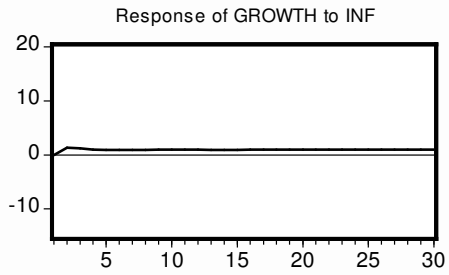


Figure 4.16
Responses of GROWTH

Response to Cholesky One S.D. Innovations



As another widely-used method to derive results from the VEC model, the variance decomposition provides information about the relative importance of variables on any other one, decomposing the variation in an endogenous variable into the component shocks of the model. As seen in Table 4.20, variance decomposition analysis indicates similar results when compared with the impulse response functions previously analyzed. The greatest portion of the variances in the inflation rate is accounted for the percentage change in the exchange rate.

In this context, about 47% to 52% of the variances in the inflation rate is accounted for the percentage change in the exchange rate, signaling to the strong dependence of the inflation on the exchange rate fluctuations. As previously mentioned, the imported goods keep a remarkable share in price indexes and they also widely used as inputs in domestic products, causing a solid relation between the inflation rate and the exchange rate. Besides, the results also reveal that about 34% of the variance in the inflation rate is accounted for by inflation rate shocks themselves at one quarter horizon, while the mentioned ratio retreats to 7% at 20 quarter time horizon.

However, the table shows that, the percentage change in the money supply has no crucial role in the explanation of the inflation rate. These results are consistent with the evidences from the impulse response functions showing that the link between the rate of change of the exchange rate and inflation rate is strong relative to other variables. In other words; the pass-through mechanism is quite strong in Turkey case.

Table 4.20
Variance Decomposition

Variance Decomposition of INF:						
Period	S.E.	INF	GROWTH	R	PC_M1	PC_EXC
1	8.606019	33.93116	15.68022	3.383708	0.000000	47.00490
2	13.20913	16.85343	23.76101	1.515459	2.508932	55.36117
3	16.09621	11.97213	23.44532	1.578240	3.317785	59.68653
4	18.06979	10.24168	23.75597	2.069221	4.482374	59.45075
5	19.57551	9.519135	24.02471	2.707275	6.178290	57.57059
6	20.86158	9.188581	24.23556	3.129020	7.841567	55.60527
7	22.08376	8.995545	24.42654	3.300656	8.969160	54.30810
8	23.32847	8.779094	24.60328	3.307200	9.522766	53.78766
9	24.59943	8.502217	24.73662	3.258080	9.721179	53.78190
10	25.84535	8.214279	24.83333	3.227081	9.811337	53.91397
11	27.01857	7.967736	24.91204	3.240807	9.941871	53.93755
12	28.10704	7.781536	24.98202	3.287703	10.14740	53.80134
13	29.12703	7.647305	25.04557	3.341587	10.39086	53.57467
14	30.10321	7.545339	25.10354	3.382895	10.61846	53.34976
15	31.05482	7.457107	25.15569	3.406335	10.79753	53.18334
16	31.99018	7.372135	25.20131	3.417051	10.92601	53.08350
17	32.90812	7.288666	25.24065	3.423316	11.02130	53.02607
18	33.80360	7.209761	25.27503	3.431135	11.10374	52.98033
19	34.67312	7.138743	25.30590	3.442325	11.18575	52.92729
20	35.51694	7.076762	25.33421	3.455497	11.26968	52.86384

Cholesky Ordering: GROWTH R PC_EXC INF PC_M1

CONCLUSION

Following the poor performances of the monetary targeting and the exchange rate targeting, increasing number of developed countries started to implement inflation targeting in 1990's. Following several developing countries those encouraged by the success of developed countries, Turkey has launched inflation targeting as its monetary policy, too.

Turkey has started with an implicit inflation targeting policy between 2002 and 2005, which was accepted as a transition period. Following this orientation period, in which the CBRT majored on two subjects; communication and transparency, it launched the explicit inflation targeting policy in the beginnings of 2006. However, the inflation rate has stayed significantly above the CBRT's inflation targets since the beginnings of the explicit inflation targeting period.

Taking early deviations from the inflation targets into consideration, this thesis has examined the success chance of Turkey in implementing inflation targeting policy, based on three widely-known preconditions; 1. the central bank independence; 2. having a sole target; 3. strong relation between the inflation rate and the monetary policy instruments.

First of all, the CBRT has reached the independence by the amended central bank law, however this is not sufficient for a successful inflation targeting policy. For the central bank independence to be functional, a country has to exhibit no significant signs of fiscal dominance. The dependence to the seignorage started to decrease since the 1980's in Turkey, and the seignorage ratio, which is defined as the annual change in the monetary base divided by nominal GDP, has retreated to 1,93 in 2002-2006 period. This level is modest with respect to the developing countries which applied the inflation targeting policy. On the other hand, although Turkey's total debt to GDP ratio has retreated to 63% in 2006, from the 2005 level of 71.6%, it is still unable to point a low fiscal dominance. Considering that the CBRT has determined the short-term interest rates as the main monetary policy instrument in the inflation targeting policy, the mentioned high level debt stock may partially restrict the CBRT's decisions on the

interest rate. On the other hand, Turkey still remains below the inflation targeting developing countries both in financial deepness and banking system standards.

Secondly, for a successful inflation targeting policy, there must not be any goal other than the price stability, which is inconsistent with it. Glancing at Turkey case, the requirement for a sole target is satisfied in the legal side and furthermore, the central bank defined its sole target as the price stability. Considering further the fact that Turkey has left the exchange rate targeting policy, it can be easily asserted that Turkey satisfies the “having a sole target” condition.

As a third precondition, literature emphasizes on the strong relation between the monetary policy instruments and the inflation ratio. This thesis has tried to examine the mentioned relation by employing static and dynamic OLS models, VAR and VEC models. Since the crucial OLS assumptions are not satisfied in the static and dynamic OLS models, these models were not used for further analysis.

In addition, the residual correlations in the VAR model reveal the high level of pass-through effect in Turkey. As mentioned above, the imported entries hold a high share in production costs, and any fluctuation in the exchange rate has an impact on inflation through a supply push inflation mechanism, in Turkey, although, the imported goods also keep a moderate share in the inflation indexes.

The error correction model for inflation rate reveals that it is affected by percentage change in the exchange rate, the percentage change in the money supply and itself. While its relation with the exchange rate is in-line with the common view, the relation between the inflation rate and the money supply is negative, conflicting with the quantity theory of money.

According to the impulse response functions, the inflation rate gives the highest response to one standard deviation innovation in the exchange rate. Besides, any shock to the inflation rate significantly affects the inflation level of the following period. On the other hand, the exchange rate is mostly affected by its past values and the interest rate. The impulse response function reveals that the interest rate does not show its generally accepted negative effect on the exchange rate in Turkey. Under usual

conditions, any rise in the interest rate affects the exchange rate negatively. However, because of the fact that Turkey is an indebted country, any remarkable rise in the interest rate creates also concerns about the debt back-payment and increase the anxiety about the general economy. Considering high dependence of the inflation rate on the exchange rate movements and further the fact that the CBRT has determined the interest rate as its main policy instrument in the inflation targeting policy, the relation between the interest rate and the exchange rate becomes crucial for the inflation targeting policy. However, since the interest rate, which is the CBRT's main policy instrument, is not able to show its widely-known effect on the exchange rate, in other words since the policy of high interest rates and low exchange rates does not work in Turkey, the CBRT loses its controlling power on the inflation rate. This means that the CBRT does not have the required abilities to control the inflation via its policy instrument.

The variance decomposition analyses derived from the VEC model signify parallel result with impulse response functions, showing that the inflation rate is strongly related with the movements of the exchange rate, while its past values are also a significant determinant of itself.

As a conclusion, although Turkey has taken remarkable step forward in the fiscal dominance field, its high level debt stock still stays as a significant barrier for a more independent central bank, in comparison with developing countries those implemented the inflation targeting policy. The empirical analyses introduce that the high debt level of Turkey is a problem also in the practical side of the inflation targeting policy. According to the empirical results, the CBRT has not a controlling power on the inflation rate via its policy instrument short term interest rate. To enable the CBRT to implement a more independent policy, the fiscal discipline has to be kept under control and the debt stock has to be retreated by creating higher primary surpluses.

REFERENCES

- Alper ve Üçer, 1998, "Some Observations on Turkish Inflation: A Random Walk Down the Past Decade," *Bogazici Journal: Review of Social, Economic and Administrative Studies*, Vol. 12, No.1, 7-38.
- Apel, Nessen, Söderström and Vredin, 1999, "Different Ways of Conducting Inflation Targeting – Theory and Practice" *Sveriges Riksbank Quarterly Review* 4/1999
- Barro and Gordon, 1983, "Rules, Discretion and Reputation in a Model of Monetary Policy", NBER Working Paper 1079
- Bernanke, Laubach, Mishkin and Posen, 1999, "Inflation Targeting: Lessons from the International Experience", Princeton University Press
- BRSA, 2006, "Financial Markets Report, Issue 1-2, March-June 2006"
http://www.bddk.org.tr/turkce/Raporlar/Finansal_Piyasalar_Raporlari/1651BDDK_FPR_Aralik2006_27042007.pdf
- Büyükakın and Erarslan, 2004, "Inflation Targeting and the Evaluation of the Applicability in Turkey" <http://kosbed.kou.edu.tr/sayi8/b%FCy%FCkakin.pdf>
- CBRT, 2002, "Monetary Policy and Exchange rate Policy in 2002 and Prospective Developments"
- CBRT, 2005, "Monetary and Exchange Rate Policy for 2005"
- CBRT, 2006, "General Framework of Inflation Targeting Regime and Monetary and Exchange rate Policy for 2006"
- CBRT, Inflation Report 2006 IV
- Christoffersen and Wescott, 1999, "Is Poland Ready for Inflation Targeting?", IMF Working Paper, WP/99/41
- Croce and Khan, 2000, "Monetary Regimes and Inflation Targeting", *Finance & Development*, September 2000
- Çiçek, 2005, "The Modeling of the Short and Long Term Dynamics of the Inflation in Turkey in the Disinflation Process" *Yönetim ve Organizasyon Magazine*, 2005, 1
- Çolakoğlu, 2002, "The Independency of the CBRT in the Context of the Transition to the Inflation Targeting Strategy" *Kocaeli University Social Institute Magazine*, 2002/2
- Debelle, 1997, "Inflation Targeting In Practice", IMF Working Paper, WP/97/35
- Enders, 1995, "Applied Econometric Time Series", John Wiley & Sons Inc.

Epstein, 2003, “Alternatives to Inflation Targeting Monetary Policy for Stable and Egalitarian Growth: A Brief Research Summary”, University of Massachusetts Amherst, Working Paper Series 62

Gottschalk and Moore, 2001, “Implementing Inflation Targeting Regimes: The Case of Poland”, *Journal of Comparative Economics* 29, 24–39

Johansen and Juselius, 1990 “Maximum Likelihood Estimation and Inference on Cointegration with Application to the Demand for Money, *Oxford Bulletin of Economics and Statistics*, 52

Johnston and DiNardo, 1997, “Econometric Methods”, McGraw-Hill Co., fourth edition

Jonas and Mishkin, 2003, “Inflation Targeting In Transition Countries: Experience and Prospects”, NBER Working Paper 9667

Işık, 2003, “Policy Instrument Selection in Fight against Inflation – A VAR Analysis” http://www.sosyalbil.selcuk.edu.tr/sos_mak/makaleler%5CNihat%20I%C5%9EIK%5C341-354.pdf

Kadıoğlu, Özdemir and Yılmaz, 2000, “Inflation Targeting in Developing Countries”, CBRT

Kara, 2006, “Turkish Experience With Implicit Inflation Targeting”, CBRT

Kumhof, 2001, “A Critical View of Inflation Targeting: Crises, Limited Sustainability, and Aggregate Shocks”, Central Bank of Chile Working Papers No: 127

Leiderman and Bufman, “Inflation Targeting Under a Crawling Band Exchange Rate Regime: Lessons From Israel” <http://www.imf.org/external/pubs/ft/seminar/2000/targets/strach9.pdf>

Lim and Papi, 1997, “An Econometric Analysis of the Determinants of Inflation in Turkey”, IMF Working Paper, WP/97/170

Macfarlane, 1997, “Monetary Policy Regimes: Past and Future”, Reserve Bank of Australia Bulletin, October 1997

Mason, Savastano and Sharma, 1997, “The Scope for Inflation Targeting in Developing Countries”, IMF Working Paper, WP/97/130

McCallum, 1996, “Inflation Targeting in Canada, New Zealand, Sweden, the UK and in General”, NBER Working Paper 5579

McCallum, 2000, “Alternative Monetary Policy Rules: A Comparison with Historical Settings for the US, The UK and Japan”, Federal Reserve Bank of Richmond Economic Quarterly Volume 86/1 Winter 2000

- Mishkin, 1997, "Strategies for Controlling Inflation", NBER Working Paper 6122
- Mishkin and Posen, 1997, "Inflation Targeting: Lessons from Four Countries", NBER Working Paper 6126
- Mishkin, 2000, "Inflation Targeting In Emerging Market Countries", NBER Working Paper 7618
- Mishkin, 2004, "Can Inflation Targeting Work In Emerging Market Countries?", NBER Working Paper 10646
- Örnek, 2003, "Can the Inflation Targeting Be Applied in Turkey"
<http://www.dtm.gov.tr/dtmadmin/upload/EAD/TanitimKoordinasyonDb/turkiyeenf.doc>
- Örnek, 2004, "Inflation Targeting : Application Features" CBRT
- Perron, 1988, "Trends And Random walks in Macroeconomic Time Series: Futther Evidence From a New Approach", Journal of Economic Dynamics and Control, Vol.12,
- Sherwin, 1999, "Strategic Choices in Inflation Targeting: The New Zealand Experience, Reserve Bank of New Zealand: Bulletin Vol. 62 No. 2
- Shriller, 1996, "Why Do People Dislike Inflation?", NBER Working Paper 5539
- Sims, 1980, "Macroeconomic and Reality", Econometrica, Vol. 48, No.1
- Steinherr, Tükel, Üçer, 2006, "Türk Bankacılık Sektörü : Zorluklar ve AB Üyeliğine Geçiş Sürecine Bakış", Türkiye Kalkınma Bankası
- Svensson, 1998, "Open Economy Inflation Targeting", NBER Working Paper, w 6545
- Şanlı, 2006, "Inflation Targeting Practices and the Applicability in Turkey"
http://www.manas.kg/pdf/sbdpdf16/Makaleler/03_Sanli.pdf
- The Law on the Central Bank of the Republic of Turkey
- Trajabo, 2002, "Inflation Targeting in Brazil, Chile, and Mexico: Performance, Credibility, and the Exchange Rate" Central Bank of Chile working paper No:171
- Tutar, 2002, "Inflation Targeting In Developing Countries And Its Applicability To The Turkish Economy" Virginia Polytechnic Institute and State University Thesis
- Usta, 2003, "Enflasyon hedeflemesi: gelişmekte olan ülkelere uygulanabilirliği ve Türkiye Örneği", CBRT
- Woglom, 2000, "Inflation Targeting in South Africa", J.Stud.Econ.Econometrics, 2000, 24(2)