INFLATION TARGETING AND INDIA

CAN MONETARY POLICY IN INDIA FOLLOW INFLATION TARGETING AND ARE THE MONETARY POLICY REACTION FUNCTIONS ASYMMETRIC?

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Abstract

Inflation, being one of the most volatile variables in the economy, possesses the potential to cause severe impact on the economy and on the life of people. The Economists and Policy makers have been trying to bring inflation under their control and to reduce its volatility as much as possible. Out of the various strategies adopted, the strategy that yielded the best result was the policy of Inflation Targeting. India has also been suffering from highly volatile inflation over the years and hence this paper tries to examine whether the Central bank, given the policy response now, could adopt the policy of Inflation targeting in India. The paper also attempts to examine whether there exists any asymmetry in the monetary policy in the India. Taylor rule and Linux Preference Function were used as models in the study. The study used secondary data collected from various publications of RBI. GMM technique was employed for the estimation of the models. The results showed that with the kind of policy response that exists now, RBI is more efficient in controlling output gap rather than current inflation in India. The study also reveals that there exists asymmetry in the monetary policy reaction of RBI.

Key Words: Inflation targeting, Monetary Policy Rule, Central bank Policy Preference
JEL Classification: E52, E58

Introduction

Inflation has been the center of attention for Economists around the globe for the past many decades. Being one of the most volatile variables in the economy that possesses the potential to cause severe impact on the economy and on the life of people, Inflation has attained utmost importance in Economics. Over the years, Economists and Policy makers have been trying to bring inflation under their control and to reduce its volatility as much as possible. Out of the various strategies adopted, the strategy that yielded the best result was the policy of Inflation Targeting. Putting it in simple words Inflation Targeting is a monetary policy to keep inflation in a declared target range, typically by adjusting the interest rates.

High rate of inflation in many countries, led to the emergence of Inflation Targeting as a significant monetary policy framework in both developed and developing countries. It has been in place
for a decade or more in nearly 20 countries as their basic monetary policy framework. The policy to target the inflation was first adopted in New Zealand in 1990. Canada followed this approach in 1991, then by Israel (1991), UK (1992), Sweden and Finland (1993), and Mexico and Spain in 1994. In the case of Australia, it is very difficult to date precisely the introduction of Inflation Targeting. Within Europe, Germany, France, Italy, and Portugal have all specified in quantitative terms their medium term inflation goal.

The policy of Inflation Targeting was highly successful in these countries. After switching over to inflation targets, their inflationary rates fell sharply and in some cases more rapidly than what the authorities had expected. Australia could achieve a steady decline in the average inflation rate from 8.1% in 1981-1990 to 2.1% as of January 2010. In Spain the average inflation rate from 1981-1990 was 9.4% and it declined to 1% as of January 2010. In Israel, since the introduction of Inflation Target in 1990-'91, the inflation rate has reduced from 19% to 3.80% in January 2010. Inflation targeting held good results in U.K. Inflation rate declined from 5.9% in 1990-'91 to 3.50 % as of January 2010. In case of Sweden too, Inflation Targeting was a success as it reduced inflation rate from 4.6% in 1992-'93 to 0.60% as of January 2010.

In India, inflation has always been a highly volatile variable in the economy. The inflation record of India from the 1950s underlines this fact. The first half of the 1950s saw India under a highly deflationary condition. The reason for this high deflationary condition can mainly be attributed to the high level of agricultural productions India had during that period. The lowest level of inflation was recorded as -12.5% in 1952-’53. However, in the later half of 1950s, India saw a surge in the price levels. Inflation rate went as high as 13.8% in 1956-’57, owing to the industrialization focused second – 5 year plan. The sequence of wars that took place in the first half of 1960s and the famine conditions during 1965-'66, maintained the inflation rates high. Inflation was as high as 13.9% during 1966-'67. A bumper agricultural production that India attained during 1967-'68 took the inflation rates down and resulted in -1.1% inflation rate in 1968-'69. Inflation maintained its high rates in 1970s, this time owing to the sharp rise in the international crude oil prices. Inflation rates shot well over 20% during this period. During the 1980s, the inflationary situation continued but the average inflation declined to 7.7%. The first half of the 1990s was characterized by double digit inflation, owing mainly to the
financial crisis. Hence, it becomes very important for the RBI to have a certain amount of control over this highly volatile variable called Inflation. Going by the experience of the other countries, the monetary policy of Inflation targeting seems to be a better tool in this regard. Hence, this paper making use of the Taylor rule tries to examine whether the Central bank, given the policy response now, could follow Inflation targeting in India. The paper also attempts to examine whether there exists any asymmetry in the monetary policy in the India.

Methodology

a. Data

Quarterly-Time series data from April 1996 to March 2008 in the Indian context is used in our regressions. The data is collected from various publications of RBI. Since the paper deals with the estimation of Taylor rule, we have taken the Call Money Rate (CMR) for interest rate as the dependent variable and annual change in seasonally adjusted Wholesale Price Index (WPI) for inflation and seasonally adjusted Gross Domestic Product (GDP) for output, as the explanatory variables in the model.

b. The Seasonal adjustment

Time series observed at quarterly and monthly frequencies often exhibit cyclical movements that recur every month or quarter. In this paper, Seasonal adjustment is made by making use of the Moving Average seasonal adjustment method.

c. Measurement of potential output

An important issue, especially in India, is the measurement of the output gap. Unlike the developed countries, there are no official measures of potential output level. Potential output is unobserved and need to be estimated. In this paper we have used Hodrick-Prescott (HP) filter method to obtain potential GDP.

d. Unit root test

Before estimating the equations, in this paper, stationary properties are tested by Augmented Dickey-Fuller test (ADF), by checking for the Unit root of the variables.

e. Estimation technique

If the regressors are endogenous and likely to be correlated with error term, then there will be a problem of simultaneity. In such situations, if the equations are over identified then we can go for Two-Stage Least Square (2SLS), Generalized Method of Moments (GMM) etc. It is now common to use the GMM estimator, as it accounts for endogeneity biases as well as
non-spherical errors. Hence, GMM is used for the estimation of the model in this paper.

**The Model and Empirical Results**

In this section, we try to identify whether the RBI can follow the Inflation targeting policy and whether there exists any asymmetry in the monetary policy of India. To understand if RBI can successfully pursue Inflation targeting, we estimate the Taylor rule function. In order to test for asymmetry in the monetary policy, we estimate the Linux function. For estimation we use quarterly data from April 1996 to March 2008. Inflation and Output gaps are used as the explanatory variables in the models. The short term interest rate is used as an endogenous variable. The output gap is measured as the difference between seasonally adjusted Gross Domestic Product and its Hodrick-Prescott (HP) trend. The annual rate of change in the seasonally adjusted Wholesale Price Index (WPI) is taken for inflation. Inflation rate has not been targeted in India. The difference between inflation and its Hodrick-Prescott trend is taken as inflation gap. Seasonality in the variables is removed by employing the Moving Average seasonal adjustment method. All the required information is collected from the various publications of Reserve Bank of India (RBI). Call money rate is used as a proxy for short term interest rates.

We estimate the Taylor rule by using the following Taylor rule equation:

\[ r^c = \beta_0 + \beta_1(y_g) + \beta_2(\pi_g) + u_1 \]  
(1)

The Linux function can be estimated by using the following equation:

\[ r^c = \beta_0 + \beta_1(y_g) + \beta_2(\pi_g) + \beta_3(y_g)^2 + \beta_4(\pi_g)^2 + \beta_5(y_g \cdot \pi_g) + \varepsilon_1 \]  
(2)

Here, \( r^c \) is call money rate; \( y_g \) is the output gap; \( \pi_g \) is the inflation gap; \( u_1 \) and \( \varepsilon_1 \) are error terms. The asymmetric preferences are introduced as the squared components for inflation and output gaps whereas the non-linearity of Philips curve maps into the cross product of the state variables.

Before estimating the equations, stationary properties are tested for the variables in the equations. In the time series analysis, the variable studied has to satisfy the stationary condition to establish a consequential relationship among itself. A series is held to be stationary series if it is characterized by a time invariant mean and variance. Estimations based on the non-stationary variables may lead to a spurious relationship. If the series is non stationary, then the regression may have a high \( R^2 \) and \( t \) statistics which may appear to be significant, but the results are without any economic meaning (Walter Enders, 2004).
To test the stationary properties, the widely used most popular unit root test Augmented Dickey Fuller Test (ADF) is used. The test results are presented in the table: 1.

Table1: Unit Root Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF</th>
</tr>
</thead>
<tbody>
<tr>
<td>r'</td>
<td>-6.44</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
</tr>
<tr>
<td>yg</td>
<td>-3.48</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
</tr>
<tr>
<td>πg</td>
<td>-4.76</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
</tr>
</tbody>
</table>

Figures in parentheses are p-values

The ADF test results in table: 1 shows that, the null hypothesis of unit root can be rejected for all the exogenous and endogenous variables in the model. All the variables included in the model are found to be stationary in their levels and integrated at order zero, I (0).

After confirming that there exists no unit root, the equations (1) and (2) are estimated. Estimation of the above models by using Ordinary Least Square (OLS) method has some series econometric problems. The OLS method implicitly assumes that the exogenous variables are strictly independent from the error term. But the empirical literature showed enough evidence to prove that the exogenous variable in the model, inflation gap will be correlated with the error term. The problem of simultaneity arises which leads to biased estimates of the coefficients of interest. In the presence of simultaneity, OLS estimators are not even consistent (Gujarati, 2004). In such situations, it is now common to use the GMM estimator, as it accounts for endogeneity biases as well as non spherical errors. To eliminate simultaneous bias as stated in the theory, thus we estimate the equations (1) and (2) using Generalized Method of Moments (GMM). The $p$- value of the test statistic is also found in both the cases of estimation. The results are presented in Table: 2. The estimate results of the equation (1) are given in the first column and that of equation (2) are given in the second column.
### Table 2: GMM Estimates

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>6.52 (0.00)</td>
<td>4.83 (0.00)</td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>0.75 (0.00)</td>
<td>0.55 (0.00)</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>0.43 (0.00)</td>
<td>0.36 (0.00)</td>
</tr>
<tr>
<td>$\beta_3$</td>
<td>-</td>
<td>0.11 (0.00)</td>
</tr>
<tr>
<td>$\beta_4$</td>
<td>-</td>
<td>0.33 (0.00)</td>
</tr>
<tr>
<td>$\beta_5$</td>
<td>-</td>
<td>0.26 (0.00)</td>
</tr>
<tr>
<td>$\chi^2$ (p-value)</td>
<td>2.83 (0.42)</td>
<td>6.14 (0.91)</td>
</tr>
</tbody>
</table>

Figures in parentheses are *p*-values

The first column in Table 2 gives the estimates for the Taylor rule equation. The constant and other two exogenous variables in the model are statistically significant. The magnitude of the coefficient output gap ($\beta_1$) is greater than the coefficient of inflation gap ($\beta_2$). It reveals that, when call money rate is used as a proxy for short term interest rate, then the monetary policy is found more effective in targeting current output gap rather than inflation.

The second column gives the estimates for the Linex model. In the Linex model, again the coefficients of both output gap and inflation gap are positive and significant, with the coefficient of output gap greater than that of inflation gap, underlining the efficiency of the central bank in output gap targeting policy. The squared output gap and the squared inflation gap terms are positive and significant, thereby providing evidence of asymmetry around a point target. The parameter capturing nonlinearity ($\beta_5$) from the structure of the economy also shows significance, giving evidence that the monetary policy of RBI can be characterized by a nonlinear policy rule.

**Conclusion and Policy suggestions**

A number of interesting results emerge from the empirical analysis. The evidence from the empirical analysis shows that in India, the policy of the Central bank is more efficient in controlling output gap rather than current inflation. It shows that the RBI could follow output gap targeting rather than inflation targeting. Consistent with the evidence of greater impact of policy decisions on the output gap, there appears to be some asymmetry in the response, with a greater propensity to act on a negative output gap than on a positive
output gap. This indicates that the Reserve Bank is ‘recession averse’, that is it is more concerned about an economic slowdown rather than inflation. In case of inflation, a rise or a fall in inflation level from its target will only call for, a more or less similar response. Although it is the case, the evidence points that the RBI is more concerned about deflation than small levels of inflation. We can also find evidences of non linearity in the monetary policy function of RBI in our empirical analysis.

The major factors that contributed towards the success of inflation targeting in the inflation targeting countries could be identified as the following:

- The Central Banks in those countries have sufficient autonomous status, unlike other developing countries.
- The Central Banks in IT countries have binding commitment towards low inflation and never exhibited asymmetry.
- The Central Banks in IT countries deployed the entire tools of monetary policy instruments exclusively towards low inflation monetary policy.
- The confidence of the people in those countries on their Central Bank also helped in effective Inflation targeting.

Hence as policy suggestion, we can suggest that RBI should try to achieve these pre requisites as early as possible if it has to change the path of monetary policy from output gap targeting to inflation targeting. RBI’s policies should not be asymmetric and stringent actions should be taken to stop further rise in inflation because a country like India where people have inadequate purchasing power, if the prices tend to rise rapidly, it would drastically affect the day to day life of the people and the people will further lose their confidence on the policy makers and in the stability of the economy.

References:


