Inflation Targeting and Macroeconomic Performance in Latin America
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Nader Nazmi*

Abstract – This paper investigates the use of monetary policy rules based on inflation targeting in the emerging market economies by posing and answering a counterfactual question: how the use of inflation-targeting policy regimes would have altered the economic performance of Latin American countries? Econometric results indicate that inflation targeting would have reduced both the average and the variance of inflation without significantly impacting the output variable. Calculated social loss functions show that social welfare would have enhanced considerably if the authorities had committed themselves to following such a monetary policy rule beginning in 1981.

Key Words: Inflation Targeting, Monetary Policy Rules, Macroeconomic Performance, Emerging Markets, Latin America

JEL Classification: E52 (Monetary Policy: Targets, Instruments and effects), E58 (Central Banks and Their Policies)

*Department of Economics, Lake Forest College, 555 N. Sheridan Road, Lake Forest, Illinois 60045. E-mail: Nazmi @lfc.edu.
1. Introduction

Since the early 1990s, the landscape of monetary policymaking has undergone a gradual and significant change. Beginning with New Zealand in 1990, the two old monetary policy regimes of targeting monetary aggregates or anchoring the exchange rate gradually lost ground to a new policy framework known as inflation targeting. Inflation targeting is a monetary policy regime that turns the announced inflation objective of the central bank into an intermediate target. In this framework, monetary policy is set to minimize the deviation of inflation forecasts from the inflation target.

While inflation targeting was initially adopted only in advanced industrialized countries, Chile and Mexico recently ushered in its use in emerging market economies. This, in a way, is venturing into uncharted territory, as there is little that is known about inflation targeting in developing countries. The purpose of this paper is to help bridge this knowledge gap through a counterfactual exercise. In particular, this paper seeks to answer a key question: how the economic performance of emerging markets would have altered if they had adopted inflation targeting in the early 1980s? To answer this question, this paper focuses on economic performance of Argentina, Brazil and Mexico and examines how monetary policy based on inflation targeting would have impacted the behavior of output and inflation variables.

This paper consists of five sections. Section 2 offers a broad overview of nominal anchors used by policymakers in their quest to achieve price stability. Section 3 discusses a simple business cycle model with sticky prices to examine the responses of output and inflation to monetary policy changes. This model is estimated in Section 4 to analyze the consequences of a hypothetical inflation targeting policy regime on output and inflation using pooled time series-cross sectional data for the period 1980-
1997 for Argentina, Brazil, and Mexico. It is shown that adopting an inflation-targeting regime aimed at a gradual reduction of inflation beginning in 1980 would have resulted in lower inflation rates without sacrificing output growth in the long run. Moreover, such a policy would have produced lower inflation and output variability, inflicting substantially lower costs on the society. Section 5 is the conclusion.

2. Monetary Policy Regimes and Price Stability

The emerging consensus among central bankers that price stability should be the paramount goal of monetary policy has helped refocus policy discussions from considerations regarding inflation-output tradeoffs to how best achieve the goal of low inflation. There is, however, less of a universal agreement about which intermediate objective provides the best vehicle for reaching this goal. Policymakers are often faced with the task of choosing among the three intermediate nominal targets of monetary aggregates, the exchange rate, and the inflation variable.

Monetary aggregate targets have become less popular over the last two decades because of concerns about the stability of money demand functions. Moreover, even if the relationship between money, nominal income and interest rates is stable, any attempts to use the money demand function in an optimal fashion may cause changes in the model parameters and result in sub-optimal policy. This type of Lucas criticism is especially relevant in emerging market countries where dramatic changes in monetary policy might be needed to stabilize the economy. In such circumstances, the estimated relationship between monetary aggregates and prices are likely to break down, making money a weak nominal anchor (Goodhardt’s Law).

Normally the credibility of monetary authorities is one of the first victims of long periods of high inflation. The success of stabilization programs, however, depends
crucially on the credibility factor. In its absence, monetary authorities may choose to send a strong signal to the public regarding their resolve to lower inflation by adapting an exchange rate anchor that limits the central bank’s discretionary powers. The trade-off between flexibility in setting monetary policy and the credibility of monetary authorities is an important consideration in deciding on an exchange rate anchor. In one extreme, as in the case of Argentina, the nominal exchange rate is fixed and the money supply is exogenously determined. A less hard line approach affords the central bank limited flexibility in the conduct of monetary policy by adopting exchange rate bands as used until recently in Ecuador, Brazil and Chile.

While the exchange rate anchor can help bring inflation down quickly and may help solve the time inconsistency problem, its use in emerging market countries is problematic. As argued by Mishkin (1998a) and Nazmi (1998), the use of the exchange rate anchor in an economy marked by a weak financial sector is risky as it would add to financial fragility and might usher in financial crises. Furthermore, the exchange rate anchor limits the policymakers’ ability to react to external shocks and removes a daily signal regarding the stance of monetary policy (Mishkin 1998b). Finally, it is difficult to articulate a well designed exist strategy when using the exchange rate anchor. There is abundant evidence that long-term adherence to the exchange rate anchor increases the likelihood of overvaluations and balance of payments crises. The balance of payment crisis does not necessarily correspond to a Krugman (1978)-type run on foreign reserves and a collapse of the domestic currency. As shown by Lahiri and Vegh (1997) the central bank could, in principle, avoid a currency crisis by pursuing an active interest rate policy. Such a remedy, however, could only be temporary because of the exuberant employment and output cost associated with it. Speculators are then offered a one way bet against the currency, resulting in currency attacks that dramatically end the
exchange rate-based stabilization. High inflation and costly recessions usually characterize the post-mortem period.

Beginnings with New Zealand in 1990, increasing number of central banks have announced inflation targeting as their policy of choice. An explicit inflation target means that the central bank's inflation forecast becomes an intermediate target. The central bank will then minimize deviations of the conditional inflation forecast from the inflation target by adjusting appropriate instruments.

Inflation targeting has a number of tangible advantages. First, it offers transparency: the public knows the central bank’s objectives regarding the future path of prices. These objectives, if credible, serve as a nominal anchor similar to the exchange rate anchor as they help shape price expectations. Second, unlike the exchange rate anchor, inflation targeting allows authorities more leeway in responding to shocks. Third, an explicit inflation target signals an institutional commitment to low inflation as it effectively removes the time inconsistency problem. Fourth, unlike exchange rate anchoring, inflation targeting is a long-term solution to the inflation problem. Fifth, it does not cost the economy imbalances in the external sector.

Despite these advantages, inflation targeting suffers from two important drawbacks. First, it can be difficult to implement an effective inflation targeting policy in practice. This difficulty stems from the crucial role that inflation forecasts play in the success (or failure) of inflation targeting schemes. Uncertainty about the quality of inflation forecasts directly translates into uncertainty about the conduct of monetary policy. This difficulty is especially of concern for emerging markets that suffer from high inflation. Since higher inflation usually corresponds to higher inflation variability, the task of inflation forecasting becomes more difficult and relying on inflation targeting becomes more risky. Second, inflation targeting requires a great deal of patience as it
corresponds to a gradual approach to disinflation. Successful inflation targeting earns central bankers credibility slowly as policy will have a lagged effect and learning by the public takes time.

The consumer price index (CPI) or the inflation rate can serve as inflation targets. The CPI target is likely to increase price variability as the central bank is forced to correct for past target misses while with inflation targeting past misses are considered as bygones. The central bank also needs to decide if it will choose the co-called headline inflation or some type of filtered inflation rate as its target. Finally, a choice needs to be made between a targeting one inflation rate (point targeting) or targeting an inflation band (range targeting).

It is worth mentioning that inflation targeting does not preclude the use of the exchange rate or short-term interest rates as instruments for minimizing the difference between the target and forecast inflation rates. While some countries such as England, Sweden, and Finland abandoned the exchange rate anchor completely when they adopted inflation targets, Spain chose inflation targeting in conjunction with its existing exchange rate anchor by widening the exchange rate band.

3. A forward looking business cycle model

Our model economy is described by four equations that are consistent with the optimization behavior of households, firms and central bankers. In particular, the output gap ($y$) is determined by

$$y = \frac{E(.)}{I_t} - \frac{i}{p},$$

where $E(.)$ is the expectations operator, $I_t$ denotes the available information at time $t$, $i$ denotes the nominal interest rate, and $\pi$ is the inflation rate. Equation (1) is the usual IS setup where output gap is set as a function of expected output for the next period and
the expected real interest rate. This model can be interpreted as an Euler equation for consumption with time-separable preferences where consumption equals aggregate output. This formulation of the output gap variable allows for the possibility of persistence in output gap through the expectation variable. In particular, an output gap model with persistence would be considered as a special case of Equation (1) where lagged output is relevant information in forming expectations about future output gap.

Inflation is described in a forward-looking Phillips curve setting of the form:

\[
\pi_t = \pi_t^{e} + \omega_{\pi} (\pi_t - \pi^{*}) + \omega_{y} (y_t - y^{*})
\]

Equation (2) is based on the assumption of short-term price rigidities of the sort introduced by Calvo (1983) and later analyzed by Woodford (1996). In particular, it describes optimal price setting for firms facing monopolistic competition and adjusting their prices with a constant probability during a given period.

To describe the central bank’s policy reaction function, we assume that central bankers minimize a loss function with the quadratic deviations of inflation and output from their target values as arguments. This leads to a reaction function of the form:

\[
\text{rate} = \omega_{\pi} (\pi_t^{e} - \pi^{*}) + \omega_{y} (y_t - y^{*})
\]

This equation says that the monetary authorities set the short-term interest rate in response to the deviation of expected inflation from their target for inflation and the deviation of output from the potential output. The coefficients \( \omega_{\pi} \) and \( \omega_{y} \) show the significance monetary authorities assign to reaching their inflation and output targets, respectively.

Finally, to complete the model we define inflation expectation as
Equation (4) describes the expectation of the one-period ahead inflation rate as a weighted average of the current inflation rate and the inflation target announced by the authorities. The weight given to the inflation target variable depends on the credibility of the monetary authorities. In one extreme, with a fully credible monetary authority the public sets its inflation expectation equal to the inflation target ($\beta = 1$) while, in the other extreme, the public pays no attention to the announced target and assumes that the current inflation rate persists into the next period.

4. **Empirical Results**

Over the last few years, considerable attention has focused on evaluating policy rules for the U.S. Federal Reserve Bank. These studies generally begin with a policy instrument variable defined as a dependent variable in a Fed reaction function. According to some policy rule, this variable is then fine-tuned in response to deviations of some variable of interest from its target value.¹ Taylor (1993) policy rule that sets the short-term interest rate as a function of the deviations of output and inflation from their target values is one widely used policy rule for evaluating monetary policy regimes in developed countries.

This study uses a pooled time series-cross country data set consisting of annual observations covering the period 1980-1997 for the three countries of Argentina, Brazil, and Mexico. In addition to representing the three largest economies in Latin America, these three countries have experienced colorful episodes of inflation and have attempted to confront their inflation problem using a battery of nominal anchors including monetary, exchange rate and inflation targets.² The data for the GDP, inflation and
nominal interest variables are taken from the International Monetary Fund’s IFS CD-ROM (December 1998).

The counterfactual exercise is conducted in seven steps. The first step consists of estimating the output gap \(y\) variable. This is calculated as the percentage difference between potential output and actual output where the former is obtained from fitting a Hodrick-Prescott filter to the GDP series for each country.

In the second step, each country is assigned an inflation target for a given period of time based on the assumption that each country adopts a gradual anti-inflation policy in 1981. Starting with this year, the inflation target for each year is set as a constant fraction of the previous year inflation such that the long run objective of single-digit inflation rates by the mid-1990s is realized. Third, interest rates consistent with preset inflation targets and zero output gap are calculated using the policy rule given by Equation (3). The weights \(\omega_\pi\) and \(\omega_y\) used in this equation are the widely-used Taylor rule weights of 1.5 and 0.5, respectively.

The fourth step consists of calculating the expected inflation rate using Equation (4). The coefficient \(\beta\), a proxy for the credibility of the central bank is assumed to depend equally on two variables: the independence of the central bank and the fiscal situation. I calculate the central bank independence index (CBII) using the methodology set forth by Cuckierman (1992). In particular, each country is assigned a score using the coding system in Cuckierman (1992) based on the eight criteria of (1) terms of office, (2) appointment procedure, (3) dismissal provisions, (4) another office held, (5) monetary policy formulation, (6) conflict resolution, (7) role in the budget-making process, and (8) the central bank’s objective. This scoring system results in a CBII ranging between 0 to 1, with the latter score corresponding to a hypothetical perfectly independent central bank. The average of this index and the central government’s deficit/surplus
variable is then defined as a proxy for the central bank’s credibility. A perfectly credible central bank \((\beta = 1)\) is defined as a central bank with the credibility index of 100 comprising of a perfectly independent central bank \((\text{CBII} = 1)\) and a balanced budget. The credibility index for other central banks is standardized relative to the fully credible central bank’s score of 100.

In the fifth step of the process, the output gap equation (1) and the Phillips curve relationship (2) are estimated using pooled data for the period 1980-97 covering the three counties of Argentina, Brazil, and Mexico. The estimation results provided in Table 1 show that inflation and output gap models are both statistically significant and that all variables in the two models have the expected signs. Moreover, with the exception of the lagged output gap variable in the inflation model, all other variables are statistically significant at the one percent level of significance.

The sixth step consists of using estimated interest rate and expected inflation variables to examine what the output gap would have been had monetary authorities used monetary rules based on the inflation targeting regime described above. Figure 1 demonstrates the evolution of the average output that would have resulted from the use of the inflation-targeting rule relative to the actual movement in the GDP. This figure suggests that the use of inflation-targeting nominal anchor would have had little impact on the evolution of the output variable.

The outcome on the inflation front, however, would have been quite different. In the seventh step of our study, average inflation rates that would have resulted from the use of monetary policy rules based on inflation targeting is calculated using the estimated Phillips curve. Figure 2 shows that the average inflation rates form inflation-targeting is considerably lower than the actual inflation rate experienced by the three countries under investigation.
The mean and variance of inflation and output for the period under consideration as well as those that would have been obtained had the authorities relied on inflation-targeting monetary rules are summarized in Table 2. It can be seen that the mean and the variance of inflation are significantly lower for rule-based policy based on inflation-targeting as defined above. The mean and the variance of output, on the other hand, show little change.

Social loss functions are also calculated in Table 2. Social losses are calculated using two sets of weights assigned to inflation and output variability. One set of weights is based on the Taylor rule and assumes that inflation variability is more costly than output variability. It thus assigns a weight (penalty) of 1.5 to inflation variance and a weight of 0.5 to the output variance. The other set is based on the assumption that inflation and output variability are equally costly and uses equal weights of 1.5 to output and inflation variability in calculating the social loss function. The results reported in Table 2 show that in both cases a significant improvement in social welfare would have resulted had the authorities relied on monetary rules based on inflation-targeting to bring inflation under control.

5. Conclusion
Table 1 – Fixed effects-SUR estimation results for the output gap model (equation 1) and the inflation model (equation 2)

| Dependent/Independent Variables | $Y_{t-1}$ | $\bar{i}_t - E(\pi_{t+1} | I_t)$ |
|---------------------------------|-----------|-----------------------------------|
| Output gap ($y_t$)              | 0.27      | -0.001                            |
|                                 | (2.38)    | (-3.15)                           |
| F-statistics = 19.21 (prob. = 0.00) | Log likelihood = -100.7 | DW = 1.76 |
| Inflation ($\pi$)               | 1.82      | 0.81                              |
|                                 | (0.51)    | (3.44)                            |
| F-statistics = 18.5 (prob. = 0.00) | Log likelihood = -326 | DW = 1.87 |

Table 2 – Actual and rule-based mean and variance of inflation and output and social loss functions.

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<th>Mean</th>
<th>Variance</th>
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<tr>
<td></td>
<td>Inflation</td>
<td>Output growth</td>
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<tr>
<td>Rule-based</td>
<td>218.1</td>
<td>2.69</td>
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<tr>
<td>Actual</td>
<td>402.8</td>
<td>2.70</td>
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<th>Social Loss</th>
<th>Social Loss</th>
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<td></td>
<td>($\alpha_x = 1.5, ; \alpha_y = 0.5$)</td>
<td>($\alpha_x = 1.2, ; \alpha_y = 1.2$)</td>
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<tr>
<td>Rule-based</td>
<td>210,145</td>
<td>168,124</td>
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<tr>
<td>Actual</td>
<td>843,036</td>
<td>678,437</td>
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Relative improvement (%) | 303.55 | 303.53 |
Figure 1 – Average output versus average output based on inflation targeting.

Figure 2 – Average inflation rates versus average inflation rates based on inflation targeting.
References


1 See, Fair y Howrey (1996) for more details and Rotemberg & Woodford (1997), and Rudebusch and Svensson (1998) for examples.
2 See Nazmi (1996) for a discussion of inflation and stabilization attempts in these countries.