

## THINKING LIKE A GOVERNOR: CENTRAL BANKING UNDER AN INFLATION TARGET

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IN LATE 2001 SOUTH AFRICA SUFFERED A SHARP DEPRECIATION of its currency. This resulted in inflation rising to such a level that the Reserve Bank of South Africa had to abandon achieving their initial inflation target of 3 - 6 per cent for 2002 and then set out with great vigour to reach the target in 2003. Since the early months of 2002 the Reserve Bank increased their operational target - the *repo rate* - several times, such that by middle September 2002 the *repo rate* was 400 basis points above its January 2002 level. Several economists and politicians decried this move, calling for a relaxation of policy in order to stimulate growth. Ironically, there was great uncertainty and dispute over the possible tightening of monetary conditions in the country, when the main goal of an inflation target regime is to remove any future uncertainty about the stance of monetary policy.

Today there is fairly broad consensus in the literature that any real growth in output should come from the supply side of the economy. In the short run however, it is believed that there is a role for a central bank to stabilise the economy. A central bank may therefore use its discretion to create favourable conditions to obtain its objective. An inflation targeting approach constrains discretion from the central bank and allows them to focus mainly on one objective.

Perhaps the recent uncertainty in South Africa stems from the

fact that the public was not familiar with an inflation-targeting regime. Perhaps it is because the Reserve Bank has no past record of achieving such targets. The reasons are unclear, but the fact is that although sharp response from the central bank was expected at the end of 2001, many market participants disagreed with the response of a 400 basis points increase in the repo rate. This paper sets out a framework in which a central bank under an inflation-targeting regime operates, and justifies why the interest rate hikes were necessary given the present framework of the South African Reserve Bank.

The paper is presented as follows. Section 1 makes some observations on the literature and empirical evidence from monetary policy. It identifies and discusses four important observations from the literature on inflation targeting. Section 2 discusses the South African situation in the framework sketched in section 1, while section 3 makes concluding comments.

## 1. RELEVANT OBSERVATIONS FROM MONETARY THEORY

There exists a vast literature on inflation targets and the implementation of them. In this paper we identify four factors that are common to many recent papers on inflation targeting. These factors are credibility and dynamic inconsistency, the role of expectations, central bank independence and, lastly, money growth targets, the instruments of monetary policy and their implementation. This section gives a synopsis of these four factors and indicates their crucial role in for the successful implementation and execution of policy.

### *(a) Credibility and Dynamic Inconsistency*

Discretionary monetary policy has long been an anomaly to economists. The issue was first posed by Simons (1936) as one of rules versus discretion. At one extreme is discretion - and the central bank is given the objective of promoting the general economic well being. At the other extreme is a fixed rule, which monetary authorities have to follow. There are the constant money growth rate rule (Friedman, 1959), the interest rate vs. money targets analysed by Poole in his famous article in 1970, the nominal GNP targeting (Fischer, 1988) and

the Fisher-Simons rule of a price level target (Fisher, 1945) to name but a few. Then some intermediate arrangements exist in several countries, in which the central bank has been given general objectives but is required to report regularly and justify its plan of action for a reasonable period ahead. Since Lucas' policy evaluation critique (1976), there has been no accepted way of evaluating detailed policy proposals. Until 1977 it appeared that discretion dominated rules, since discretion could always be used to adopt and mimic any good rule. In their seminal paper, Kydland and Prescott (1977) brought the concept of dynamic inconsistency to macroeconomics in the rules *vs.* discretion context and completely changed the debate since then. Their paper forms the basis of any monetary framework that operates in a framework with certain objectives, *i.e.* without complete discretion.

Dynamic inconsistency occurs when a future policy decision that forms part of an optimal plan formulated at an initial date is no longer optimal from the viewpoint of a later date, even though no new information has materialised in the meantime. A government or policy maker with discretion may, under rational expectations, be expected to make the short-run optimal decision, every time it can, and on average produce a worse outcome than would be if its hands were tied.

*An Example of Dynamic Inconsistency*

Suppose the monetary authority has a single loss function quadratic in the inflation rate ( $\pi$ ) and the deviation of the level of output ( $y$ ) from its target level:

$$L(\cdot) = \beta \pi^2 + \lambda (y - cy^*)^2, \tag{1}$$

$$\beta > 0, c > 1, \lambda > 0$$

$y^*$  Can be interpreted as full employment output. The loss function represents nothing else than the short-run

inflation/output trade-off available to policy makers. On the supply-side, the Lucas-supply curve — which is an expectational Phillips-curve — describes the relationship between output and inflation:

$$y = y^* + \alpha(\pi - \pi^e) \quad [2]$$

where  $\pi^e$  represents the expected rate of inflation. If one considers only a one period game, the policy maker will minimize their loss function with respect to inflation ( $\pi$ ), subject to the Lucas supply function.

If private agents can correctly anticipate inflation, *i.e.* the expected rate of inflation equals the actual rate of inflation, then by solving the equation the actual rate of inflation will be at a positive level of  $\pi_d$  where the subscript d represents "discretion".

It can be shown in this case that the loss function of the policy maker will be

$$L_d = (c - 1)^2 y^{*2} \left(1 + \frac{\alpha^2}{\beta}\right) \quad [3]$$

The size of the parameters  $\alpha$ ,  $\beta$  and  $c$  in equation [1] and equation [2] plays an important role in the analyses. The smaller is  $\beta$ , the smaller will be the loss to the policy maker when inflation is increasing, so that inflation is likely to be higher. Also, the greater is  $\alpha$ , the higher the inflation rate will be, for the gain in output will be higher.

If the policymaker can precommit to a certain level of inflation (in this example a zero inflation for simplicity), the precommitment equilibrium gives a value for the loss function of

$$L_p = (c - 1)^2 y^{*2} \quad [4]$$

Clearly  $L_p < L_d$ , *i.e.* the loss function under precommitment is less than the loss function under discretion. So why does the policy maker not choose the precommitment level of inflation over the discretionary level? According to the rules of the game, under

which the private sector commits itself first to a given  $\pi^e$ , precommitment is not Nash equilibrium. Once the private sector has committed itself to  $\pi^e = 0$ , the policy maker will choose the positive inflation. Why will the policymaker want to "fool" the private agents? If private agents expect the policy maker to create zero inflation, *i.e.*  $\pi^e = 0$ , but instead the policy maker acts opportunistically, it can be shown that the loss function to the policy maker is

$$L_f = \left(1 + \frac{\alpha^2}{\beta}\right)^{-1} (c-1)^2 y^* \quad [5]$$

By analysing the loss function under discretion, precommitment and fooling, one can see that

$$L_f < L_p < L_d \quad [6]$$

From equation [6] it is clear that if the policy maker has discretion, it will be tempted to move from the third best solution to the best solution by fooling the public. However, if it can somehow commit to zero (low) inflation, then they will obtain the second best outcome of  $L_p$ . The discretionary policy produces the largest loss, resulting in a positive rate of inflation with no output gain<sup>1</sup>. Therefore one would expect the policy maker to produce zero (low) inflation and obtain  $L_p$ . However, because the loss function is lower under fooling and the output gain greater than the case when the policy maker acts consistently, the policy maker is tempted to violate expectations of the private sector, so that  $\pi > \pi^e$ , and therefore the output gain greater. In striving to obtain output gains by fooling the public, the policy maker only succeeds in creating higher inflation with no output gain in the longer run. The example above can be extended into a multi-period model. It is still the case that policy makers, under discretion, may but will not necessarily produce

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<sup>1</sup> There will be no output gain under discretionary policy. Discretion gives the only Nash equilibrium in the game such that  $\pi = \pi^e$ , therefore from equation [2] there will be no output gain.

the optimal outcome.

If a policy maker has a history of credibility under discretionary policy, so that it was always the case that  $\pi = \pi^e$  (or close to), then there will be no time inconsistency problems. This is typically the case where the central bank has a history of being very inflation averse, like in the case of Germany and Switzerland. If it is not the case that the central bank has a history of credible policy and inflation aversion then the time inconsistency problem will be very prominent. How does one find a solution to the problem? The policy maker's loss function should be adjusted such that  $\beta \rightarrow \infty$  and  $\alpha \rightarrow 0$ , *i.e.* place a very big weight on inflation in the loss function so that if inflation increases marginally, the loss is great. Similar, a small weight should be placed on output. The policy maker should realise that any change in output will be only temporarily. This will reduce the inherent tension between permanent higher inflation and temporary lower unemployment. Output has been mitigated in the loss function to control the dynamic inconsistency problem inherent in monetary policy. There should not be any uncertainty over the true agenda of a central bank with an inflation target — they only have one agenda, and that is inflation control, not output. With skilful implementation, inflation targeting could make policy credible, transparent and consistent.

Credibility, as discussed above, is central to the next observation — the role of expectations on the supply side of the economy.

#### *Role of expectations and the Expectations Trap Hypothesis*

The important role of expectations can be described through the expectations trap hypothesis. A central bank under discretion (with no reputation), which wants to bring down inflation, will face the so-called expectations trap (Lawrence and Gust, 2000). In the language of Chari, Christiano and Eichenbaum (1998), one can say that when a central bank is pressured to produce inflation because of a rise in inflation expectations, the economy has fallen into an expectations trap.

An expectations trap is a situation where an increase in private agents' expectations of inflation, pressures the central bank into increasing actual inflation. There are different means by which this can happen, but the basic idea is always the same. The problem is initiated through a rise in the public's inflation expectations. The inflation trap works mainly through the cost-push factors of the economy — and should therefore be avoided at all cost. Higher inflation expectations lead people to demand, and receive, higher wage settlements. Firms are happy to pay the increased wages because, expecting a rise in the general price level, they think they can pass along higher wage costs in the form of higher prices. This places the central bank in the scenario mentioned above. The central bank can produce the inflation everyone expects — and wants — by raising money growth. Or if it does not, it will put the economy through a recession.

With no reputation of low inflation, once the central bank announces that they will establish low inflation in the next period, firms will doubt it. If they indeed follow through with their promise, actual inflation will be lower than expected inflation, *i.e.*  $\pi < \pi^e$ . This will necessarily result in a recession for the country (from the Lucas supply curve - equation [2]).

However, to obtain or preserve credibility the central bank will have to tighten monetary policy for some period, until private agents realise the central bank is credible. As long as the central bank is faced with the inherent tension between higher output and lower inflation, they will be stuck in this trap of no credibility and high inflation forever, or a painful temporary recession and credibility thereafter. This is similar to the situation experienced in Canada in the early 1990's.

Where, under an expectations trap, does the ultimate responsibility for inflation lie? According to the hypothesis the cause of the problem lies with the policy makers or central bank. If the central bank is known as extremely inflation averse, then there is little reason for expectations to suddenly jump.

An example by Lawrence and Gust (2000) illustrates the point. Imagine an oil shortage. It is reasonable to expect that the shortage will put upward pressure on the price level. Because of various lags in the economy, this rise might take place over a few months. But, there is nothing in conventional economic reasoning that would connect an oil shortage to a sustained, extended rise in prices that we call inflation. A 20 per cent jump in oil prices will have a once-of-effect in prices. The person who would think that prices will continue to increase for years because of the once-of-jump would seem as foolish as the person who, seeing temperatures outside drop by one degree from today to the next, forecast a drop in the temperature by 50 degrees over the next 50 days.

One way to render the central bank's announcement of low inflation in the next period credible, and avoid a recession, is to adjust the loss function to an inflation target situation. Now private agents know the central bank has little opportunity to create high inflation, so that  $\pi = \pi^e$  and output will be stable.

Even if inflation is not of a demand-pull nature, but rather of a cost-push nature, the central bank will still use its instruments to fight inflation expectations. The only way the central bank can influence cost-push pressures, is through expectations. If expectations about future prices are low, then wage demands will stay low, production prices will stay low and future inflation will be low.

#### *Central Bank Independence*

Although generally accepted and well documented, independence is worth mentioning. Numerous studies before have shown that the more independent the central bank is, the lower the inflation rate will be . This flows directly from the argument that if the central bank is independent, the government cannot use the short- term

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<sup>2</sup> Alesina and Sachs 1988; Grilli, Masciandaro, and Tabellini, 1991; Cukierman, Webb, and Neyapti, 1992 all find that independence and inflation are highly negatively correlated.



inflation/output trade-off for short-term political gain. If the central bank is inflation-averse, or operates under an inflation target, it is unlikely to pay attention to calls for temporary higher output at the cost of permanent higher prices. A second observation that should be made is that there does not seem to be any relationship between the variation in output and central bank independence. This implies that the country should grant the central bank all the independence it needs, for this does not influence output, but do seem to allow for low inflation.

The central bank should also be independent from market sentiment. Market participants are constantly evaluating the performance of the central bank and, in a sense, giving advice in two primary ways. The first is through the never-ending din of market chatter about the central bank's behaviour. Traders, financial industry economists and many others are constantly evaluating policy and trying to forecast it. The second is through asset prices and, importantly, the term structure of interest rates and some futures contracts, which embody assumptions about the central bank's future actions.

Independence, expectations and credibility lead to the success of the execution of monetary policy under an inflation target, which is discussed in the next section.

*Money Growth Targets, Instruments of Monetary Policy and Implementation.*

Monetary policy implementation encompasses the three previous observations, and its success is a function of each. This section highlights important aspects of monetary policy implementation.

Since the beginning of the 1990s financial market innovation developed in such a fashion that relationships which were useful in central banking seem to have broken down. New products, technology and instruments took the task of sole creator of money out of the hands of the central bank, and are not directly controllable by the central bank anymore. This is a reason why so many central banks moved to targeting inflation directly, as opposed to targeting some intermediate monetary variables, such as M2 or M3, credit extensions, *etc.* Although the causality still remains, Friedman (1996)

shows that the relationship between these variables and inflation has broken down to such an extent in the US that this traditionally stable relationship cannot be used as an operational target but only as some "information variable" in the policy process. He concludes that money growth variables cannot be used as a target for monetary policy.

In the same breath interest rates should be mentioned. Virtually all the major central bankers nowadays use the overnight interbank rate as their central policy instrument. The resolution of this long-running controversy illustrates the interaction between theory and best practise. In his seminal paper Poole (1970) shows that when shocks in the domestic economy are mainly directed to the money demand side, a central bank should use an interest rate as operational target if it wants to minimise the variation in output. On the other hand, if shocks to the domestic economy are mainly affecting the goods and services sectors, then money supply should be used as the relevant operational target. The instrument that a central bank uses is a function of the nature of the economy. Although some hybrid operational targets do exist, like targeting an interest rate and exchange rates to influence output or prices, Poole's analysis remains a central theme for deciding on an operational target.

Regardless of what type of operational target is in use, macro-economic modelling of the economy stays an indispensable part of monetary policy implementation. No one knows the "true model" for an economy, not even the central bank. Any central bank can only do its best in simulating the economy by means of a macro model, but will still have a shortage of data. However, although not sufficient, it is necessary and probably the best way to operate monetary policy. Respectable policy multipliers can only be generated by a fairly comprehensive macro model. Regardless of the Lucas critique (if applicable) it is simply impossible to estimate how policy at time  $t$  will affect, say, inflation at time  $t + j$ , without using some quantitative model of the economy.

According to Alan Blinder (1997), vice-chair of the Fed in the

1990s:

"there are two basic ways to obtain quantitative information about the economy: you can study econometric evidence, or you can ask your uncle...but I believe there is far too much uncle-asking in general..." A macro model gives the economist some indication of the lags of the economy or the so-called pipeline effects, which is not observable through "uncle-asking".

A last comment should be made on the time-horizon of policy makers. Any central banker must think in a time frame longer than the short run to operate in a sustainable policy framework. This runs parallel with two concepts already mentioned. The first is the dynamic inconsistency problem where short-run optimal policy differs from long-run sustainable policy. The second is the independence from government and market sentiment.

## 2. THE SOUTH AFRICAN SITUATION

This section makes short comments on the South African situation, in the framework of the four observations made in section one.

### *(a) Credibility and Dynamic Inconsistency*

In the past the South African Reserve Bank failed to contain inflation due to various reasons. This is also one of the main reasons why an inflation target was adopted by the Reserve Bank. It was therefore the right policy to restrain the discretion from the Reserve Bank and get inflation expectations down by reducing the inherent inflation/output tension embedded in short-run monetary policy. If the Reserve Bank follows a true inflation target, they should not be too concerned about output.

Although the Reserve Bank has limited discretion (which should improve their credibility), there is room for improvement. Du Plessis (2002) argues that in order to enhance its credibility, the Reserve Bank should improve accountability and transparency in their process of policy setting (especially in the case of the MPC).

### *(b) Role of Expectations and the Expectations Trap Hypothesis*

One of the prominent parts of inflation control is to keep inflation expectations at bay. Although the initial origin of the

inflation increase in 2001 was external and cost-push in nature, the danger existed if not controlled, that domestic expectations could fuel future inflation. As explained, the Reserve Bank is ultimately responsible for inflation control. In hindsight it appears that the Reserve Bank misjudged the speed at which inflation expectations increased in 2002 as well as its rigidity. De Wet (2002) estimates that inflation is influenced four times more by interest rates than by the effective exchange rate. This implies that if the effective exchange rate depreciates by 18 per cent, as was the case between September 2001 and September 2002, the Reserve Bank will probably have to increase the short-term interest rate between 400 and 500 basis points. The increase of course is not permanent but only to keep expectations at bay. The timing of the increases is also important. If the Reserve Bank increased the repo rate by 400 basis points in January 2002, expectations might have been in firm control, and a shorter period of tightening would probably have been necessary.

However, as people realise in the future that the Reserve Bank is serious about inflation, smaller periods of less tightening will be necessary. If the Reserve Bank manages to get inflation under control this time round, next time will be less painful. As in the example used in explaining the expectations trap, no economic theory states that inflation should keep on rising because of a once-off depreciation of the exchange rate — except expectations about inflation. Given expectations, it is necessary for the Reserve Bank to tighten monetary policy enough to indicate that they will not tolerate inflation.

*(c) Central Bank Independence*

The Reserve Bank will do anything in its power to reach its inflation target, as has been announced several times by the governor. Therefore, the sooner economic agents realise that inflation is important, the smaller the chance will be that  $\pi < \pi^e$ , and the smaller the chance of a possible recession (equation [2]). An inflation-targeting framework gives the Reserve Bank the

freedom and independence to tighten monetary conditions. The government has not before compromised the Reserve Bank's independence in order to obtain an intermediate goal at the cost of long-term macro economic policy. The government seems to realise that tight monetary policy will not be the reason for poor economic performance in the long run, but that high inflation will hamper economic growth. Several studies (Love and Wen, 1999; Feldstein, 1979) have shown that the cost associated with permanent higher prices far exceeds the benefit of a temporary lower level of output.

*(d) Money Growth Targets, Instruments of Monetary Policy Implementation.*

It has long been conventional wisdom that policymakers cannot "fine-tune" the economy. Furthermore, they should not try, because their knowledge base is insufficient. Therefore the Reserve Bank will not get the level of tightening exactly right (although they will try their best), but would rather achieve their goal with certainty than miss its target and possibly lose some credibility.

As in the case with other countries, and pointed out by Du Plessis (2002), there is a great degree of instability between the traditional relationship of money growth and inflation in South Africa, which compounds the information problem. Growth in money variables should not be seen as a decisive indication of what will happen to the policy stance of the Reserve Bank, for the Bank do not target any of those variables. Money variables can be used for information purposes, but by no means as operational targets (Friedman, 1996).

Lastly, the Reserve Bank has superior information about the lags of monetary policy, and will adjust instruments accordingly. What is the best instrument for South Africa? The best instrument is an appropriate interest rate, for shocks to money demand tend to dominate shocks in the goods and services sector.

### 3. CONCLUSION

This paper identifies four factors from the literature crucial for

monetary policy under inflation targeting. These factors — credibility, expectations, independence, and targets and policy implementation — are evaluated in the South African context. All four factors are closely related and should not be seen in isolation. They are dependent and causality runs in all the directions. It should be clear therefore that in order for monetary policy in South Africa to be successful, the Reserve Bank cannot fall short in any of these areas. Failure to do so in one area might jeopardise the whole inflation-targeting regime.

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