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**Article**

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## Research Summaries

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### Inflation Targeting

Ben S. Bernanke\*

Undoubtedly the most interesting development in monetary policy in recent years is the widespread adoption by central banks of a policy framework called "inflation targeting." As the name suggests, this approach is characterized by the announcement of official inflation targets at one or more horizons, and by the explicit acknowledgment that low and stable inflation is the overriding long-term objective of monetary policy. In practice, other important features of inflation targeting include greater "transparency" of policy—that is, increased communication and clarity about the plans and objectives of monetary policymakers—and, in some cases, increased accountability of the central bank for attaining its announced objectives.

New Zealand and Canada were pioneers of the inflation targeting approach; although, as I discuss later, the monetary policy strategies of Germany and Switzerland were important precursors. Other countries that have officially adopted inflation targeting include Australia, Finland, Israel, Japan, Spain, Sweden, and the United Kingdom. Some developing countries, Chile being a leading example, use modified versions of this strategy. The United States has declined to adopt inflation targeting formally, although the focus of the Federal Reserve Board under Alan Greenspan on maintaining low infla-

tion (including the use of pre-emptive strikes against possible future inflation) incorporates elements of this approach. Finally, the new European Central Bank is likely to adopt a modified form of inflation targeting, although political considerations (the need to demonstrate continuity with the policies of the Bundesbank) apparently will dictate that the ECB pay attention to monetary aggregates as well.

In light of the interest in and increasing application of inflation targeting, it is important to understand its potential strengths and weaknesses. My recent research has focused on the historical record of inflation targeting and the potential pitfalls for inflation targeters that are suggested by economic theory.<sup>1</sup>

#### The Bundesbank as Inflation Targeter

One barrier to empirically assessing inflation targeting is its short historical record: New Zealand, the first formal inflation targeter, adopted the approach only in 1990. In searching for relevant experiences, the student of inflation targeting is tempted to look to the post-1975 monetary policy regimes of Germany and Switzerland. Although both the Bundesbank and the Swiss National Bank refer to their approaches as "money targeting" rather than inflation targeting, there is a widespread perception that inflation targets are central to German and Swiss monetary policymaking. For example, the Bundesbank develops its money targets by starting with an inflation objective, then working backward to determine the rate of money growth that is consistent with that objective.

Ilian Mihov and I have analyzed the role of inflation targets in the Bundesbank's policymaking.<sup>2</sup> We ask the following question: Suppose that, after setting its money targets for the year, the Bundesbank were to observe higher money growth than the target; but because of offsetting factors, there is no accompanying change in its inflation forecast. Would the Bundesbank tighten policy? If it did not, then it seems reasonable to conclude that the Bundesbank is basically an inflation targeter. If it did tighten policy, particularly if it tightened enough to return money to its target path, then the Bundesbank would be better characterized as a money targeter, albeit one for which inflation goals remain important.

Anecdotally, there appear to have been numerous episodes in which the Bundesbank ignored its money targets to try to meet more fundamental objectives of policy, notably its inflation goals. To test this proposition more formally, however, we need a quantitative indicator of what it means to tighten or loosen policy. To that end, Mihov and I apply a method that we developed in an earlier study of monetary policy in the United States.<sup>3</sup> Our approach is to estimate a model of the central bank's operating procedure. With this estimate in hand, we can infer which variables under the control of the central bank are the best indicators of policy stance at a given time. Specifically, among candidate indicators such as various short-term interest rates or measures of bank reserves, we can determine which indicators (or combinations of indicators) have the highest correlation with shocks to policy (and, accord-

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ingly, a low correlation with endogenous factors like changes in the demand for reserves). For the case of the Bundesbank, our estimates suggest that the Lombard rate (a rate analogous to the discount rate in the United States) is a marginally better indicator of policy than the call rate, a short-term rate that has been used often as a policy indicator in previous studies.

Our formal test of whether the Bundesbank targets money therefore amounts to checking whether shocks to the expected evolution of the money stock affect the setting of the Lombard rate, holding fixed the forecast of inflation. We find that, at medium-term and longer horizons, forecasted inflation explains a much greater share of the variance in the Lombard rate than does forecasted money growth (or, for that matter, than do forecasted changes in output, or in the value of the deutsche mark). In this important respect, at least, the Bundesbank seems closer to being an inflation targeter than a money targeter.

If we provisionally treat Germany (and possibly Switzerland, which follows a similar approach) as an inflation targeter, what lessons do we learn? Over the much longer period of its operation, the German approach to monetary policy has achieved results that are quite similar to what has been seen in the shorter experiences of formal inflation targeters. On the plus side, Germany has maintained low and stable inflation, and the central bank has high credibility. In particular, the public's confidence in the Bundesbank's commitment to low inflation has allowed it the flexibility to pursue short-term objectives, such as stabilization of output or the exchange rate, without increasing the inflation expectations of the public. On the other hand, there is no evidence that the use of inflation targeting has allowed Germany or any

other country to reduce significantly the output costs of disinflation.

## **Inflation Targeting in Practice: A Case Study Approach**

Inflation targeting regimes differ along many dimensions that are hard to quantify, such as details of implementation, the channels by which the central bank communicates with the public and the government, who is responsible for achieving inflation objectives, and the relevance of political and institutional factors. These qualitative issues, together with the relatively short history of most inflation targeting regimes, suggest that case studies may be a useful supplement to more conventional analysis for learning about the inflation targeting approach.

Together with Thomas Laubach, Frederic Mishkin, and Adam Posen, I have undertaken detailed case studies of the experiences of all major inflation targeting countries, to be reported in our recently published book.<sup>4</sup> My co-authors and I conducted historical studies of post-1975 monetary policy regimes in Germany and Switzerland (the precursors to inflation targeting), and of the recent policy regimes in New Zealand, Canada, the United Kingdom, Sweden, Israel, Australia, and Spain. The case studies are reported in a parallel form: each begins with an account of the adoption of inflation targeting in the country, followed by a discussion of the operational framework employed by the central bank, and then a narrative description of policymaking and economic events under the inflation-targeting regime. The case studies are supplemented by econometric analyses.

Perhaps the most important conclusion from the case studies is that it is fundamentally incorrect to characterize inflation targeting (as con-

ducted in practice) as an ironclad policy rule, in the sense of the traditional rules-versus-discretion debate. Instead, inflation targeting is better thought of as a policy framework, in which policy is "tied down" in the long run by the inflation target (which serves as a nominal anchor for the system), but in which there is also considerable leeway for policymakers to pursue other objectives in the short run. In particular, adoption of inflation targeting does not amount to abandoning output stabilization. First, inflation targeting, even in the short run, is consistent with stabilizing output against aggregate demand shocks. Second, supply shocks can be handled within the inflation targeting framework by various mechanisms, such as the exclusion of volatile components from the targeted price index or lengthening the period over which the inflation target is to be reached. Finally, as noted, inflation targeting permits a degree of policy discretion in the short run, allowing the central bank to respond to current economic developments, so long as the long-run inflation goal is not compromised.

Achieving a degree of short-run flexibility for policy requires that the public's expectations of inflation remain stable in the face of short-term fluctuations in policy and the economy. In other words, the medium- and long-term inflation goals of the central bank must be reasonably credible. In practice, inflation-targeting central banks have sought to strengthen their credibility by taking measures to increase transparency and accountability. Transparency requires that policymakers' objectives, information, and plans be communicated clearly and in a regular and timely fashion to the government and the public. All inflation targeting central banks have taken substantial steps toward openness in policymaking, for example through

regular publication of inflation reports that include detailed information on inflation prospects and likely policy responses. Accountability requires at a minimum that the central bank stake its reputation on either meeting its inflation targets or in providing clear and compelling reasons for why the target was missed. Mechanisms for increasing accountability range from New Zealand's provision (not exercised thus far) for dismissing the central bank governor if the inflation target range is breached, to the common requirement of regular reporting by the central bank to parliament.

The record of inflation targeting is good, albeit short at this point. There is strong evidence that inflation and inflation expectations have both fallen and become more stable in inflation targeting countries. In particular, it appears that inflation, once down, stays down; there is less tendency for inflation to rise during business cycle expansions. Low and stable inflation should promote growth and output stability in the long run. However, as already noted, the hope that inflation targeting might reduce the output costs of an initial disinflation does not appear to have been borne out.

## Inflation Forecasts and Monetary Policy

Some critics of inflation targeting have argued that the approach is not operational because of the time that it takes monetary policy actions to affect inflation, as well as the difficulties of forecasting inflation. These problems are cited as reasons for policy to target money, exchange rates, or some other variable that can be more directly controlled than prices.

This argument suffers from logical problems. Either intermediate targets

like money and exchange rates bear a stable relationship to long-run objectives like inflation or they do not. If they do, then they can be used, along with other information, to target long-run inflation. (Indeed, as Lars Svensson emphasized,<sup>5</sup> a policy of targeting the central bank's expectation of inflation must *a fortiori* dominate the use of a single intermediate target, as the inflation expectation in principle should incorporate all relevant information, including that embodied in the intermediate target.) If, on the other hand, intermediate targets do not bear a stable relationship to long-run objectives, then there is no rationale for targeting them.

Although intermediate targets do not seem to provide a good alternative, forecasting and controlling inflation directly is difficult in practice. The temptation exists for central banks to try to use various shortcuts to target inflation, for example, by adjusting policy automatically in response to private-sector inflation forecasts, or to the inflation forecasts implicit in certain asset prices. A theoretical analysis I have conducted with Michael Woodford<sup>6</sup> suggests that such shortcuts will not work, and might be quite dangerous.

Woodford and I study a dynamic model that incorporates sluggish price adjustment and shocks to both aggregate demand and aggregate supply. We show in this context that attempts to "target" private-sector inflation forecasts (by allowing policy to respond strongly to deviations between private-sector forecasts of inflation and the official inflation objective) are typically inconsistent with the existence of a rational expectations equilibrium; and, further, that policies approximating targeting of private-sector forecasts are likely to have undesirable properties. More

generally, we show that central bank policies that react to private-sector forecasts of any macro variable (such as output or interest rates) are particularly susceptible to indeterminacy of rational expectations equilibrium. Similar conclusions apply to policies that attempt to target the inflation forecasts implicit in asset prices (for example, in the spread between yields on real and nominal bonds).

Our work does not imply that targeting the forecast of inflation is impossible or that there is no useful information in asset prices and private-sector forecasts. However, it does suggest that inflation targeting central banks should base their policy decisions on explicit structural models of the economy, not explicit or implicit private-sector forecasts.

<sup>1</sup> For an introduction and overview of the issues raised by inflation targeting, see B. S. Bernanke and F. S. Mishkin, "Inflation Targeting: A New Framework for Monetary Policy?," NBER Working Paper No. 5893, July 1997; published in *Journal of Economic Perspectives*, 11 (Spring 1997), pp. 97–116.

<sup>2</sup> B. S. Bernanke and I. Mihov, "What Does the Bundesbank Target?," NBER Working Paper No. 5764, September 1996; published in *European Economic Review*, 41 (June 1997), pp. 1025–1054.

<sup>3</sup> B. S. Bernanke and I. Mihov, "Measuring Monetary Policy," *Quarterly Journal of Economics*, 113 (August 1998), pp. 869–902.

<sup>4</sup> B. S. Bernanke, T. Laubach, F. S. Mishkin, and A. S. Posen, *Inflation Targeting: Lessons From the International Experience*, Princeton, NJ: Princeton University Press, 1998.

<sup>5</sup> L. Svensson, "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets," NBER Working Paper No. 5797, October 1997; published in *European Economic Review*, 41 (June 1997), pp. 1111–1146.

<sup>6</sup> B. S. Bernanke and M. Woodford, "Inflation Forecasts and Monetary Policy," NBER Working Paper No. 6157, September 1997; published in *Journal of Money, Credit, and Banking*, 29 (November 1997, part 2), pp. 653–684.