The Inflation-Targeting Debate

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At the Bank of Canada's June 2000 seminar, I presented a paper that shared the title of this year's conference, "Issues in Inflation Targeting." In that paper, I discussed a number of ongoing debates on inflation targeting. I have been invited back this year to give the John Kuszczak Memorial Lecture, and I plan to engage in a similar exercise. I will cover five topics of the debate: (i) Does inflation targeting improve economic performance? (ii) Is inflation targeting consistent with the dual mandate? (iii) Can central bank transparency go too far? (iv) Would a price-level target be better than an inflation target? (v) Would a point target be better than a target range?

1 Does Inflation Targeting Improve Economic Performance?

Because inflation targeting has been a recent phenomenon, it has taken time to accumulate empirical evidence on its impact. What is the current state of the debate on whether inflation targeting is able to improve economic performance?

The general conclusion from the empirical evidence is that inflation targeting is associated with an improvement in overall economic performance.[1]

1. This is the conclusion in a recent paper presented to the Executive Board of the International Monetary Fund (Roger and Stone 2005).

This conclusion is derived from the following results:[2]

(i) Inflation levels (and volatility), as well as interest rates, have declined after countries have adopted inflation targeting.

(ii) Output volatility has not worsened, and if anything, it has improved, after the adoption of inflation targeting.

(iii) Exchange rate pass-through seems to be attenuated by the adoption of inflation targeting.

(iv) The drop in inflation levels and volatility, and in interest rates and output volatility, was part of a worldwide trend in the 1990s, and inflation targeters have not done better in terms of these variables or in terms of exchange rate pass-through than have non-inflation-targeting industrialized countries such as the United States or Germany.[3]

Although these results suggest that inflation targeting is beneficial, they are less conclusive than at first appears. Ball and Sheridan (2005, 250) have stated that "there is no evidence that inflation targeting improves performance as measured by the behavior of inflation, output, or interest rates." They argue that the apparent success of inflation-targeting countries is simply a reflection of regression towards the mean; that is, countries that start with higher inflation are more likely to find that inflation will fall faster than countries that begin with an initially low rate of inflation. Since countries that adopted inflation targeting generally had higher initial inflation rates, their larger decline in inflation just reflects a tendency of all countries, both targeters and non-targeters, to achieve better inflation and output performance in the 1990s when inflation targeting was adopted. Ball and Sheridan thus state (p. 250): "This finding suggests that better performance resulted from something other than targeting."

Because Ball and Sheridan (2005) is one of the few empirical papers that is critical of inflation targeting and has been cited extensively by opponents of the regime, it is worth examining more carefully whether their claim that

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2. There is also mildly favourable evidence for the impact of inflation targeting on sacrifice ratios. Bernanke et al. (1999) did not find that sacrifice ratios in industrialized countries fell with the adoption of inflation targeting, while Corbo, Landerretche, and Schmidt-Hebbel (2002), with a larger sample of inflation targeters, have concluded that inflation targeting did lead to an improvement in sacrifice ratios. Defining sacrifice ratios is extremely tricky, however, so I would put less weight on this evidence. Cohen Sabbán, Gonzalez Rozada, and Powell (2003) also find that inflation targeting leads to nominal exchange rate movements that are more responsive to real shocks rather than nominal shocks. This might indicate that inflation targeting can help the nominal exchange rate to act as a shock absorber for the real economy.

3. For evidence supporting the first three results, for example, see Bernanke et al. (1999); Corbo, Landerretche, and Schmidt-Hebbel (2002); Neumann and von Hagen (2002); Hu (2003); Truman (2003); and Ball and Sheridan (2005).

better performance resulted from other sources. Hyvonen (2004) has pointed out that regression to the mean is not a general feature of the data, and is particular to the 1990s. Thus, there is reason to suspect that a change in how monetary policy was done in the 1990s is the source of the better inflation performance during that period, and inflation targeting was one manifestation of the changing approach to monetary policy that put much more emphasis on achieving price stability. As Gertler's (2005) comment on Ball and Sheridan points out, an equally plausible interpretation is that countries that experienced high inflation adopted inflation targeting to get inflation under control, and inflation targeting did indeed facilitate the reduction in inflation. Ball and Sheridan's conclusion that inflation targeting had nothing to do with improved economic performance is unwarranted.

However, their paper does raise a serious issue about the empirical literature on inflation targeting. Adoption of inflation targeting is clearly an endogenous choice, as has been pointed out by Mishkin and Schmidt-Hebbel (2002) and Gertler (2005), and so finding that better performance is associated with inflation targeting may not imply that inflation targeting causes this better performance. Future research to establish whether inflation targeting does lead to improved economic performance therefore needs to deal explicitly with potential endogeneity. Indeed, in a project that I am working on with Klaus Schmidt-Hebbel, we plan to do exactly that.

The fourth result, that inflation and output performance of inflation-targeting countries improves but is no better than that of countries like the United States and Germany, also suggests that what is really important to successful monetary policy is the establishment of a strong nominal anchor. As pointed out in Bernanke and Mishkin (1992), Mishkin and Posen (1997), Bernanke et al. (1999), and Neumann and von Hagen (2002), Germany was able to create a strong nominal anchor with its monetary-targeting procedure. In the United States, the strong nominal anchor has been Alan Greenspan (e.g., Mishkin 2000). Although inflation targeting is one way to establish a strong nominal anchor, it is not the only way. It is not at all clear that inflation targeting would have improved performance in the United States during the Greenspan era, although it well might do so after Greenspan is gone if we are not as fortunate with the choice of the next Fed chairman (Mishkin 2005). Furthermore, as has been emphasized in Calvo and Mishkin (2003) and Sims (2005), an inflation target by itself is not capable of establishing a strong nominal anchor if the government pursues irresponsible fiscal policy or inadequate prudential supervision of the financial system, which might then be prone to financial blow-ups.

There is, however, empirical evidence on inflation expectations that I believe is more telling about the possible benefits of inflation targeting. Recent research has found the following additional results:

(v) Evidence that the adoption of inflation targeting leads to an immediate fall in inflation expectations is not strong.[4]

(vi) Inflation persistence, however, is lower for countries that have adopted inflation targeting than for countries that have not.

(vii) Inflation expectations appear to be more anchored for inflation targeters than for non-targeters; that is, inflation expectations react less to shocks to actual inflation for targeters than non-targeters, particularly at longer horizons.[5]

These results suggest that once inflation targeting has been in place for a while, it does make a difference, because it better anchors inflation expectations and thus strengthens the nominal anchor. Inflation targeting could therefore lead to an even stronger nominal anchor in the United States, even over what we have achieved under the "maestro," Alan Greenspan. Since recent theory on optimal monetary policy, sometimes referred to as the new neo-classical synthesis (Woodford 2003; and Goodfriend and King 1997), shows that establishing a strong nominal anchor is a crucial element in successful monetary policy, the evidence on inflation expectations provides a strong case for the adoption of inflation targeting.

2 Is Inflation Targeting Consistent with the Dual Mandate?

The Federal Reserve operates under what is known as a dual mandate, i.e., legislation directs the Federal Reserve to promote both price stability and full employment. In contrast, many other central banks, such as the Bank of Canada, the Bank of England, and the European Central Bank, operate under a hierarchical mandate in which price stability is the primary objective of the central bank, and other objectives, such as full employment, are pursued only as long as they are consistent with price stability.

As monetary theorists, we may not see a real difference between the dual and hierarchical mandates, because as long as full employment is defined as

4. For example, Bernanke et al. (1999) and Levin, Natalucci, and Piger (2004) do not find that inflation targeting leads to an immediate fall in expected inflation, but Johnson (2002, 2003) does find evidence that expected inflation falls after the announcement of inflation targets.

5. Levin, Natalucci, and Piger (2004) and Castelnuovo, Nicoletti-Altimari, and Rodríguez Palenzuela (2003).

the natural rate of employment, there is no inconsistency between achieving price stability and the natural rate of employment.[6] In practice, however, a substantial difference exists between these two mandates, because the public, politicians, and even some economists may view a hierarchical mandate as putting too much emphasis on inflation control and not enough on reducing output fluctuations. Indeed, Lawrence Meyer (2004) has argued, and I think rightly, that the American public and politicians strongly support a dual mandate and would be unwilling to change the Federal Reserve objectives to a hierarchical mandate. Americans are not the only ones who think this way. I would wager that the average person in most countries would choose a dual rather than a hierarchical mandate.

Because inflation targeting involves a target for inflation but not for output or unemployment, at first glance, inflation targeting seems to be inconsistent with a dual mandate and opens the door to accusations that inflation targeters are, as Mervyn King (1997) put it, "inflation nutters," i.e., that they care only about minimizing inflation fluctuations. However, concerns that inflation targeting is inconsistent with the dual mandate are unfounded. Nonetheless, inflation-targeting central banks or those contemplating inflation targeting need to make it clearer that their objectives are consistent with the dual mandate in order to retain support for central bank independence and inflation targeting.

Inflation-targeting theory, as represented by canonical models such as Svensson (1997), clearly shows that inflation targeting is not only not inconsistent with the dual mandate, but indeed is based on it: an inflation-targeting central bank would have as its objective the minimization of a weighted average of the variability of both output and inflation fluctuations, which is exactly what the dual mandate specifies. The inflation-targeting regime that results from this analysis is one in which the central bank does not try to hit the inflation target over the policy horizon if inflation is far from the target. Instead, its approach to the target is more gradual. Svensson has called this strategy "flexible inflation targeting," and as argued by Bernanke et al. (1999), this is exactly what inflation-targeting central banks do in practice.

However, to preserve or obtain support for inflation targeting, central banks must make it clear that they do indeed care about output fluctuations and that they are pursuing a dual mandate. Unfortunately, the reality is that central bankers, whether they target inflation or not, are reluctant to discuss concerns about output fluctuations even though their actions show that they

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6. This is an implication of the new neo-classical synthesis described by Goodfriend and King (1997).

do care about them. This lack of transparency is the "dirty little secret" of central banking. One remarkable manifestation of this occurred in August 1994 at the Federal Reserve Bank of Kansas City's Jackson Hole Conference, when Alan Blinder, then vice-chairman of the Federal Open Market Committee (FOMC), had the temerity to mention that a short-run trade-off between output and inflation exists and that monetary policy should therefore be concerned about minimizing output as well as inflation fluctuations. Blinder was subsequently pilloried by many central bankers and in the press, with a *Newsweek* columnist declaring that he was not qualified to be a central banker (see Samuelson 1994). The discomfort that central bankers as a group have with discussing their concern about output fluctuations is also illustrated by a story that Lawrence Meyer (2004) tells about a conversation that he had with two leading central bankers shortly after he became a governor at the Fed. They advised him that "good central bankers never admit they pursue stabilization policy" (Meyer 2004, 152).

Central bankers fear that if they are explicit about the need to minimize output fluctuations as well as inflation fluctuations, politicians will use this to pressure the central bank to pursue a short-run strategy of overly expansionary policy that will lead to poor long-run outcomes. In response, central bankers engage in a "don't ask, don't tell" strategy.

Besides being the height of non-transparency, the don't ask, don't tell strategy suggests that central bankers don't believe in the dual mandate. Suspicions that the central bank has preferences that are clearly inconsistent with those of the public can erode support both for central bank independence and inflation targeting. The case for the central bank to discuss that it does care about reducing output fluctuations is quite strong. But how can central banks do this?

One answer is that a central bank can announce that it will not try to hit its inflation target over too short a horizon, because this would result in unacceptably high output losses, especially when the economy gets hit by shocks that knock it substantially away from its long-run inflation goal. Inflation-targeting banks have been moving in this direction; for example, the Reserve Bank of New Zealand has modified its inflation-targeting regime to lengthen the horizon over which it tries to achieve its inflation target.[7]

Although inflation-targeting central banks have lengthened the horizon for their targets to two years or so, with the Bank of England being a prominent example, this still does not completely solve the problem, because it gives the impression that the horizon for inflation targets is fixed, which is not

7. See Sherwin (1999), Drew and Orr (1999), and Reserve Bank of New Zealand (2000).

sufficiently flexible if a dual mandate is being followed.[8] Until now, the use of a specific horizon such as two years has not been a problem for inflation targeting in advanced countries like the United Kingdom, because inflation has not been subject to large shocks; consequently, inflation has remained close to the target level. In this case, having the horizon for the target equal to the two-year horizon at which policy changes take effect is consistent with optimal policy. However, as Svensson (1997) has shown, when there is concern about output fluctuations, and the inflation rate is shocked sufficiently away from its long-run target, the path for the medium-term inflation-target horizon needs to be modified.

A striking example of how large shocks to inflation can be handled occurred in Brazil recently (Fraga, Goldfajn, and Minella 2003). Brazil experienced a major exchange rate shock in 2002 because of concerns that the likely winner in the presidential election would pursue populist policies that would lead to currency depreciation. The resulting depreciation then led to a substantial overshoot of the Brazilian inflation target. In January 2003, the Banco Central do Brasil announced a procedure for modifying its inflation targets. First, the central bank estimated the regulated-price shock to be 1.7 per cent. Then, taking into account the nature and persistence of the shocks, it estimated the inertia from past shocks to be 4.2 per cent, of which two-thirds was to be accepted, resulting in a further adjustment of 2.8 per cent. The central bank then added these two numbers to the previously announced target of 4 per cent to get an adjusted target for 2003 of 8.5 per cent (= 4 per cent + 1.7 per cent + 2.8 per cent). The central bank announced the adjusted target in an open letter sent to the Minister of Finance in January 2003, explaining that reaching the non-adjusted target of 4 per cent too quickly would entail far too high a loss of output. Specifically, the announcement indicated that an attempt to achieve an inflation rate of 6.5 per cent in 2003 would be expected to entail a decline of 1.6 per cent of GDP, while trying to achieve the previous target of 4 per cent would be expected to lead to an even larger decline in GDP of 7.3 per cent.

The procedure followed by the Banco Central do Brasil had tremendous transparency, both in articulating why the inflation target was missed and in explaining why the new target path was chosen. The discussion of alternative target paths, with the explanation that lower inflation paths would

8. The fixed horizon is also problematic, because it is inconsistent with optimal monetary policy; see, for example, Woodford (2004). Indeed, critics of inflation targeting, most notably Donald Kohn (2004), who is a member of the Board of Governors of the Federal Reserve, have also been concerned that inflation targeting may be too rigid, because inflation-targeting central banks in advanced economies have often adopted a fixed horizon for their inflation targets.

lead to large output losses, demonstrated that the central bank did indeed care about output fluctuations, thus demonstrating that it was not an "inflation nutter" and that its concern about output losses was aligned with similar concerns of the public.

Even though advanced economies have not yet had inflation shocks of the magnitude that Brazil has recently experienced, outlining the procedures that they will use to respond to any future adverse shocks provides a vehicle for explaining that they do indeed care about output fluctuations.[9] By announcing that they would do what the Brazilians have done if a situation arose in which inflation were shocked substantially away from the long-run goal, central bankers can get the "dirty little secret" out of the closet that they do have an appropriate concern about output fluctuations. Yet, they will still be able to assure the public that they continue to worry about the long run and the importance of achieving price stability. A procedure like the one followed by Brazil conveys the fact that the central bank cares about output fluctuations in a forward-looking context, because it highlights decisions that the central bank will make about the future path of inflation and the horizon over which inflation will return to the target. It therefore continues to make clear that the central bank is focused on output fluctuations in a longer-run and not a short-run context, which is necessary for minimizing the time-inconsistency problem.

Monetary authorities can further the public's understanding that they care about reducing output fluctuations and that they are following a dual mandate by emphasizing that monetary policy needs to be just as vigilant in preventing inflation from falling too low as it is from preventing it from being too high. They can do this (and some central banks have) by explaining that an explicit inflation target may help the monetary authorities stabilize the economy, because they can be more aggressive in easing monetary policy in the face of negative demand shocks to the economy without being concerned that this will cause a blowout in inflation expectations. However, to keep the communication strategy clear, the explanation of a monetary policy easing in the face of negative demand shocks needs to indicate that it is consistent with the preservation of price stability.

In addition, central banks can also clarify that they care about reducing output fluctuations by indicating that when the economy is very far below

9. Central banks in advanced countries are aware of the need to modify the inflation path if the economy is subjected to large shocks. For example, in the United Kingdom, the inflation-targeting regime stipulates that if inflation is knocked more than one percentage point away from the target (now 2 per cent), the Bank of England will need to specify the path of inflation and the length of time that it will take to get back to the target.

any reasonable measure of potential output, they will take expansionary actions to stimulate economic recovery. In this case, the measurement error of potential output is likely to be swamped by the size of the output gap; therefore, it is far clearer that expansionary policy is appropriate and that inflation is unlikely to rise as a result of such actions. In this situation, the case for taking actions to close the output gap is much stronger and does not threaten the credibility of the central bank in its pursuit of price stability.

3 Can Central Bank Transparency Go Too Far?

Although I have argued that inflation-targeting central banks need to increase their transparency in discussing output fluctuations, there is an issue of how far transparency should go. Some monetary economists, with the most prominent example being Lars Svensson (2002), suggest that central bank transparency should go much farther than it has. He advocates that central banks announce their projections of the future policy path and also announce the central bank objective function. But can transparency go too far?

To answer this question, we need to keep the following question in mind: Does increased transparency help the central bank to do its job—that is, enable it to conduct monetary policy optimally with an appropriate focus on long-run objectives? The answer might well be no, particularly if the increase in transparency violates the KISS (keep it simple, stupid) principle.

Although Svensson's argument for announcing the projection of the policy path is theoretically sound, announcing the path is problematic. One objection raised by Charles Goodhart (2001), a former member of the Monetary Policy Committee of the Bank of England, is that it would complicate the decision-making process of the committee that makes monetary policy decisions. Most central banks make decisions only about the current setting of the policy rate. Goodhart (2001, 173) argues that "a great advantage of restricting the choice of what to do now, this month, is that it makes the decision relatively simple, even stark." If a policy projection with time-varying rates is announced, this clearly requires that the monetary policy committee come to an agreement on this policy path. Svensson (2002) argues that this could be done by a "simple" voting procedure, but this procedure is far from simple, and I agree with Goodhart that it is unlikely to work. Forcing committee members to make a decision about the future path of rates and not just the rate today may complicate matters so much that the decision-making process could be impaired. Although committee members might have some idea of a future direction for policy rates, they are likely to have trouble thinking about a precise policy-rate path rather than just the setting of the rate today. Furthermore,

getting committee members to agree on a future path of the policy rate might be very difficult and could, in fact, be contentious.[10]

I had a glimpse of the problems with projections of the policy-rate path when I sat in on FOMC meetings while I was director of research at the Federal Reserve Bank of New York from 1994 to 1997. Upon my arrival at the Fed, the greenbook forecasts (prepared by Board staff) were conditioned on a non-constant interest rate path. Several FOMC members objected to this procedure and probably for two reasons. First, having a staff projection of future interest rates might lead to some prejudgment of the committee's decision. Second, it is far easier to make a decision just on the rate today and not have to discuss the path for future policy rates at the same time. The objections eventually won the day: the procedure for generating the greenbook forecasts was changed so that forecasts are now conditioned on a constant policy-rate path, at least in the short term. Thus, I side with Goodhart. Announcing a projection for the policy-rate path that would require agreement by the committee would be counterproductive.

The second problem with announcing a projection of the policy-rate path is that it might complicate communication with the public. Although economists understand that any policy path projected by the central bank is inherently conditional because changes in the state of the economy will require a change in the policy path, the public is far less likely to understand this. When new information comes in and the central bank changes the policy rate from its projected path, the public may see this as reneging on its announced policy or as an indication that the central bank's previous policy settings were a mistake. Thus, even when the central bank is conducting its policy in an optimal manner, deviations from its projected policy path may be viewed as a central bank failure and could damage the bank's credibility. In addition, deviations of the policy rate from its projected path might be seen as flip-flops on the part of the central bank. As we often see in political campaigns, when a candidate changes position, even if it reflects changes in circumstances and thus reflects sound judgment, the candidate is vulnerable to accusations of weakness. Wouldn't central banks be subject to the same sort of criticism when circumstances force them to change the rate from its previously projected path? The result might be reduced support for the central bank and its independence.

The recent Federal Reserve experience with the language of their post-FOMC statement illustrates problems that can arise when the public does

10. Kohn (2000) comes to a similar conclusion. He reports that members of the Bank of England's Monetary Policy Committee stressed the difficulty of reaching agreement on a future path of interest rates.

not understand that projected policy paths depend on the evolution of the data. To underscore its commitment to preventing a deflationary spiral in the United States, the FOMC announced in August 2003 that it would maintain policy accommodation for a "considerable period." As Eggertsson and Woodford (2003) have shown, a commitment to keeping the policy rate unusually low beyond the time when the economy begins to recover is an important policy tool for dealing with deflationary shocks. However, as is also clear from Eggertsson and Woodford, the length of the "considerable period" depends on the evolution of the economy. The public may not fully understand this and if the economy comes back far stronger than anticipated, monetary policy may need to be tightened even when there has been a commitment to easy monetary policy for a "considerable period." We would then have the problems described above, where the central bank's credibility might be tarnished. Thus, the commitment to a policy path, even when it is needed, is not without its difficulties. As indicated in Ito and Mishkin (2004), I still believe that deflationary environments, like the one we see in Japan, are sufficiently damaging that a commitment to the zero interest rate for an extended period is needed to reflate the economy. However, the cost of a commitment to a projected policy-rate path is trickier when the deflation risks are not as serious. This problem has been recognized by officials at the Fed, and it explains why they have been seeking an exit strategy from their commitment to a policy-rate path by first changing the language in January 2004 to say that the FOMC can be "patient" in removing policy accommodation and then in May 2004 to say that policy accommodation can be removed at a pace that is likely to be "measured."

The bottom line is that except in exceptional deflationary circumstances like the one Japan has experienced, the announcement of a policy-rate path does not have much to recommend it. It is, in fact, likely to complicate policy discussion within central banks, which might then impair the quality of monetary policy decisions, and it may also lead to a loss of credibility of the central bank and a weakening of support for central bank policies. Therefore, announcement of its projection of the policy-rate path may make it harder for the central bank to conduct monetary policy optimally with an appropriate focus on long-run objectives.

Svensson (2002) argues that for the public and the markets to fully understand what a central bank is doing, they need to understand the bank's objectives. Announcing an inflation target is not enough: full transparency requires that the central bank reveal its objective function.

Again, we must ask whether revealing its objective function will help the central bank to do its job. I believe that the answer is no, because pushing

transparency further in this direction again violates the KISS principle and is likely to hamper the communication process.

The first problem with announcing an objective function is that it might be difficult for members of a monetary policy committee to specify an objective function. Having watched how members of a monetary policy committee operate, I can attest that members of monetary policy boards don't think in terms of objective functions and would have a very hard time describing theirs. Indeed, I would suggest that most monetary economists, even brilliant ones, would have trouble specifying what their relative weight on reducing inflation versus output fluctuations would be. A counter to this argument is that the weight could be backed out by revealed preference. Monetary policy committee members could be confronted with hypothetical choices about acceptable paths of inflation and output gaps and then their choices would reveal their relative weight on reducing inflation versus output fluctuations. Although committee members would be able to do this when confronted with a real-world situation, and this is effectively what was done in Brazil in early 2003, I think they would find it difficult to do when the choices are hypothetical—I know I would.

A second problem, raised by Goodhart (2001), is that it would be difficult for a committee to agree on its objective function. As mentioned above, committee members might have trouble defining their own objective function, but also because the composition of the committee changes frequently and existing members may change their views on objectives depending on circumstances, they would have to revisit the decision on the committee's objective function frequently. Deciding on the committee's objective function would thus substantially increase the complexity of the decision process and might also be quite contentious. This complication of the process could subsequently weaken the quality of monetary policy decisions.

A third problem is that it is far from clear who should decide on the objective function. If the members of the monetary policy board decide, isn't this a violation of the democratic principle that the objectives of bureaucracies should be set by the political process? An alternative would be for the government to decide. But if we think that it would be hard enough for a monetary policy committee to do this, it would clearly be even more difficult for politicians to decide on the objective function.

Even if it were easy for the monetary policy committee or the government to come to a decision on the objective function, would it be easy to communicate it to the public? If economists and members of a monetary policy committee have trouble quantifying their objective function, is it likely that the public would understand what the central bank was talking

about when it announced its objective function? The announcement would likely only complicate the communication process with the public and is another violation of the KISS principle.

The announcement of the central bank's objective function can add a further complication to the communication process that might have even more severe consequences for the ability of the central bank to do its job well. The KISS principle argues for articulation of monetary policy in as simple a way as possible. The beauty of inflation-targeting regimes is that by focusing on one objective—inflation—communication is fairly straightforward. On the other hand, with the announcement of the objective function, the central bank will be announcing that the central bank has two objectives, minimizing both output and inflation fluctuations. Discussion of output as well as inflation objectives can confuse the public and make it more likely that the public will see the mission of the central bank as elimination of short-run output fluctuations, thus worsening the problem of time inconsistency.

One potential outcome is that firms will raise wages and prices because they know that the monetary authorities are likely to accommodate these rises by pursuing expansionary policy to prevent output gaps. The result is that a self-fulfilling equilibrium can occur in which wages and prices rise, and then monetary policy accommodates this rise. This leads to further rises in wages and prices, which, in turn, lead to a new equilibrium with higher inflation without a reduction in output fluctuations. Chari, Christiano, and Eichenbaum (1998) have described this bad equilibrium as an "expectation trap." Discussing monetary policy objectives in terms of output fluctuations can therefore lead to a loss of inflation-fighting credibility for the central bank, with the result that the trade-off between inflation and output fluctuations worsens.

The announcement of the objective function not only requires the announcement of the inflation target and the relative weight on reducing inflation versus output fluctuations, but it also requires the central bank to announce its estimates of the current and future output gaps and hence its estimate of potential output and its growth rate. The announcement of estimates of potential output, and particularly its growth rate, may increase the probability that the public sees them as a target for monetary policy and thus may increase political pressures on the central bank to eliminate output gaps and pursue high growth in the short run, with the resulting negative consequences mentioned above. This problem is likely to be even more damaging because potential output is very hard to measure.

One measurement problem for potential output occurs because the monetary policy authorities have to estimate it with real-time data, i.e., data that are

available at the time they set the policy instrument. GDP data are frequently revised substantially, and this is one reason why output gaps are mismeasured in real time. Even more important, it is notoriously hard to know what potential GDP and its growth rate actually are without hindsight. In the United States, for example, it was not until the 1980s that policymakers recognized that potential GDP growth had slowed markedly after 1973. Orphanides (2001) has shown that the errors in measures of output gaps have been very large in the postwar period.

An even more severe measurement problem occurs because, conceptually, the output gap that belongs in an aggregate supply equation is not at all clear and may be quite different from conventionally measured output gaps. Clarida, Galí, and Gertler (1999) point out that the New Keynesian aggregate supply equation should have the output gap specified as a marginal cost measure rather than as an output gap, and they find that the marginal cost measure has substantially different movements and timing than the conventionally measured output gap. McCallum and Nelson (2000) and McCallum (2001) argue that conventionally measured output gaps, which estimate the gap as deviations from a trend, differ substantially from more theoretically grounded measures based on the output level that would prevail in the absence of nominal price stickiness. It is true that there are measurement problems with inflation as well as output gaps, but both the conceptual and real-time measurement problems for inflation are of a far smaller magnitude.

The severe measurement problems for the output gap could interact with an increased focus on eliminating output gaps to produce serious policy mistakes such as those that occurred in the United States in the 1970s. Orphanides (1998) shows that the use of real-time data of output gaps might lead to such inaccurate estimates that active monetary policy that reacts strongly to output gaps increases economic instability. Indeed, Orphanides (2002) argues that the reason for the Federal Reserve's poor performance during the 1970s was not that it was unconcerned with inflation, but rather that it focused too much on eliminating output gaps.

Given the objections raised here, it is not surprising that no central bank has revealed its objective function to the public. Furthermore, the discussion here suggests that even if the central bank does not announce its objective function, the announcement of current and future potential output and output-gap estimates still has the potential to worsen monetary policy performance. Thus, the discussion also argues against the publication of central bank estimates and forecasts of the potential output and output gap, even if the publication of inflation and output forecasts is felt to be beneficial. Indeed, although the majority of inflation-targeting central banks

publish output and inflation forecasts, only the central banks of New Zealand, Norway, Iceland, the Czech Republic, Hungary, and Colombia publish their forecasts of potential output or output gaps, while the central banks of Canada and Sweden publish only current estimates of the output gap (see Mishkin 2004, Table 1).

Transparency is a virtue, but like all virtues, it can go too far. The famous fashion designer Chanel came up with the marvelous dictum that "You can never be too rich or too thin." But you can be too thin. Similarly, central banks can be too transparent. Central bank transparency must always be thought of as a means to an end. Transparency is beneficial when it serves to simplify communication with the public and helps generate support for central banks to conduct monetary policy optimally with an appropriate focus on long-run objectives.

4 Would a Price-Level Target Be Better Than an Inflation Target?

Five years ago, I was quite skeptical of price-level targets, but given recent research and ongoing events in Japan, I have come to the view that a price-level target is an important potential tool for monetary policy makers.[11]

The experience in Japan demonstrates that countries can fall into a deflation trap—with ongoing deflation and the nominal interest rate unable to fall below zero, the real interest rate soars, and the resulting unintended tight monetary policy continues to promote deflation and a weak economy. Since the nominal interest rate cannot be lowered below zero, the traditional monetary policy instrument—the short-term interest rate—loses its effectiveness in combatting the deflationary spiral. In textbooks, this situation is described as a liquidity trap, but it is better to describe this situation as a deflation trap, because monetary policy is not ineffective in this situation, as it is in the liquidity trap of the conventional Keynesian model. Recent literature (Krugman 1998; Eggertsson and Woodford 2003; Auerbach and Obstfeld 2004; Svensson 2003) suggests that there is a solution to this problem: the management of expectations. If the central bank can persuade the markets and the public that there will be higher inflation, then even with the interest rate at a floor of zero, the real interest rate will fall and this will stimulate aggregate demand through the usual channels (Mishkin 1996). But how is the central bank to do this?

Once an economy has entered a prolonged deflation, as it has in Japan, lowering the real interest rate to stimulate the economy requires a substantial

11. This section is based on my work with Takatoshi Ito in Ito and Mishkin (2004).

increase in expected inflation. This is why Krugman (1998) made the radical suggestion for the Bank of Japan to adopt an inflation target of 4 per cent for a 15-year period. However, a high inflation target, as suggested by Krugman, is unlikely to be credible, for two reasons. First, a commitment to a high inflation target may not be credible because it is too much at variance with a goal of price stability. As documented in Bernanke et al. (1999), no inflation-targeting central bank in an industrialized country has chosen a medium-term inflation target above 3 per cent. Indeed, I suspect that the Krugman proposal may have increased the Bank of Japan's resistance to inflation targeting, because this level of inflation was well above what officials in the bank believed was consistent with price stability. Furthermore, once the economy has emerged from a deflationary spiral and starts to recover, the central bank will be tempted to renege on its commitment to a high inflation target, because it would like the economy to return to an inflation rate consistent with price stability. Thus, as pointed out by Eggertsson (2003), a central bank in a deflationary environment is subject to a time-inconsistency problem: it cannot credibly commit to "being irresponsible" and so continue to shoot for high inflation. The result of the time-inconsistency problem is that the markets would not be convinced that inflation would remain high, and inflation expectations would not be high enough to lower real rates sufficiently to stimulate the economy out of the deflation trap.

Another problem with an inflation target is that it is not "history-dependent" because it is purely forward looking (Woodford 2000, 2003). An inflation target is not adjusted depending on the past outcome of inflation, and, as Eggertsson and Woodford (2003) have shown, it will not be effective in extricating an economy from a deflation trap. When the interest rate has hit a floor of zero, a deflationary shock, which lowers the price level and puts the economy even farther below its potential, requires even higher expected inflation for the real interest rate to be lowered and be even more stimulative. A price-level target does exactly this: the same price-level target implies that inflation will be expected to be higher, and this produces exactly the right response of a lower real interest rate and more stimulative monetary policy.

The theoretical argument for a price-level target when an economy is in a deflationary environment is thus quite strong. But there is a further reason for the adoption of a price-level target when an economy has experienced a prolonged period of deflation along with a severe balance-sheet problem that prevents the financial system from working properly, as in Japan (e.g., Posen 1998; Mishkin 1998; Hoshi and Kasyhap 2004). In Japan, non-performing loans have weakened bank balance sheets, and the lack of capital has meant that banks have been forced to cut back on lending, particularly for new investment. The result is that the financial system is unable to

allocate capital to productive investment opportunities, and this is a key element in Japan's stagnation. The deflation has also weakened corporate balance sheets that have found their debt increase in value in real terms while their assets have not (the debt-deflation phenomenon described by Irving Fisher 1933). The loss of net worth implies that even firms with good investment opportunities may then not be able to obtain funds at favourable rates, because the firm is more likely to engage in risky (moral-hazard) behaviour since there is less at stake in the firm (Mishkin 1991). Thus, restoring both financial and non-financial balance sheets is crucial to helping an economy like Japan's to achieve a more efficient allocation of capital that will restore it to health.

A price-level target that would get the price level to what it would have been if the economy had not experienced deflation is an important way to help restore balance sheets. A higher price level would lead to lower real indebtedness of firms and would thereby increase their net worth, making it more attractive to lend to them if they have productive investment opportunities. The improvement in a firm's balance sheets would also help reduce non-performing loans, and this would have a positive knock-on effect on bank balance sheets, thus making it easier for them to lend.

Furthermore, after a prolonged period of deflation, an economy may need to undergo substantial restructuring if it is to return to health. Both the Bank of Japan and commentators on the Japanese economy have stressed the need for a restructuring of the Japanese economy. Indeed, the Bank of Japan has continually argued that the economy cannot recover without restructuring and has been concerned that expansionary monetary policy was seen as an alternative to the needed restructuring and thus may be counterproductive. (This line of thinking seems to have stopped since Toshihiko Fukui's appointment as Governor March 2003.) Closing down inefficient firms and financial institutions may be precisely what the economy needs in the long run, but in the short run, it might lead to severe dislocations and unemployment. Indeed, this is probably why there has been so much resistance to the restructuring process on the part of Japanese politicians. Here is where a price-level target to raise the price level comes in. As we have seen, a higher price level would help restore financial and non-financial balance sheets and would help the financial system to start working again to allocate capital, which is critical to a restructuring process. Also, to the extent that a commitment to a higher price level by the monetary authorities helps raise aggregate demand, this would help cushion the short-term negative effects of the restructuring process. A price-level target, which encourages an expansionary monetary policy, is thus more sensibly viewed as a complement to restructuring rather than an impediment.

The analysis above suggests that a price-level target has many advantages when an economy is already experiencing deflation. The criticism that a price-level target might lead to an overshoot of the target that must be reversed, which could lead to deflation and an economic contraction, is no longer valid. When an economy is in a deflation trap and is far from the appropriate price-level target, the price level is necessarily lower than the target and consequently promotes higher expected inflation, which lowers real interest rates. This then works in exactly the right direction to get the economy back on track. A price-level target thus dominates an inflation target in a deflationary environment.

But what should be done once the price-level target is achieved? One strand in the literature suggests that it is optimal to continue with the target. In models with a high degree of forward-looking behaviour (for example, Clarida, Galí, and Gertler 1999; Dittmar, Gavin, and Kydland 1999; Dittmar and Gavin 2000; Eggertsson and Woodford 2003; Svensson 1999; Svensson and Woodford 2003; Vestin 2000; Woodford 1999, 2003), a price-level target produces less output variance than an inflation target. However, empirical evidence (for example, Fuhrer 1997) does not clearly support forward-looking-expectations formation, and models with forward-looking behaviour have counterintuitive properties that seem to be inconsistent with inflation dynamics (Estrella and Fuhrer 1998).

The traditional view, forcefully articulated by Fischer (1994), argues that a price-level target might produce more output variability than an inflation target, because unanticipated shocks to the price level are not treated as bygones and must be offset. Specifically, a price-level target requires that an overshoot of the target must be reversed, and this might require contractionary monetary policy, which, with sticky prices, could lead to a sharp downturn in the real economy in the short run. Indeed, if the overshoot is large enough, returning to the target might require a deflation, which could promote financial instability and be quite harmful. My suspicion is that this traditional view has strong supporters in central banks in most countries and is the reason why no central bank currently has adopted a price-level target. (A price-level target was used in the 1930s in Sweden; see Berg and Jonung 1999.)

Taking the traditional view into account suggests that a conservative strategy is to abandon the price-level target once it is achieved and replace it with a more conventional inflation target.[12] Indeed, this is close to the position advocated as a general rule by the United States Federal Reserve governor

12. Reifschneider and Williams (2000) show that rules of this type, which target inflation in normal times but target the price level when interest rates fall to zero, perform very well.

Ben Bernanke (2002). However, he is agnostic about keeping to a price-level target or going to an inflation target once the price-level target is achieved.

Another reason an inflation target may be more desirable after the price-level target is achieved is that it is a little easier to explain to the public, because it is not a moving target. And since increased transparency and accountability are highly desirable for the conduct of monetary policy, it seems sensible to follow the KISS principle.

5 Would a Point Target Be Better Than a Target Range?

In the paper that I presented at the 2000 Bank of Canada seminar, I discussed whether an inflation target was better set as a point or a range, and I concluded that a point target was the better choice. Although a range conveys to the public that there is uncertainty in the inflation process and that the central bank's control of inflation is imperfect, it might result in too much focus on the edges of the range that can lead the central bank to concentrate too much on keeping the inflation rate just within the range rather than hitting the midpoint of the range. My concern that the central bank would have an asymmetric reaction to inflation rates just inside and outside the range led to my advocacy of a point target. My views on the choice between the two, however, were not based on theoretical modelling, which at the time did not exist, and I now believe they are wrong.

In recent work with Niklas Westelius (Mishkin and Westelius 2005), we examine how target ranges work in the context of a Barro-Gordon (1983) type model, but within a more realistic setting in that the time-inconsistency problem stems not from the preferences of the central bank, as in Barro-Gordon, but instead from political pressures from the government. What we found surprised me. Target ranges turn out to be an excellent way to cope with the time-inconsistency problem and provide incentives that bring monetary policy very close to optimal policy where time inconsistency is avoided altogether.

In our model, the government would like to have unemployment below the natural rate and puts too much weight on reducing unemployment volatility. Then political pressure on the central bank results in two types of bias: an inflation bias in which the level of inflation tends to be above the social optimum, and a stabilization bias in which output fluctuations are too low and inflation fluctuations are too high. These biases can be eliminated in one of two ways. The first involves the appointment of a conservative central banker, à la Rogoff (1985), who has both an inflation target below the social optimum (target conservative) as well as a weight on output fluctuations in the loss function below the social optimum (weight conservative).

Alternatively, central bankers can operate under a quadratic inflation contract, à la Walsh (1995), in which they are punished for letting inflation rise above the social optimum and for allowing inflation volatility to be too high.

Either approach, however, is hard to implement. It is likely to be quite difficult to find a central banker with the "right" preferences and it is hard to believe that politicians would naturally want to appoint central bankers with different preferences than theirs. An opportunistic government would also be unlikely to appoint a conservative central banker or concede to a low inflation target, so that a regime based on having a conservative central banker is unlikely to be stable over time. Inflation contracts are not feasible either, because central bankers are not paid a great deal—and this is particularly true in Canada—so it is highly unlikely that governments would be willing to write an inflation contract that would give central bankers sufficient incentives to pursue optimal policy. It is also inherently inconsistent for a government with one set of preferences to explicitly declare that it wants the central bank to have different preferences by writing a contract that in effect makes the central bank act more conservatively than the government wants. Writing such an inflation contract would be politically untenable for any politician. Furthermore, public officials are almost never paid on the basis of their performance, and I know of no central banker anywhere in the world who receives performance-based pay.

Inflation-band targeting, in which the central bank has a target range and bears some cost if inflation goes outside the range, is not only feasible but has been implemented in many countries. For example, the Governor of the Reserve Bank of New Zealand is subject to dismissal if inflation falls outside the target range, while the Governor of the Bank of England must write a public letter of explanation to the government when the inflation rate falls outside the plus or minus 1 per cent range around the 2 per cent inflation target. Inflation-band targeting has several advantages relative to either appointment of a conservative central banker or inflation contracts. First, it eliminates the problem of finding the perfect central banker with the right preferences. Second, the framework is likely to be stable over time once the government has agreed to it. Third, the target range provides added flexibility to the inflation-targeting regime that is more palatable to politicians. Fourth, it is a simple framework that is easily implemented, in contrast to inflation contracts.

When we analyze how inflation-band targeting works in our model, we find that it has a marginal cost structure that is very close to that of the optimal inflation contract as long as realized inflation is not too far outside the target range. This tells us that the target range has to be wide enough so that

realized inflation ends up inside it most of the time, and this also tells us that the more uncertainty there is about the inflation process, the wider the target range has to be. Indeed, this is what we actually find in practice, where emerging-market countries, which are more likely to have greater uncertainty about inflation outcomes, tend to choose wider target ranges.

When we do welfare comparisons, we find that a suitably designed target range is able to get welfare very close to the social optimum outcome, with only slightly higher inflation and output volatility than the social optimum. Indeed, we find that inflation-band targeting can produce a welfare gain over pure discretionary monetary policy that goes over 90 per cent towards the maximum attainable by the social planner.

The bottom line from this research is that I have to eat my words. I now believe that an inflation-target range is highly desirable.

Conclusion

This is an exciting time to be a monetary policy maker or a student of monetary policy. In recent years, we have made substantial progress in understanding how to conduct monetary policy. Inflation targeting has proved to be highly successful and has been adopted by more and more countries. The debate over inflation targeting continues, however, and I hope that my remarks have made a contribution.

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