Price Stability (Inflation Targeting) as the Sole Goal of Monetary Policy: The International Experience

Marc Labonte
Specialist in Macroeconomic Policy

Gail E. Makinen

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Summary

In the 1970s, many countries were plagued by persistently high inflation rates. Since persistent inflation is ultimately the result of monetary policy, many countries in the 1990s and 2000s sought institutional reforms to their central banks to prevent a return to the 1970s experience. A popular reform was to move from giving central banks multiple policy goals to a single mandate of price stability. The single mandate was accompanied by the introduction of an inflation target, under which central banks aim to keep inflation within a pre-defined numerical range. The logic behind these reforms was a belief among proponents that it would remove the political temptation to "pump up" the economy in the short run at the expense of long-run price stability and a belief that "fine tuning" monetary policy in response to every change in economic conditions was of little value. Some Members of Congress have expressed interest in (and introduced legislation on) adopting a price stability mandate for the Federal Reserve. Federal Reserve Chairman Ben Bernanke is a long-time advocate of inflation targeting.

This report analyzes the success of inflation targeting abroad by comparing both the performance of targeters to non-targeters and the performance of countries before and after targeting was adopted. It finds that the economic performance of targeters improved distinctly after the adoption of an inflation target, particularly in terms of lower and less variable inflation. When compared with non-targeters, however, the success is less impressive because many non-targeters also enjoyed strong economic performances in the 1990s. This suggests that there could be some unidentified third factor that explains the success of inflation targeters. There is little evidence supporting the theory that low inflation can be achieved only at the cost of lower and more volatile economic growth. The period of disinflation that frequently accompanied the introduction of inflation targeting, however, was often temporarily costly in terms of higher unemployment and lower growth.

The report then looks more closely at four economies that have adopted a price stability goal: New Zealand (which was the first country to adopt inflation targeting), Canada, the United Kingdom, and the Euro Area. One key finding from these case studies is that, in practice, central banks tend to operate with greater latitude and more discretion than some targeting proponents may have envisioned. For example, central banks still tend to respond to a decline in economic activity by lowering interest rates, even though strict attention to the target might not justify it. This is possible because exceptions to the targets are granted for a variety of shocks and the definition of inflation being targeted often excludes price changes due to factors such as food, energy, and excise taxes.

This report will not be updated. For an in-depth discussion of the theoretical debate and practical issues for crafting an inflation target, see CRS Report 98-16, *Should the Federal Reserve Adopt an Inflation Target?*

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Background

The high inflation rates that bedeviled market economies during the 1970s had a profound effect on both policymakers and economists. It convinced the former that inflation can have serious and disruptive economic and social consequences. It helped convince a skeptical economics profession that "while such influences as oil price shocks, droughts, depreciation of the dollar, or excise tax hikes may boost price indexes at one time or anther, sustained inflation requires at least the acquiescence of the central bank."[1]

The conclusion that a sustained rise in the price level is a monetary phenomenon is important, for it places responsibility for persistent inflation on the central bank. It also kindled renewed interest among economists in sorting out and accounting for the costs that inflation imposed upon a society. And it led to various policy proposals for controlling inflation. One of these involves replacing the multiple goal directive under which many cental banks operate with a directive that focuses exclusively on promoting and ensuring the achievement of "price stability."

Although the United States has not replaced the current multi-goal mandate of "maximum employment, stable prices, and moderate long-term interest rates"[2] for monetary policy with a single goal of "stable prices," interest in doing so has had support from both Democratic and Republican Members of Congress. An early example of Democratic support was the "Zero Inflation Resolution" introduced by Congressman Stephen Neal of North Carolina in 1989. In the 109th Congress, Representative Jim Saxton, Republican of New Jersey, introduced the Price Stability Act of 2005, H.R. 498, which would mandate price stability as the primary goal of the monetary policy of the Board of Governors of the Federal Reserve System and the Federal Open Market Committee. Federal Reserve Chairman Ben Bernanke is a long-time advocate of inflation targeting.[3]

The goal of "price stability" has become the focus of monetary policy in most industrialized countries and a number of developing countries. Typically, this goal has been carried out by giving central banks an inflation target (or the central banks have given themselves such a target) to meet. The experience of four economies, New Zealand, Canada, the United Kingdom, European Central Bank (ECB), whose central banks have either been directed or chosen to focus on such a goal, will be reviewed here in some detail.

The reason for reviewing this experience is straightforward. The proposal for a single goal of price stability has been controversial, both politically and within the economics profession, with proponents claiming that it would promote low inflation and macroeconomic stability and opponents claiming that low inflation would come at the expense of macroeconomic stability. Furthermore, while implementing a directive to achieve and maintain price stability sounds simple, it can involve many technical problems such as how to define the goal; which price index to use in measuring price stability; what exceptions, if any, to permit; whether the target should be a range or a point; who should set the target; the period for which it should be set; what type of

[1] Testimony of Alan Greenspan before the Subcommittee on Domestic Monetary Policy of the Committee on Banking, Finance, and Urban Affairs, 101st Cong., 1st sess., hearing on H.R. 409, October 5, 1989, p. 6.

[2] Federal Reserve Reform Act of 1977 (P.L. 95-188).

[3] See, for example, Ben S. Bernanke, "A Perspective on Inflation Targeting," remarks at the Annual Washington Policy Conference of the National Association of Business Economists, Washington, DC, March 25, 2003.

accountability should be enforced; and so on.[4] The experience of these countries in implementing and operating monetary policy under a single goal to promote "price stability" should be of value to U.S. policymakers, for it can provide insight into problems that might be encountered in implementing such a strategy, as well as reduce uncertainty about how monetary policy functions under a single goal regime.

Theoretical Considerations

Monetary policy has two main goals. First, it seeks to provide price stability, in terms of a low and stable rate of inflation. Second, it seeks to provide economic stability. While it is a long standing view among economists that manipulating the money supply cannot influence the long-run growth rate of an economy, it can mitigate the booms and busts of the business cycle in the short run. All else equal, weak spending would lead to lower inflation, and vice versa. So while these goals will sometimes conflict, they are often compatible.[5]

Given these two goals, it may seem strange that many central banks now focus monetary policy on a single goal of price stability. But how to best pursue the second goal, economic stability, is a matter of some controversy. Proponents of inflation targeting claim that a single goal regime would lead to lower inflation and a more stable business cycle. This claim is based on an argument that is both political and economic in nature. They argue that when central banks are not given clear policy goals, they are vulnerable to political pressures to use expansionary monetary policy to boost economic growth above its sustainable rate for short-term political gain. The long-run consequences of such an opportunistic policy, they argue, is higher inflation and a monetary policy that over time is less effective at altering aggregate demand. By holding central banks to a sole goal of price stability, proponents claim that monetary policy can no longer be abused for political purposes. By preventing abuse, the sole goal of price stability becomes compatible with the other goal, economic stability.[6] Furthermore, these proponents are likely to be influenced by a body of literature that suggests that when central bankers "fine tune" monetary policy to stabilize the economy, they are likely to do more harm than good because of the time lags and uncertainty inherent in monetary policy.[7] Focusing on price stability, they argue, gives central bankers a long-term perspective that is more appropriate.

Opponents of inflation targeting argue that the economic stability goal should not be officially subordinated to the price stability goal. They argue that doing so will exacerbate the booms and busts of the business cycle to society's detriment. In particular, they fear that too great a focus on low inflation will lead to periods of needlessly sluggish growth and high unemployment. They

[4] For a detailed discussion of these issues, see CRS Report 98-16, *Should the Federal Reserve Adopt an Inflation Target?*, by Marc Labonte and Gail E. Makinen.

[5] For an introduction to monetary policy issues, see CRS Report RL30354, *Monetary Policy and the Federal Reserve: Current Policy and Conditions*, by Gail E. Makinen and Marc Labonte.

[6] It should be noted that low inflation is not an end itself, but a means to an end. There are many ways in which lower and more stable inflation could improve economic efficiency. For example, lower inflation would reduce tax and investment distortions, reduce uncertainty in planning, and divert resources away from the unproductive avoidance of inflation. At the relatively low rates of inflation found in the industrialized world, however, these improvements in efficiency may be too small to translate into measurable increases in GDP growth. Indeed, it is difficult to find such improvements in the data. Thus, this report focuses on whether inflation targeting makes growth more stable, rather than focusing on whether it increases growth rates. For more information, see CRS Report RL30344, *Inflation: Causes, Costs, and Current Status*, by Marc Labonte and Gail E. Makinen.

[7] See CRS Report RL31056, *Economics of Federal Reserve Independence*, by Marc Labonte.

argue that it is possible for monetary policy to pursue both goals responsibly. They point to the economy's complexity and the multitude of potential shocks that could affect an economy as rationales for giving central bankers as much discretionary decision-making power as possible.

The Experience of Industrialized Countries That Focus Monetary Policy on a Goal of Price Stability

Both sides of the price stability debate make compelling arguments, and since the arguments are partly political, they cannot be settled by theory alone. To an extent, the argument can be settled empirically, however. Both sides claim that their policies would lead to (or at least not prevent) low and stable inflation and stable economic growth. Since so many foreign central banks operate under an inflation target, one can look to international experience to see which argument receives the most support.

Two pieces of evidence can be brought to bear on the argument. First, did countries that adopted inflation targets have lower and stabler inflation and more stable growth after the adoption of the target? Second, did inflation targeters have lower and stabler inflation and more stable growth than non-targeters? The latter question is useful because even if a country saw its macroeconomic performance improve after the adoption of an inflation target, it could be due to a broader change in the economy or the political climate. For example, macroeconomic performance could have improved because voters became less tolerant of high inflation, the economy was subject to fewer supply shocks, or policymakers' understanding of the economy improved. If the improvement were due to any of these other reasons, then the adoption of an inflation target by policymakers uncommitted to responsible policy would not lead to a decline in inflation.[8] By comparing targeters to non-targeters, one can gauge whether the improvement in a targeting country was part of a broader trend rather than the adoption of a target.[9]

Tables 1 and **2** compare the economic performance of inflation targeters and non-targeters, respectively. The average inflation rate indicates whether inflation has been kept low, and the standard deviation of inflation over time indicates whether it was kept stable (a lower standard deviation is equal to greater stability). Monetary policy cannot determine the long-run growth rate of the economy, but it can influence its stability, in terms of smoothing the ups and downs of the business cycle. The output gap and standard deviation of economic growth are used to determine if economic performance was stable. The output gap is a measure of how far an economy is operating from full potential (i.e., when all of its resources are employed), and is measured as a percentage of GDP; using the average absolute value (so that positive and negative output gaps

[8] Statisticians refer to this phenomenon as an identification problem or omitted variable bias: it could be that inflation targeting did not cause responsible monetary policy; rather, responsible policymakers simultaneously pursued low inflation policies and adopted inflation targets. Because there is no way to directly measure responsibility, the improvement is attributed to the inflation target—which is measurable—instead.

[9] For similar overviews, see Edwin Truman, *Inflation Targeting*, Institute for International Economics, October 2003; Frederic Mishkin and Klaus Schmidt-Hebbel, *One Decade of Inflation Targeting in the World: What Do We Know and What Do We Need to Know?*, National Bureau of Economic Research (NBER), Working Paper 8397, July 2001; Ben S. Bernanke et al., *Inflation Targeting* (Princeton: Princeton University Press, 1999); Ben S. Bernanke and Frederic S. Mishkin, "Inflation Targeting: A New Framework for Monetary Policy?" *Journal of Economic Perspectives*, vol. 11, no. 2, spring 1997, pp. 97-117.

do not cancel each other out) is more appropriate if one assumes that it is undesirable to be above or below full potential.

One problem with the sample of non-targeters is that it is very small and not diverse. There are only two large economies in the world that do not have an explicit or legislatively-imposed inflation target (United States and Japan), no medium sized economies, and a handful of small economies. There is a significant degree of diversity in central bank regimes among non-targeters, however.[10]

How successful a country has been at achieving price stability depends on what one considers to be the optimal rate of inflation. There is widespread agreement among economists that inflation is harmful if it is higher than a few percentage points per year or negative (i.e., deflation). Below a few percentage points, however, consensus breaks down. Some economists argue for an inflation rate of zero, stressing the harmful effects that inflation has on planning and the distortions in economic activity it creates through channels such as the tax system. Other economists argue that low but positive inflation is beneficial to an economy because it helps "grease the wheels" of the economy by making it possible to have real relative price declines without requiring nominal prices to decline. In addition, all economists engaged in this debate recognize measurement errors in the consumer price index (CPI) and GDP deflator that cause inflation to be overstated. If measured inflation is, say, two percentage points higher than actual inflation, then the central bank would need to target a measured inflation rate above 2% just to avoid deflation. Thus, a positive rate of measured inflation may be necessary to keep actual prices stable.

Table 1. Economic Performance of Inflation Targeters, Before and After

Country	Inflation Rate —Average	Inflation Rate —Standard Deviation	Output Gap— Average of the Absolute Value	Economic Growth— Standard Deviation
Australia				
pre-target (1985-1994)	5.3%	3.0%	1.4%	2.1%
post-target (1995-2004)	2.7%	1.5%	0.9%	0.8%
Canada				
pre-target (1982-1991)	5.3%	1.9%	1.9%	2.8%
post-target (1992-2001)	1.7%	0.7%	1.0%	1.5%

[10] The United States and Japan have independent central banks with multiple goals (one of which is price stability), a high degree of policy discretion, and floating currencies. Denmark has maintained a fixed exchange rate since 1982, first with the German mark then with the Euro, which means that its monetary policy is set *de facto* by the ECB. Hong Kong maintains a currency board tied to the U.S. dollar, a form of monetary policy where policy is automatically determined by the number of U.S. dollars entering Hong Kong, giving its central bank very little discretion to change policy. Singapore, has a multiple goal monetary policy, with a greater focus on managing the (floating) exchange rate than the U.S. Cyprus' monetary policy discretion is limited by an exchange rate that is fixed within a band.

Country	Inflation Rate —Average	Inflation Rate —Standard Deviation	Output Gap— Average of the Absolute Value	Economic Growth— Standard Deviation
Iceland				
pre-target (1992-2001)	3.2%	1.6%	3.0%	2.7%
post-target (2002-2006)	4.0%	1.5%	2.1%	3.4%
Israel				
pre-target (1988-1997)	13.8%	4.0%	n/a	2.2%
post-target (1998-2006)	2.5%	2.3%	n/a	3.0%
New Zealand				
pre-target (1981-1990)	11.1%	7.3%	1.8%	2.3%
post-target (1991-2000)	2.1%	0.6%	2.2%	2.5%
Norway				
pre-target (1992-2001)	2.3%	0.6%	1.9%	1.4%
post-target (2002-2006)	1.6%	0.8%	1.1%	0.9%
Sweden				
pre-target (1983-1992)	6.7%	2.5%	2.6%	1.9%
post-target (1993-2002)	2.0%	1.2%	2.2%	2.1%
Switzerland				
pre-target (1990-1999)	2.3%	2.0%	1.8%	1.3%
post-target (2000-2006)	1.0%	0.4%	1.2%	1.4%
United Kingdom				
pre-target (1983-1992)	5.3%	1.3%	1.1%	2.0%
post-target (1993-2002)	1.8%	0.6%	1.0%	0.8%

Country	Inflation Rate —Average	Inflation Rate —Standard Deviation	Output Gap— Average of the Absolute Value	Economic Growth— Standard Deviation
Euro Area				
pre-target (1989-1998)	3.1%	1.2%	1.7%	1.3%
post-target (1999-2006)	2.1%	0.4%	1.1%	1.1%

Source: CRS calculations based on data from the Organization of Economic Cooperation and Development and the International Monetary Fund.

Notes: Inflation is based on the CPI. The post-target period is dated from the first full year that the target is in place. Data covers 10 years before and after (if possible) inflation targeting was in place.

As seen in **Table 1**, every industrialized economy has seen its average inflation rate fall after the adoption of an inflation target, except Iceland whose inflation was already fairly low. In the process, many of these countries saw their inflation rates fall from uncomfortably high levels into the range that economists prefer. However, Switzerland, the Euro Area, Iceland, and Norway had already achieved low inflation before adopting an inflation target. Prices have also been more stable after the adoption of the inflation target, as the standard deviations of their average inflation rates have also fallen in each country with a long enough experience to evaluate.[11]

Table 2. Economic Performance of Non-Inflation Targeters (1997-2006)

Country	Inflation Rate —Average	Inflation Rate —Standard Deviation	Output Gap— Average of the Absolute Value	Economic Growth— Standard Deviation
Cyprus	2.8%	0.9%	n/a	1.2%
Denmark	2.1%	0.5%	1.0%	1.1%
Hong Kong	-0.3%	3.2%	n/a	4.5%
Japan	-0.1%	0.8%	1.7%	1.5%
Singapore	0.8%	0.9%	n/a	4.2%
United States	2.6%	0.7%	0.8%	1.2%

Source: CRS calculations based on data from the Organization of Economic Cooperation and Development and the International Monetary Fund.

Note: Inflation is measured by the CPI.

But how did the performance of inflation targeters compare to the non-targeters in **Table 2**? Every non-targeter was able to achieve an average inflation rate below 3% in the past 10 years without an explicit inflation target. On the other hand, inflation targeters did a better job of avoiding deflation (a fall in prices) than non-targeters. Among non-targeters in the past 10 years,

[11] Some countries have adopted an inflation target too recently to conclusively judge their track record. In particular, the standard deviation is not a particularly meaningful measure for a data series with only a couple of observations. Thus, although included for all countries, it does not convey particularly useful information for countries who have very recently adopted an inflation target.

Japan and Hong Kong experienced six years of deflation, and Singapore experienced two years. By contrast, among targeters, only Israel and New Zealand suffered from deflation (one year each). Both targeters and non-targeters enjoyed extremely stable inflation, as measured by the standard deviation of the inflation rate, with the exception of Israel and Hong Kong. Israel underwent a major disinflation (a decline in the inflation rate) around the time it adopted an inflation target, which would make the standard deviation large. Hong Kong's experience illustrates one of the drawbacks of a currency board: inflation is effectively determined by fluctuations in the demand for Hong Kong assets. When the demand for assets is volatile, the inflation rate will be volatile.

What about the critics' claim that inflation targeting would lead to excessively volatile economic growth? As measured by the output gap and the standard deviation of the growth rate (third and fourth column of **Table 1**), four economies (Australia, Canada, United Kingdom, Euro area) experienced more stable economic growth after the adoption of an inflation target, two economies were less stable (New Zealand and Israel), and two had mixed experiences (Sweden and Switzerland). This may suggest that, in practice, the political benefits of inflation targeting (e.g., preventing opportunistic behavior) may outweigh the economic disadvantages.[12] It may also suggest that most targeters do not interpret their mandate literally. When faced with a choice between preventing an economic downturn or preventing inflation from rising slightly above its target, they choose the former and reduce interest rates, although a literal interpretation of their mandate would have them choose the latter and increase interest rates. In practice, inflation targeters seem to leave central banks more room for discretion and fine tuning than one might expect, and this does not appear to come at the expense of maintaining price stability.[13]

Compared with non-targeters, the economic growth of targeters is comparably stable. A few small countries were markedly more volatile than the rest, four of which were targeters (Iceland, Israel, New Zealand, and Sweden) and two non-targeters (Singapore and Hong Kong). Since smaller countries tend to be more vulnerable to external conditions beyond their control, their economies would be expected to be less stable. Among the rest of the countries, the results were broadly similar. Australia and Great Britain demonstrate that targeters can maintain economic stability for long periods of time, and the United States and Denmark demonstrate that non-targeters can do so as well. As for the concern that an inflation target would make a recession more serious, there does not seem to be any correlation between inflation targeting and countries with lower growth during the 2001-2002 economic slowdown. New Zealand, Australia, Canada, and the United Kingdom—all targeters—escaped the slowdown relatively unscathed. Nor is there strong evidence that negative output gaps were more likely to persist in countries with inflation targets. The United Kingdom and New Zealand had large and persistent output gaps throughout the early 1990s with an inflation target (while they were still in the transition phase of the target regime);

[12] In the implementation of an inflation target, there was a transition period in many countries when the inflation rate was reduced for a couple of years before it was kept within the long-run target boundaries. This is likely to have caused economic growth and employment to have fallen temporarily. In many countries, part of the disinflation occurred before the announcement of the target regime. Whether the disinflation should be attributed to the pre-target regime (because the need for disinflation came from the policies of the past), the target regime (because policymakers could have left inflation high in the absence of the target to avoid negative GDP effects) is a matter of debate. If the transition period is included in the targeting period, one should not extrapolate that performance into the future since the disinflation is a one-time event. Since **Table 1** covers a 10 year period, any transition effects should not affect the results.

[13] One way to allow a central bank to respond to changes in economic activity without breaching the target is to make the target range sufficiently wide that modest changes in inflation are not deemed a concern.

on the other hand, Switzerland and Iceland in the early 1990s, and Japan in this decade, had similar difficulties without a target.

Now that the aggregate data have been analyzed, it may be useful to review the individual experiences of four key economies in greater depth to gain a richer understanding of how inflation targeting has worked out in practice. New Zealand is examined because it was the first country to adopt inflation targeting. Canada and the United Kingdom are examined because they are important trading partners who were also earlier target adopters. Finally, the Euro Area is considered since it is the world's second largest economy.[14]

New Zealand

Among the four economies highlighted in this report, New Zealand has the most detailed and structured program directing its central bank, the Reserve Bank of New Zealand, to follow a goal of price stability.[15] New Zealand also has the longest experience with inflation targeting. On May 4, 1989, the government of New Zealand introduced the Reserve Bank of New Zealand Act. It was passed by parliament on December 15, 1989, and took effect on February 1, 1990. The act declared the "stability of the general level of prices shall be the overriding objective of monetary policy." No other subordinate objectives are mentioned in the act, although the administration of the act makes it possible for the Bank to focus on other goals such as GDP growth and employment.

Under the terms of the legislation, the Minister of Finance and the Reserve Bank Governor are required to make periodic *Policy Targets Agreements* (or PTAs) regarding the price index to be targeted and the allowable range of inflation that is consistent with the act. "Price stability" is defined in terms of an allowable but positive inflation rate rather than a stable *price level*, which would require any inflation that occurred to be offset by deflation.

The inflation goal is set by the government, and it is incumbent on the Reserve Bank to achieve it. The Governor of the Bank is required to report on the inflation performance twice per year and *may* be dismissed for failure to achieve the target at any time during his/her five-year term. Dismissal is not, however, automatic. As of this date, no Governor has been dismissed. To enhance the independence of the Bank, the government provided for its advanced funding for a five-year period (it should be noted that this advanced funding was specified in *nominal* terms, which should act as an added incentive to keep the inflation rate low). However, it would be wrong to view the Bank as anything other than an agency of the government. It does not have statutory independence even though it does have instrument independence in that it can vary interest rates to achieve its goal.

Although the PTA fixed the consumer price index as the index for measuring inflation, it allowed the Reserve Bank to exclude from that measure of inflation the "first round" effects from changes in the international terms of trade, indirect taxes, natural disasters, disasters due to livestock

[14] Individual country studies can also be found in John Ammer and Richard T. Freeman, "Inflation Targeting in the 1990s: The Experience of New Zealand, Canada, and the United Kingdom," *Journal of Economics and Business*, vol. 47, 1995, pp. 165-192; Bennett T. McCallum, *Inflation Targeting in Canada, New Zealand, Sweden, the United Kingdom, and In General*, NBER Working Paper no. 5579, May 1996.

[15] See also Donald Brash, "Inflation Targeting 14 Years On," Reserve Bank of New Zealand, *Bulletin*, vol. 65, no. 1, p. 58.

disease outbreaks, and changes in the interest-cost component of the CPI. It is important to note that the Reserve Bank calculates the effect of these factors on the inflation rate. The calculations are not made by the government's statistical agency, Statistics New Zealand. Thus, the Reserve Bank prepares the inflation numbers against which it is evaluated. However, when these "escape clauses" are invoked, the Bank must formally communicate this to the government.

The core of this regime, as noted above, is the PTA. In the first one, dated March 1990, an eventual goal of holding inflation within a range of 0% to 2% was expressed. However, as an interim, the Reserve Bank announced that it would use as a "guidepost" a range for inflation at year's end of from 3% to 5%. It was emphasized that the target was intended to be a true range in that both floor and ceiling were important and that no special emphasis was to be placed on the midpoint. In actual practice, the inflation rate has frequently been near the upper bound of the range. The election that took place in December 1990 resulted in a new government. It worked out a new PTA with the Reserve Bank under which a new set of inflation goals were adopted for the next three years—2.5% to 4.5% for the end of 1991, 1.5% to 3.5% for the end of 1992, and 0% to 2% for the end of 1993. Late in 1993, the government extended the 0% to 2% range for an indefinite period and specified that the inflation rate was to be contained within this range on a *continuous* basis. Since the consumer price index is only published quarterly, this means that the price stability goal must be met every quarter as opposed to being met on an average basis over the year or at the end of the year.[16]

The PTA negotiated in December 1996 had an indefinite time horizon and broadened the target range to 0% to 3%. Part of the reason for broadening the range was political. A newly emerging political party had campaigned on the basis that the prevailing range was too restrictive and that, as a result, it had an adverse effect on employment. In the election in 1996, this party came to hold the balance of power. After it joined the governing coalition, the range increase took place. A second reason for broadening the range was operational. The Reserve Bank complained that the narrow range and the need to meet the inflation target *continuously* caused undesirable instability in the instruments of monetary policy, meaning that often large fluctuations in interest rates and exchange rates took place. These fluctuations were thought to be disruptive to output growth and employment.

The PTA signed on September 17, 2002, involved several significant changes in the conduct of monetary policy. First, the targeted range was changed to 1% to 3% from 0% to 3%. Second, the target did not have to be achieved continuously. It was now to be met over the "medium term." Third, there appears to a subtle shift in emphasis in the sense that price stability now becomes more of a means to an end, with the ultimate goal to "...promote sustainable and balanced economic development in order to create full employment, higher real income and a more equitable distribution of incomes." It is unclear at this time what this means in terms of compromising the price stability goal. It clearly diminishes accountability.

It should be emphasized that throughout the period in which monetary policy has been committed to a price stability goal, the Reserve Bank has continued to acknowledge that it still has a short-run objective of securing the financial stability of the country and to this end is prepared to act as a lender-of-last-resort. Such a necessity has not yet arisen, however. Moreover, the "escape

[16] Technically, a government cannot commit future governments to a specified target range. Thus, "indefinite period" must be understood to be until the end of the then sitting parliament. However, it is increasingly the experience that maintaining the target rate is a litmus test for monetary responsibility. Thus, opposition parties during elections pledge to maintain the target if elected. For this reason, the target takes on a life of its own.

clauses" allow the Bank to give some attention to such competing goals as GDP growth and unemployment. For example, should the Bank be forced to deflate the economy in the presence of an oil price hike (a "terms of trade" shock), it could have serious negative consequences for GDP growth and employment. By invoking the escape clause, the Bank can accommodate the shock and moderate its short-run consequences for output and employment. The drawback is that the Bank can potentially use escape clauses to deflect blame for policy mistakes, and too many uses of the escape clause would render the inflation target meaningless.

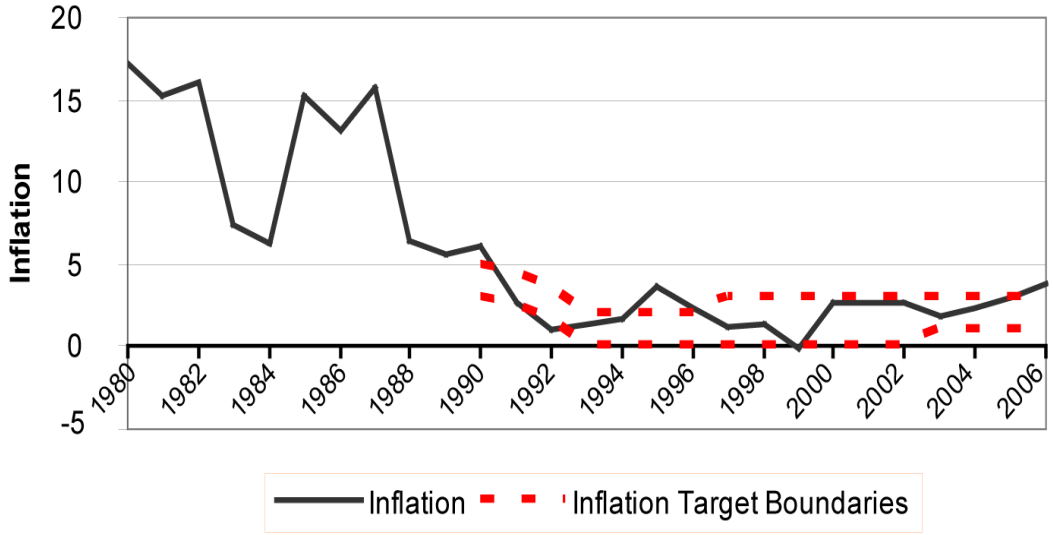
The Reserve Bank has been aided in achieving its price stability goal by the government's commitment to a program of budget deficit reductions. Between 1986 and 1993, the budget was in deficit each year ranging between 0.7% and 4.6% of GDP. From 1994 to 2006, the budget was in surplus each year. This move to budget surpluses has decreased the stress placed on the Reserve Bank to accommodate budget deficits, giving it greater independence to focus on achieving price stability.

An important element of this new regime was to establish the credibility of the price stability goal in the minds of economic agents. Economists believe that monetary policy is more effective when the public's inflation expectations are low. Thus, an important element of New Zealand's new monetary regime is to promote transparency by providing information to the public about why monetary policy decisions are made, how policy is executed to keep inflation within the targeted range, and what it seeks to accomplish (although, as noted above, there are still gaps in transparency.) Survey data indicate that inflationary expectations in New Zealand fell from double-digit rates in the 1980s until about 1992, and were stable through the rest of the period covered by the study.[17]

The evidence from **Figure 1** suggests that the Reserve Bank has been able to keep the underlying inflation rate within the targeted range during most of this period. The bank has invoked the terms of trade escape clause three times, 1990-1991, 1994, and 2000-2001 to accommodate international oil price shocks. As noted above, giving the Bank discretion to invoke an escape clause does not come without a price: the transparency and credibility of policy is reduced. For example, the increase in oil prices in 1994 was not significant, yet the bank invoked an escape clause anyway.

[17] Murray Sherwin, "Inflation Targeting—The New Zealand Experience," p. 267, available at http://www.bankofcanada.ca/en/conference/con97/cn97-14.pdf.

Figure 1. Inflation and Inflation Targeting in New Zealand



Source: International Monetary Fund.

Note: Inflation is measured as the consumer price index.

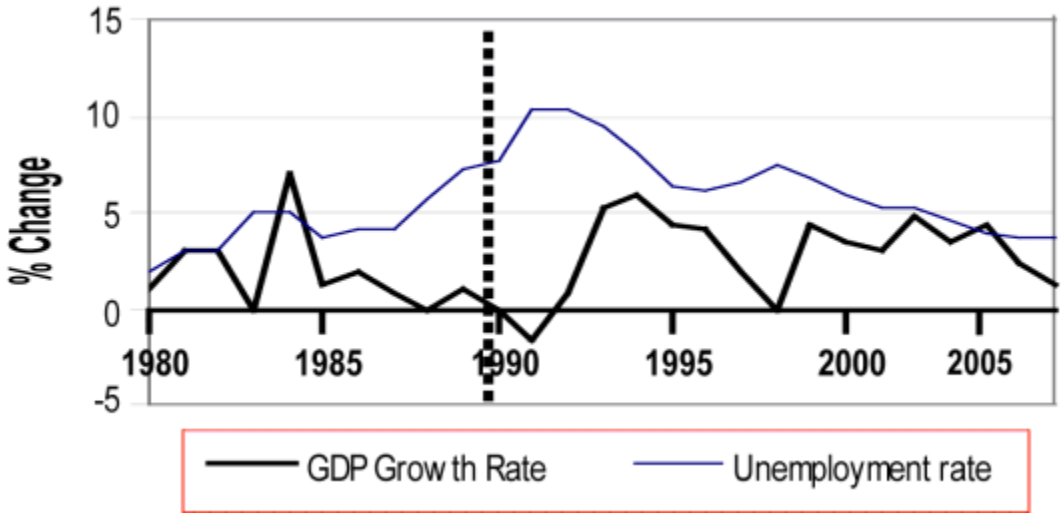
A case can be made that inflation targeting has yielded substantial benefits for New Zealand by comparing the period 1982-1989 with 1994-2001.[18] Between those periods, the average inflation rate under the new regime fell by more than 80%. Much of the fall in inflation occurred before inflation targeting was introduced, however. The fall in inflation was accompanied by a rise in the average unemployment rate. As seen in **Figure 2**, averages may be deceptive, however. While it is true that between 1994 and 2001, unemployment averaged 6.6%, the rate has been falling and in 2001, it averaged 5.3%. (By 2006, it had fallen to 3.8%.) In the earlier period, it averaged 4.8%, but was on the rise, reaching 7.1% by 1990.[19] The average rate of growth of GDP over the years 1994-2001 was 3.1%. During the target period, GDP contracted in only one year, 1998, at the height of the Asian financial crisis. Thus, inflation targeting did not render New Zealand immune from this major regional economic shock. Over the period 1982-1989, GDP growth averaged 2.8%. This average was dominated by two years, 1984 (6.6%) and 1987 (6.8%); in five other years, it was under 2%, and during 1983, GDP grew only 0.1%. Another way to measure economic performance is to see how close actual GDP is to potential or full-employment GDP. Over the period 1994-2001, the absolute average of the output gap was 1.0%. During the 1982-1989 period, it was 1.9%, or nearly twice as large. During both 2000 and 2001, New Zealand's GDP was very near to its potential. Unemployment and economic growth data since 1980 are shown in **Figure 2**. Of course, the improvement in economic performance may not have been

[18] For each of the four focus countries, comparisons will be made between the period in which the goal of price stability was fully implemented vs. the same number of years prior to the single goal regime. The transition period, in which the new regime had been announced but the central bank had not yet been required to reach its ultimate inflation target, is not included in either set of results. Since the 0% to 2% goal was to be reached at the end of 1993, we designate 1994 as the full implementation of the new regime for New Zealand.

[19] Ideally, the comparison in each period should be the difference between the actual unemployment rate and the "full employment rate of unemployment," the latter of which might vary over the different time periods. In other words, since monetary policy cannot influence the full employment rate of unemployment, the regime should be considered a success if the unemployment rate was kept closer to the full employment rate than in the earlier period, regardless of which period had the lowest unemployment rate. Since the full employment rate is not available for all countries, we present the actual unemployment rate instead as a suggestive measure.

caused by inflation targeting; it could have been the result of other policy changes or good luck instead.

Figure 2. Economic Indicators in New Zealand, 1980-2006



Source: International Monetary Fund

Note: Dashed vertical line marks the introduction of inflation targeting.

The transition period in which the new regime was being implemented, 1990-1993, was not without cost. The inflation rate declined from 6.2% in 1990 to 1.7% in 1993. GDP growth was flat in 1990, -1.7% in 1991, and 0.7% in 1992. In 1993, it resumed at a healthy 5.2%. Reflecting the performance of actual GDP, the output gap deteriorated from 0.6% in 1990 to -3.5% in 1992. The unemployment rate rose from 7.8% in 1990 to 10.3% in 1991 and 1992.

To gauge how the Bank has balanced its price stability mandate with the desire for economic stability in practice, it is useful to look more closely at two episodes where the regime was tested (1997-1998, 2000). In 1997-1998, the Bank had to react to contagion effects from the Asian Crisis, characterized by a fall in exports to leading trading partners, an exchange rate appreciation with affected Asian countries that put pressure on import-competing industries, and worldwide financial unrest. The Bank held short-term interest rates steady in 1997 and the first half of 1998, despite the fact that inflation was falling and well within the target range in the second half of 1997. The economy began to contract in 1998. The Bank then lowered rates significantly in the second half of 1998. Perhaps the Bank would have reacted more strongly to the negative shock had it not been for its sole goal mandate. On the other hand, the effects of the crisis may have been more serious than the Bank anticipated. Looking at the Bank's *Monetary Policy Statements* from the time, it appears that the Bank initially underestimated the negative effect the crisis would have on GDP and overestimated its inflationary effects (because the trade-weighted exchange rate was depreciating).

In late 2000, the inflation rate unexpectedly rose a full percentage point above the target, despite a monetary tightening that began earlier in the year. The rise in oil prices that year probably contributed to this rise in inflation. Interestingly, the Bank did not tighten policy further when inflation moved above the target, citing the transitory nature of the oil shock. In fact, the Bank undertook a slight easing in policy in mid-2001, despite the fact that inflation was still slightly above the 3% target boundary. This easing was presumably in response to the contraction of GDP

in the first quarter of 2001. Thus, faced with a clear choice between an inflation rate that was above target and a slowing economy, the Bank did not take sharp measures to rein in inflation as the "sole goal" mandate suggests to some. The target may have made the Bank's response to the slowdown more moderate than it otherwise would have been, however.

Canada

The Bank of Canada's commitment to a goal of price stability was not the result of legislation amending the Bank Act to make price stability the exclusive focus of monetary policy. Rather, the effort to commit the Bank to this goal began in 1988 as a personal campaign by the then Bank Governor, John Crow. His efforts culminated in the joint announcement by the Minister of Finance and the Governor of the Bank on February 26, 1991 of formal targets for "reducing inflation and establishing price stability in Canada."[20] (The announcement date was carefully chosen to attract public attention, as it was the day on which the government announced its budget.) Thus, it was a policy of the government and the Bank, and not a change in the Bank of Canada Act. Such a cooperative or joint effort continues to this day with the inflation target being jointly determined and announced by the government and the Bank.[21]

As in New Zealand, price stability was defined in terms of a targeted rate of inflation rather than a stable price level. A precise definition was not given initially to the term "price stability" since the government and the Bank were uncertain about how the economy would behave in an environment of price stability. However, at the outset, the Bank stated that "price stability" meant an inflation rate below 2%.

The joint announcement specified that it was desired that the rate of inflation would fall between 2% and 4% by the end of 1992 (some 22 months beyond the date of the announcement), to between 1.5% and 3.5% by mid-1994, and to between 1% and 3% by the end of 1995. The 1% to 3% range has been continuously reconfirmed to the present day.[22] Setting out the path to price stability in the initial announcement was thought to be important in building expectations of economic agents and the credibility of the Bank in achieving such a goal. Studying the inflationary expectations of the public over this time can determine how successful the target has been in this regard. One study found evidence that inflation targeting lowered the inflationary expectations of the public quickly, from over 5% shortly before the target was introduced to 2% in 1996.[23] But another study found that inflation targeting had no rapid effect on inflationary expectations, and, to the extent that expectations fell, they remained above the target range.[24]

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[20] Joint Statement of Finance Minister and Bank Governor, February 26, 1991.

[21] See also Gordon Theisen, "The Canadian Experience with Inflation Targeting," in Banco de Mexico, *Stabilization and Monetary Policy*, 2000, p. 85.

[22] Since the Canadians have estimated that the upward bias in their CPI is at most 0.5%, something else must be behind the decision to keep the range at 1% to 3%. It may lie in the fact that some of the Bank's research has shown that this range is sufficiently wide to accommodate control error and unexpected shocks, mainly supply in nature, over and above those due to food, energy, and the first round effects from changes in indirect taxes. We date 1996 as the beginning of the new price stability regime, omitting the transition period.

[23] Ben Fung, Scott Mitnick, and Eli Remolona, *Uncovering Inflation Expectations and Risk Premiums from Internationally Integrated Financial Markets*, Bank of Canada Working Paper 99-6, 1999. This study derived a measure of inflationary expectations based on the yield curve on government bonds.

[24] Agathe Cote et al, "Inflation Expectations and Real Return Bonds," *Bank of Canada Review*, summer 1996, p. 40. This study analyzed the yield on inflation-indexed bonds and consumer surveys on inflationary expectations. Unfortunately, the inflation-indexed bonds were not issued until 1991, so it is not possible to determine if inflationary (continued...)

Several aspects of the joint announcement should be noted. First, the initial target range was to apply nearly two years after the announcement. This was done on the grounds that monetary changes taken today would have their effects in the future. It was also done to increase the likelihood of success. Second, the targets did not have to be met continuously over any given period. They were to be achieved by some specific date. Third, the initial announcement made it sound as though the objective to be targeted was the midpoint of the range. This has not been the practice, however, as the Bank has not moved aggressively to force the rate to the midpoint of the range when it has lingered at or below the lower bound of the range. But in some circumstances in which the inflation rate was pushed above the upper bound of the targeted range, the Bank would be expected to return the rate to the midpoint of the range.

Although the targeted inflation rate range is specified in terms of the total consumer price index, the Bank of Canada, in practice, conducts monetary policy based on a modified CPI because it is interested in the trend rate of inflation, and the actual course taken by the CPI can be influenced temporarily by the prices of such volatile items as food and energy, and more permanently by such one-time events as changes in indirect taxes. Thus, the Bank uses a modified CPI that excludes the eight most volatile components of the CPI. For example, in 1994 headline inflation briefly fell below 0%. But the Bank interpreted the effect to be caused by a reduction in sales tax rates, and did not change the stance of monetary policy. Unlike the Reserve Bank of New Zealand, this index is computed by Statistics Canada rather than by the Bank itself.

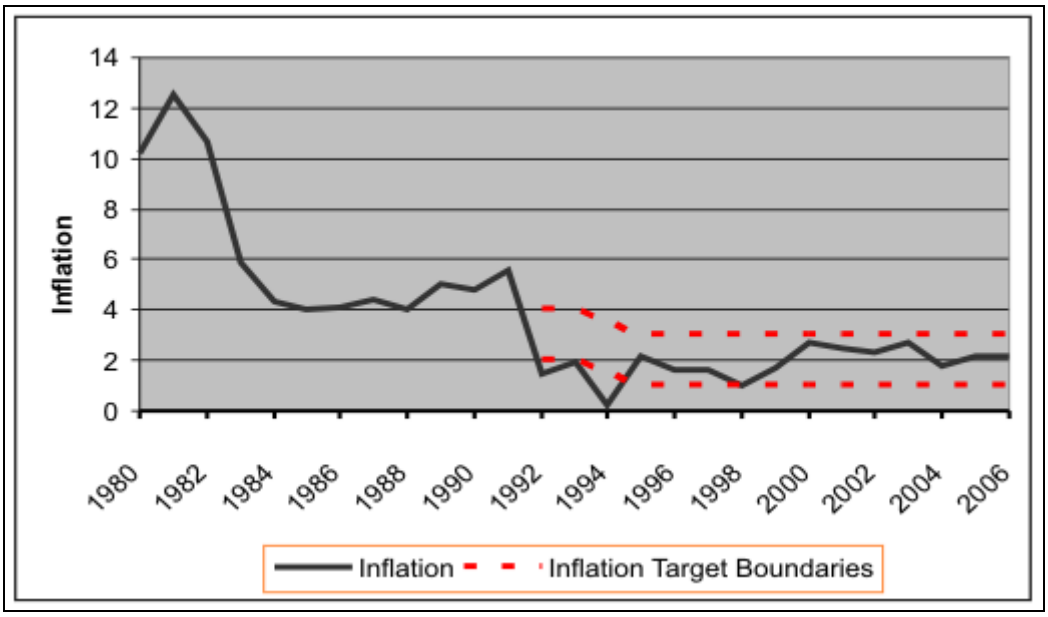
Accountability in the Canadian framework is weaker than that of New Zealand. The Minister of Finance cannot fire the Governor of the Bank for a failure to achieve the inflation goal. The Minister can issue a "policy directive" ordering a change in policy such as moving the interest rate in a given direction. This possibility, however, must add some uncertainty to the perception of economic agents about the independence of the Bank to pursue the price stability goal. No such directive has yet been issued, and some analysts argue that the policy directive does not pose a credible threat to central bank independence because the government is unlikely to ever issue a directive. As in New Zealand, the Bank of Canada has made a large effort toward greater policy transparency by communicating to the public its assessment of the economy, the role played by monetary policy in the behavior of the economy, and the rationale for its decisions. Since 1995, the Bank of Canada has issued a semi-annual *Monetary Policy Report*.

The government and the Bank recognize that under certain circumstances the inflation targets can be breached. These are not enumerated at great length as in New Zealand, but clearly large increases in oil prices or a widespread natural disaster are possible examples. Whether to accommodate these shocks was left to the discretion of the Bank. The data in **Figure 3** show that the Bank of Canada has had a good deal of success meeting its price stability target. From the data it would appear that the Bank of Canada has managed to cope with oil price shocks and the major changes in the relationship of the Canadian to the U.S. dollar. (Between March 1991 and November 2002, the Canadian dollar fell from U.S.$0.86 to $0.64, a depreciation in nominal terms of about 26%.)

(...continued)

expectations changed after the inflation target was introduced.

Figure 3. Inflation and Inflation Targeting in Canada



Source: International Monetary Fund.

Note: Inflation is measured as the consumer price index.

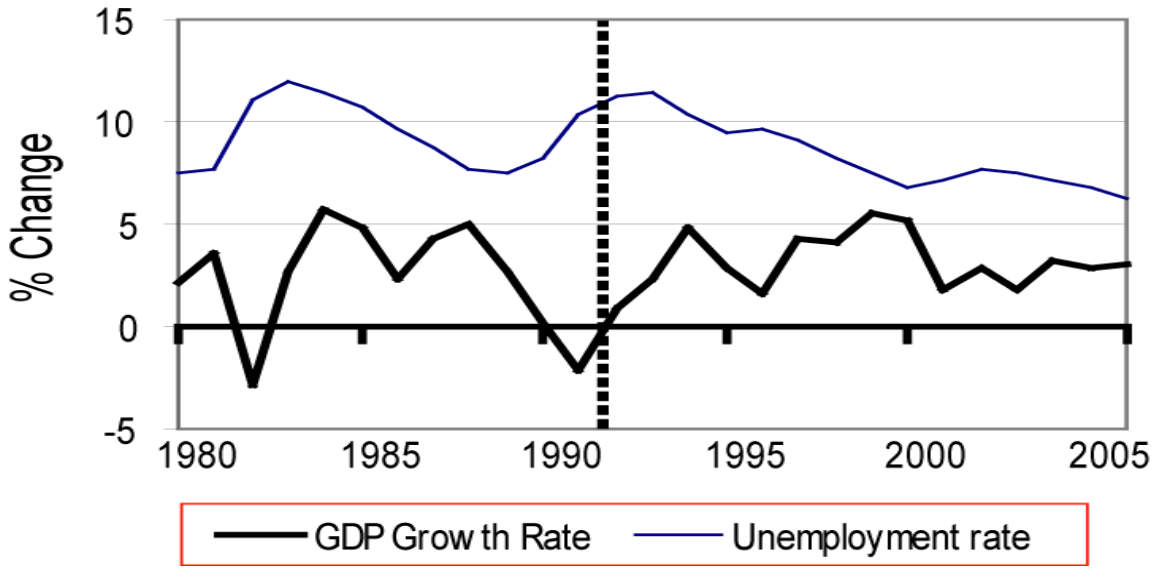
In support of the price stability goal, the government of Canada adopted official targets for the reduction of the federal budget deficit—the Spending Control Act of 1992. Significant budget deficit reductions have been achieved and, as in New Zealand, this has reduced pressure on the Bank of Canada to accommodate the government, thus strengthening the ability of the Bank to focus monetary policy on achieving price stability.[25] Between 1990 and 1995, the budget deficit of the federal government fluctuated between 5.3% and 9.1% of GDP. In 1996, the deficit declined to 2.8% of GDP, and from 1997 through 2006, the budget was in surplus in all but two years.

The performance of the Canadian economy since the price stability regime was fully implemented has been impressive, as shown in **Figure 4**. The average inflation rate under the target was nearly 50% lower than in the years before the target. Between 1996 and 2001, real GDP grew at an average rate of 3.6% and was positive each year. Moreover, Canada managed to avoid the contraction in GDP experienced by the U.S. in 2001, an unexpected result since nearly 40% of Canadian GDP is exported to the United States. Over the period 1986-1991, before the target was adopted, GDP growth was positive in five of the six years and averaged 2.1%. The absolute average of the output gap during 1996-2001 was 0.9%. During 1986-1992, the gap averaged 1.6%, nearly twice as high. The unemployment rate averaged nearly the same over both periods, 8.9% vs. 8.7%. Averages do not tell the whole story, however. During 1996-2001, the rate fell from 9.6% to 7.2% while during the earlier period, the rate rose from a low 7.5% to a high of 10.3%. The transition period to the new regime, 1992-1995, was not an easy one. The inflation rate was 4.8% in 1990 and 5.6% in 1991. It fell to 1.5% in 1992. GDP registered very

[25] It is interesting to note that the path and goals for inflation announced on February 26, 1991, became embodied and used in the preparation of the government budget. They replaced the inflation forecast that had been used before the February announcement.

slow growth in 1992 and 1994, and contracted 2.1% in 1993. Unemployment was above 11% in 1992 and 1993.[26]

Figure 4. Economic Indicators in Canada, 1980-2006



Source: International Monetary Fund.

Note: Dashed vertical line marks the introduction of inflation targeting.

United Kingdom

In October 1992, the Chancellor of the Exchequer announced that the focus of British monetary policy was to be shifted to controlling inflation.[27] This followed Britain's withdrawal from the European Exchange Rate Mechanism whose system of fixed exchange rates had served as an anchor for British monetary policy.

The announcement was made by the Chancellor because the then-subordinate position of the Bank of England to the government was continued (the Chancellor, rather than the Bank Governor, set monetary policy). Neither its autonomy nor independence was enhanced by the change in focus. In fact, this was simply a policy change by the government and involved no change in the statutes governing the Bank. Thus, the new policy could be reversed at any time.[28]

According to the Chancellor's announcement, the goal was to hold the inflation rate, as measured by the retail price index less the mortgage interest component, to a range of 1% to 4% per year with an expectation that the rate would be below 2.5% by the end of the then sitting parliament (which would be no later than the spring of 1997).[29] (In December 2003, the targeted inflation rate was switched to the consumer price index (CPI)). Thus, the index used to measure inflation

[26] The contraction in monetary policy actually predated the inflation targeting regime. Short-term interest rates were in double-digits from 1989 to early 1991.

[27] The Chancellor of the Exchequer is the British equivalent of the American Secretary of the Treasury.

[28] See Ben S. Bernanke et al., *Inflation Targeting* (Princeton: Princeton University Press, 1999), p. 147.

[29] This index is not compiled by the Bank of England.

included both food and energy. This meant that the British chose to include such things as oil price shocks in their target. Moreover, there was no list of special exceptions to meeting the targets for shocks such as in the New Zealand legislation. As the prevailing inflation rate at the time of the announcement was below 4%, a goal of keeping it below 4% was not thought to be very ambitious. The range of the inflation target set by the Chancellor was originally intended to limit the scope for both slippage and counter-cyclical policy. Later, the width of the range was interpreted as representing the view that monetary policy could only imperfectly control the inflation rate. In June 1995, the range of 1% to 4% was replaced by a point target of 2.5% that was to be met on a continuous basis. Since the point target was not (and could not be) continuously met, it implied that some deviations were to be tolerated.

In this initial step to change the monetary regime, the Chancellor set the inflation target. The Bank of England provided a two-year inflation forecast on a quarterly basis (based on such factors as the level of unemployment, GDP growth, the fiscal position of the government, and the growth rate of various measures of money), together with a recommendation on the base interest rate, its major tool for implementing monetary policy. The Chancellor decided whether or not to follow the Bank's recommendation. Thus, in this arrangement, the policy target was not the current inflation rate, but rather the rate expected to prevail two years in the future. It was upon this forecast that the Bank made its recommendation on the current position to take by monetary policy.[30] Several times during these early years, the Chancellor overruled the recommendations of the Bank to change the base rate.

A problem with this arrangement that was perceived early on was that since the Chancellor controlled the base interest rate, the policy variable, a refusal to raise or lower it following recommendations of the Bank of England, could be interpreted in a variety of ways (e.g., that the Chancellor disagreed with the Bank's inflation forecast, or that there was a difference in their respective commitments to the inflation goal). This tended to obscure transparency and weaken accountability and probably also worked to raise expectations of inflation.

Subsequently, steps were taken by the government that both increased the independence of the Bank of England and provided greater information about monetary policy. Beginning in February 1993, the Bank began to issue a quarterly *Inflation Report*, presenting the Bank's assessment of inflation prospects and the views of the staff and officers about economic matters in general. The then Chancellor promised not to edit these reports but allow them to become public as written by the Bank. Subsequent to September 1992, the Chancellor and the Governor instituted formal consultative meetings designed to formulate the implementation of monetary policy (i.e., changing interest rates to achieve the inflation goal). In April 1994, the Chancellor agreed to the publication of the minutes of these monthly meetings after a lapse of six weeks, rather than the previous 30 years. There was no doubt, however, that it was the Chancellor who made the ultimate decision about interest rate changes even though the Bank was given control over the precise timing of the changes. This makes the United Kingdom a unique case in that it may have been the only country to adopt an inflation target without giving its central bank instrument independence (i.e., control over interest rates). Since both inflation targeting and central bank independence are the two major institutional changes that have been credited with generating the worldwide decline in inflation in the 1990s, it is interesting to note that Britain achieved price stability with the former but not the latter.

[30] The reason for the two-year lag is that current changes in monetary policy are expected to have an effect on the inflation rate only in the future.

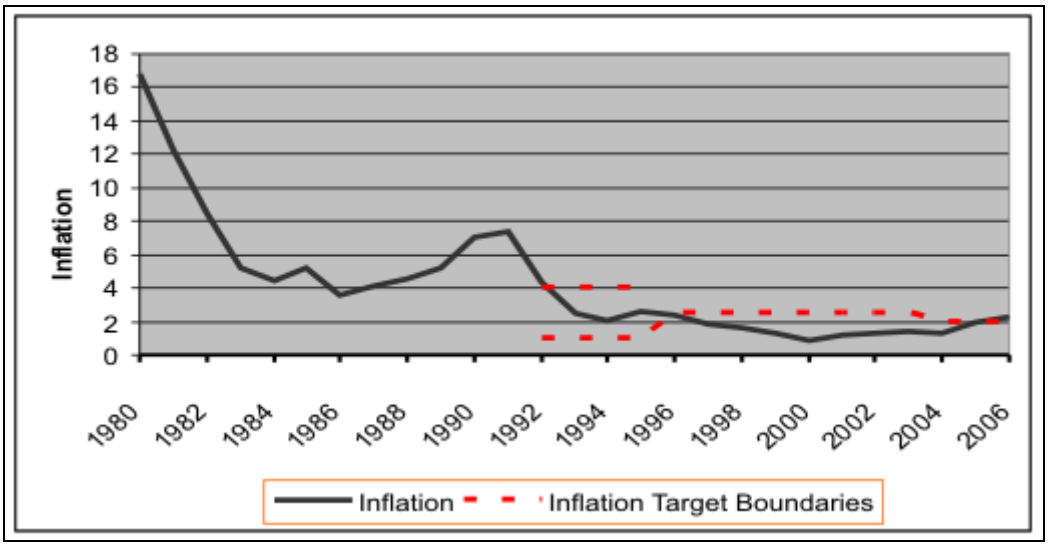
The situation changed on May 6, 1997. The incoming Labour government announced that from then on the Bank of England would be given control over changes in the base interest rates that it felt were necessary to achieve the government's inflation target. Decisions on moving the base interest rate were to be made by a newly created nine-member Monetary Policy Committee. Five of the nine members are Bank of England officers, including the Governor and Deputy Governor. The remaining four are appointed by the government. All serve for a term of three years and are eligible for reappointment. Thus, the Bank was given instrument independence, but not goal independence. On June 12, 1997, just prior to the first meeting of the Monetary Policy Committee, the Chancellor announced that the inflation target would remain 2.5%, but should the actual rate deviate from the target by more than one percentage point (in either direction), it was to trigger a report from the Committee explaining why this had happened, what policy actions were to be taken to deal with it, and when the inflation rate was expected to be back on target. In December 2003, the target was changed to 2%, as measured by the CPI. In April 2007, the Committee wrote its first report to the Chancellor explaining why inflation was more than 1% higher than its target.[31]

There are two possible weaknesses in the current regime. First, the inflation target is set by the government, and the Bank of England is expected to achieve this target subject to an override by the government if required in the "national interest." The law is silent on the conditions under which such an override can be invoked This ambiguity, it can be argued, makes it difficult for economic agents to discern a clear signal of the seriousness of the government's commitment to achieve its goal. No overrides have yet occurred, however. Second, a government can only set an inflation target that lasts while it has a majority in the parliament. When a parliament comes to an end, a question can arise whether inflation in excess of the target will be remediated or whether bygones will be bygones. This, and the possibility of a new target, can also cause uncertainty for economic agents. This may be an inherent limitation of targeting, for no democratic government is likely to surrender its right to determine economic policy to an unelected body. However, as noted above, adherence to a target, once set, seems to be a litmus test for monetary responsibility.

In spite of perceived institutional shortcomings, the new emphasis of price stability has yielded impressive results. Since the adoption of the regime, the inflation rate shown in **Figure 5** has been kept very close to 2.5%, which was markedly lower than during the previous 10 years. The British have had no difficulty achieving price stability in spite of the inclusion of food and energy in their targeted price index. Quite clearly, the United Kingdom has now had more than a decade of low inflation, in marked contrast with the wide fluctuations during the preceding decade.

[31] "Mervyn Writes That Letter," *Economist*, April 21, 2007, p. 65.

Figure 5. Inflation and Inflation Targeting in the United Kingdom



Source: International Monetary Fund.

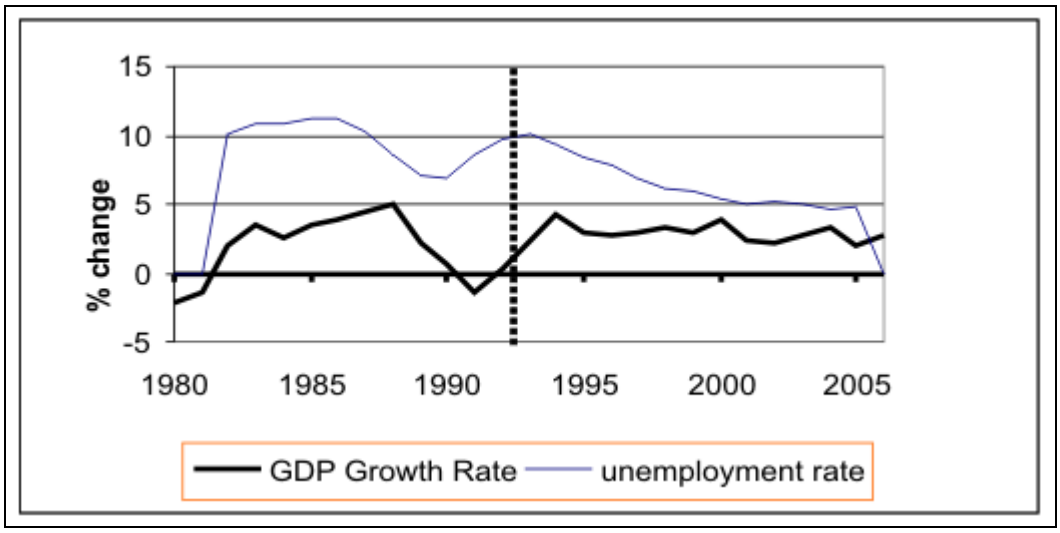
Note: Inflation is measured as the annual change in the consumer price index.

Although the United Kingdom achieved price stability before the Bank's independence was enhanced, there is evidence that independence had a significant effect on inflationary expectations. A measure of inflationary expectations derived from bond yields suggests that it had trended downward after the implementation of the inflation target in 1992. The sharpest drop in expectations came after the Bank of England was made operationally independent in 1997. Since then inflationary expectations have dropped from over 4% to about 2.5%, equal to the inflation target.[32]

The average inflation rate has been cut by half, but **Figure 6** shows this has not had an adverse consequence on the major performance indicators of the British economy. GDP has registered positive growth in each year from 1993 through 2007, and has averaged nearly 3% per year. From 1984 to 1992, GDP contracted in one year (1991) and recorded no growth in another (1992) and averaged 2.4%, due to a worldwide economic downturn. Like New Zealand and Canada, a major disinflation accompanied this contraction, with inflation falling from 8.1% in 1990 to 3% in 1993. However, most of the disinflation occurred before the new targeting regime was even announced. The unemployment rate in the United Kingdom has fallen from 9.4% in 1993 to 5.1% in 2001. Over this period, it averaged 7.2%. (In 2004, it fell to 4.8%.) From 1984 to 1992, unemployment averaged 9% and was below 6% in only one year. The absolute average of the output gap from 1993 through 2001 was 0.9% compared with 1.2% during 1984-1992. Over both periods, it was very large in only one year, 1993 (-2.3%).

[32] Cedric Scholtes, "On Market-Based Measures of Inflation Expectations," *Bank of England Quarterly Bulletin*, spring 2002, p. 67.

Figure 6. Economic Indicators in the United Kingdom, 1980-2006



Source: International Monetary Fund.

Note: Dashed vertical line marks the introduction of inflation targeting.

The new monetary regime did not initially enjoy a supporting fiscal policy. The initial announcement of the shift in monetary policy did not coincide with any statutory commitment to bring down the then-large budget deficit that in 1992 was 6.4% of GDP. It rose to a high of 7.9% of GDP in 1993. It then began a decline, and by 1998 a surplus of 0.4% of GDP was recorded. The deficit trended upward during the 1984-1992 period, with only one year of surplus (1988), while it trended downward from 1993 to 2001, with surpluses from 1998 to 2001. Since 2002, the budget has returned to deficit.

The Euro Area

The euro area's adoption of the goal of price stability is unique: it is the only instance in which the goal was adopted at the currency's founding.[33] Then again, the euro is a unique political development in itself. On January 1, 1999, the European Central Bank took over responsibility for monetary policy in the countries of the euro area. As of 2007, 13 countries have willingly given up their currency and control of their monetary policy, and handed it to a newly created multi-country institution, the European Central Bank (ECB), which has a high degree of political independence and is directly answerable only to the European Union (EU), and not its individual member states. Furthermore, to ensure the Euro's success, the countries of the EU have placed significant limitations on their fiscal policy and public debt, as discussed below.

The sole goal of price stability is enshrined in the multi-national treaty between sovereign governments of the EU that brought the euro and ECB into existence. This makes it much more difficult to change than the mandate of most central banks, since it can only be changed if the treaty is amended. The specific numerical inflation target was not specified in the treaty, however. It was independently chosen by the ECB's Governing Council to support the price stability goal,

[33] Factual information from this section comes from Otmar Issing et al., *Monetary Policy in the Euro Area* (Cambridge: Cambridge University Press, 2001).

and can be changed at any time at the ECB's discretion. Interestingly, the definition they chose was inflation of less than 2%, not explicitly specifying whether this represented a band from 0-2% and if there was a preferred midpoint to the band. Note that the 2% target has precedence in the EU and was not chosen arbitrarily: in the years leading up to the euro, the council of the EU instructed all prospective members of the euro to bring their inflation rate down to 2%. This is somewhat analogous to the transition period that many countries adopt when implementing an inflation target in which inflation is allowed to slowly decline down to the targeted rate.

Many of the other details surrounding the target were not included in the treaty either. The Governing Council decided that the inflation target should be achieved over the medium term, and that inflation would be defined by the 12 month change in the harmonized index of consumer prices (HICP) for the euro area as a whole (policy will not be directed towards unique inflationary developments in individual countries). The ECB decided against targeting a core inflation rate or identifying "escape clauses" when the target would not have to be met.

Credibility is always an important issue for central bankers and one of the main arguments used by inflation target proponents. The ECB faced a unique credibility problem: it has no past record on which to stake its reputation. For political reasons, many participants felt that the ECB could achieve credibility if it could establish continuity with the Bundesbank, the German central bank which was known for its tough anti-inflationary stance. This was one reason that the sole goal of price stability was enshrined in the founding treaty. It also helps explain why the growth rate of the monetary aggregates is given a prominent role in the ECB's decision making—restraining the growth of the monetary aggregates had traditionally played a prominent role in Bundesbank policy—despite the fact that targeting the aggregates will sometimes contradict the inflation target.[34]

Accountability and transparency are provided through annual and quarterly reports to the European Parliament, publication of the ECB's inflation forecast, and press releases immediately following the monthly meetings of the ECB Governing Council, which determine changes in monetary policy. There are no formal penalties in place if the inflation target is missed, however, and the meeting minutes and voting records of individual members of the Governing Council are not released.

As is the case with individual countries, large budget deficits can make the goal of price stability more difficult for the ECB to achieve. Indeed, a shared monetary policy creates greater incentives for individual countries to run large budget deficits than would normally occur when the fiscal and monetary authorities represent the same government. That is, individual countries could benefit by increasing their budget deficits to the detriment of the other members of the euro area since budget deficits would tend to push interest rates up across the euro area. Individual countries may also be less concerned about debt default if they think the ECB would be willing to bail them out.

To offset the debt incentive problem, the EU adopted the "Stability and Growth Pact," which limits euro members to budget deficits under 3% of GDP, unless the member's economy shrank by at least 0.75%, and limits member sovereign debt to less than 60% of GDP. Since a number of

[34] Some economists do not consider the ECB to be a true inflation targeter since it does not have a sole goal of price stability. It also has a goal of targeting the growth of the money supply. The rationale for the latter goal, however, can only be understood in terms of promoting price stability.

countries wishing to join the euro already had debt levels above 60% of GDP, this requirement was modified to require members to adopt a future debt path that would lead them to a debt level of 60% of GDP. To enforce the pact, the EU had the right to fine offending countries up to 0.5% of their GDP. These fiscal strictures are undoubtedly harsher than those that most other sovereign countries face: U.S. budget deficits were higher than 3% of GDP for most of the period from 1982 to 1993, and again from 2003 to 2004. However, if the countries in the euro area are compared with, say, the state governments in the United States operating in the "dollar area," then the strictures do not appear particularly harsh at all. Nearly all American states are legally required to run balanced budgets and cannot be bailed out by the Federal Reserve if they default (although they could theoretically be bailed out by the federal government).[35]

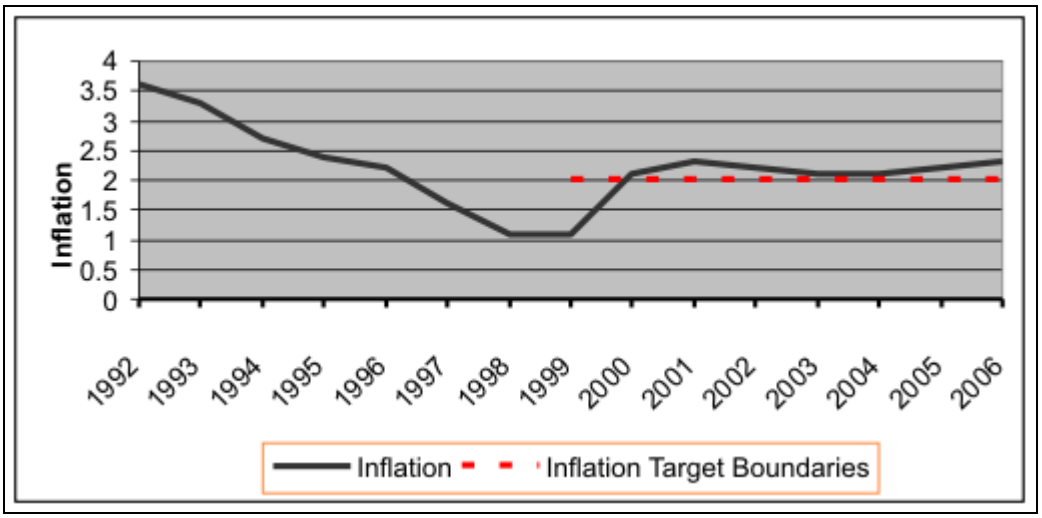
In the first three years of the euro, all euro area countries met the requirements of the Stability and Growth Pact and budget deficits were significantly smaller than in preceding years. However, several of the countries ran a small budget deficit despite experiencing relatively robust economic growth. Unfortunately, budget deficits grow when economic growth falls, due to declines in tax revenues and automatic increases in expenditures. When the euro area's economy slowed in 2002, it became clear that several countries were unlikely to fulfill the pact's requirements. To date, no fines were assessed for these violations although the offending countries took no remedial action, and at this time the pact's future is in question as a result.

As seen in **Figure 7**, the ECB has successfully kept the inflation rate low, but not as low as its target. From June 2000 to 2005, the HPIC was at or slightly above the upper bound of 2% in most months. This occurred despite the fact that economic growth was weak from 2001 to 2005, as seen in **Figure 8**. Growth was relatively robust in 1999 and 2000, but over the last decade it has fallen short of the growth rates enjoyed by the United States. The overall growth rate in the 2000s masks the fact that the countries on the "periphery" such as Ireland and Greece have enjoyed rapid rates of growth, while countries at the "core" such as Italy and Germany have lagged behind. Average unemployment was lower in the 2000s than the previous decade, but remains relatively high, as it has been since the 1980s. Research suggests that inflation targeting has had little effect so far on inflationary expectations. Although inflationary expectations reached their lowest point in 15 years in 2000, they reached their highest point—well above the target's upper bound—since 1993 in late 2001.[36]

[35] For more information, see Anne Brunila, Marco Buti, and Daniele Franco, eds., *The Stability and Growth Pact*, Palgrave (Hampshire, U.K.: 2001).

[36] M. Forsells and G. Kenny, "The Rationality of Consumers' Inflation Expectations: Survey-Based Evidence for the Euro Area," *European Central Bank working paper 163*, August 2002. The authors derive an estimate of inflationary expectations based on the European Commission Consumer Sentiment survey.

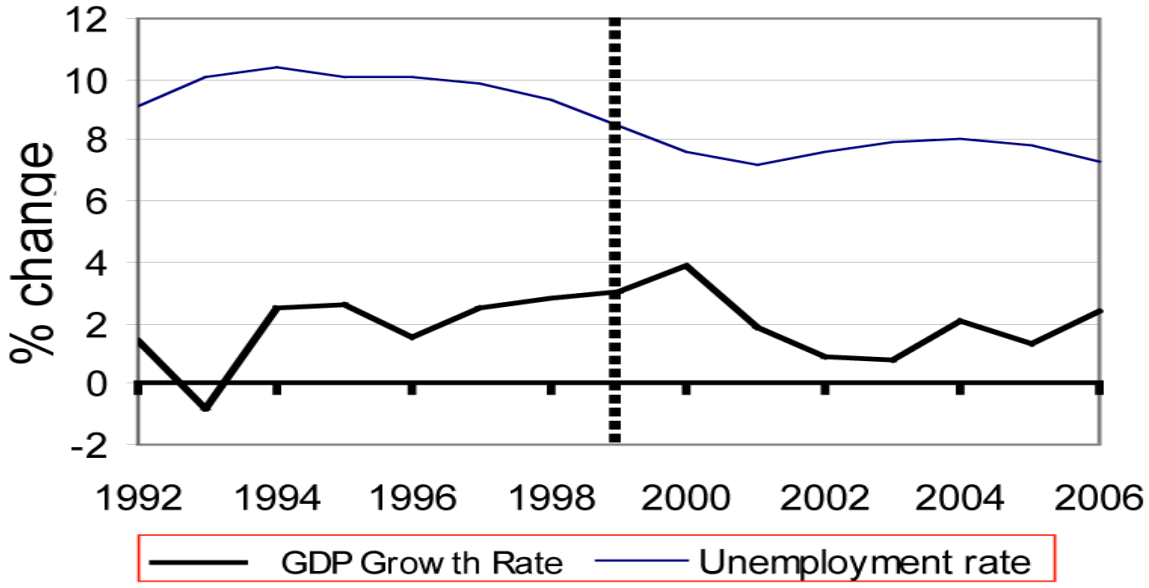
Figure 7. Inflation and Inflation Targeting in the Euro Area



Source: International Monetary Fund.

Note: Inflation is measured as the annual change in the consumer price index.

Figure 8. Economic Indicators in the Euro Area, 1992-2006



Source: International Monetary Fund.

Note: Dashed vertical line marks the introduction of inflation targeting.

In its first few years of policymaking, the ECB has come under significant criticism.[37] Critics charge that the Bank has been too slow to respond to changing economic conditions. These critics have become particularly vocal since economic growth in the euro area began to slow in 2001. Growth was below 2% from 2001 to 2005. In some countries, such as Germany and Italy, growth has been lower than the average. The critics claim that the ECB should have cut interest rates more aggressively, as the Fed did, to counter the downturn. From October 2000 to June 2003, the ECB cut the overnight interest rate from 4.75% to 2%. During that time, the Federal Reserve lowered overnight interest rates by 5.5 percentage points to 1%. Critics have also claimed that the Bank has not been sufficiently transparent, pointing to the fact that financial markets have expected a more expansionary policy than the Bank has delivered.

The irony of this criticism is that the Bank appears to be doing exactly what would be expected from a central bank whose sole goal is price stability. From June 2000 to 2005, the HPIC was typically at or above the upper bound of 2%. Although the economic slowdown would be expected to quell inflationary pressures, it did not do so enough to offset other developments that were boosting prices, such as the oil price spike. It is difficult to see how the Bank could have cut interest rates more aggressively without ignoring its target. And since it never deviated from its target, its actions should have been transparent. In this light, the misperception on the part of financial markets seems to be due to their belief that the Bank would pursue its mandate less aggressively than it did.

Literature Review

In his previous academic career, Chairman Bernanke and his co-authors devised a series of tests to answer the question "How successful has inflation targeting been?" First, they ask "Does inflation targeting make disinflation less costly?" In other words, does the short-run tradeoff between inflation and unemployment improve under an inflation targeting regime? To answer this question, they look at the predicted tradeoff based on data prior to the regime and compare it with the actual tradeoff after the regime. They do not find compelling evidence that inflation targeting improves the short-run tradeoff. Second, they ask "Does adoption of inflation targeting reduce inflationary expectations?" Based on survey and interest rate data, they find that inflationary expectations declined in all targeting countries after the adoption of the target, but not immediately. However, during that time inflationary expectations declined in non-targeting countries as well, suggesting there could be some other force driving expectations.[38] Finally, they ask "Does inflation targeting change the behavior of inflation?" For example, they hypothesize that if targeting improves central bank credibility and inflationary expectations, then there would

[37] For example, see Hugh Williamson, "Germany to Urge ECB to Cut Interest Rates," *Financial Times*, October 16, 2002, p.5; John Berry, "Euro Still Struggling as Debut of Cash Nears; Challenge to Dollar Fails to Materialize," *Washington Post*, p. D7, December 26, 2001; "Irrational Pessimism," *The Economist*, December 8, 2001; Hamish Mcrae, "Don't Lay All the Blame at Poor Duisenberg's Door," *The Independent*, p. 23, October 20, 2000; Mark Tran, "Growing Pains for European Bank," *The Guardian*, August 30, 2001; Tony Barber, "Anxious Midwife Awaits Birth of the Euro," *Financial Times*, December 19, 2001.

[38] More evidence on the behavior of inflationary expectations can be found in David Johnson, "The Effect of Inflation Targeting on the Behavior of Expected Inflation," *Journal of Monetary Economics*, vol. 49, 2002, p. 1521. He found statistically significant evidence that inflation targeting, all else equal, would bring down expected inflation by about one percentage point the year after its announcement. See also Andrew Levin, et al, "The Macroeconomic Effects of Inflation Targeting," Federal Reserve Bank of St. Louis, *Review*, vol. 86, July/August 2004, p. 51. Levin et al argue that there is less of a link between past inflation and expectations of future inflation in inflation targeting countries than non-targeting countries.

be less pass-through from price shocks to long-term inflation. To answer this question, they forecast inflation rates based on data prior to the adoption of the targeting regime and compare it with actual rates achieved after the regime. They find that the actual rates are better than forecasted, suggesting targeting may improve the inflationary process in a benign way. However, actual rates were better than forecasted in many non-targeting countries as well. This suggests that more prudent central banking in general, rather than inflation targeting in particular, has changed the behavior of inflation.[39]

Economist Michael Dotsey argues that a direct comparison of targeters and non-targeters underestimates the effectiveness of inflation targeting because the countries that choose to become targeters are more likely to have had problems with high inflation in the past. He argues a better way to judge inflation targeting is by comparing the change in inflation before and after inflation targeting is adopted to the change in inflation in non-targeting countries over the same period of time. When this comparison is made, he finds that inflation targeters experience a much larger decline in inflation than non-targeters. This conclusion begs the question of why some countries have been able to keep inflation low without inflation targeting, however. It may also imply that a country that has already achieved low inflation, such as the United States, has little to gain from adopting an inflation target.[40]

Economists Dueker and Fischer compare three targeting countries (New Zealand, United Kingdom, and Canada) to three non-targeters (Australia, Germany, and the United States), and find little statistical difference between the two groups. In both groups, inflation fell, and the inflation performance of the targeter closely matched its non-targeting counterpart.[41]

Economists Neumann and von Hagen empirically estimate how monetary policymaking changed after the adoption of inflation targeting. They find that interest rates rose more when inflation rose in Australia, New Zealand, the United Kingdom, and Sweden after targeting was adopted, but find contradictory evidence for Canada. Compared with non-targeters, monetary policy is not significantly more responsive to inflation in targeting countries than in Germany, but it is more responsive than in Switzerland and the United States, although some of this evidence is not statistically significant. Monetary policy is most responsive to the output gap—which would not occur under a strict inflation target—in two targeters (Australia and Canada) and two non-targeters (Switzerland and the United States).[42]

Economists Ball and Sheridan argue that countries show a reduction in inflation after adopting a target because of "reversion to mean"—countries with high inflation one year are more likely to have low inflation in the next year independent of policy choices. The authors also found no statistical evidence that targeting countries had more stable inflation or economic growth than non-targeting countries after adjusting for mean reversion. Therefore, they argue that the benefits of inflation targeting are overestimated by looking at reductions in inflation. By stressing the role

[39] Ben S. Bernanke et al., *Inflation Targeting*, Princeton University Press, (Princeton: 1999), chap. 10. In their sample, four countries are considered to be inflation targeters: New Zealand, Great Britain, Sweden, and Canada.

[40] Michael Dotsey, "A Review of Inflation Targeting in Developed Countries," Federal Reserve Bank of Philadelphia, *Business Review*, 2006:3, p. 10.

[41] Michael Dueker and Andreas Fischer, "Do Inflation Targeters Outperform Non-Targeters?," *Federal Reserve Bank of St. Louis Review*, September 2006, p. 431.

[42] Manfred Neumann and Jurgen von Hagen, "Does Inflation Targeting Matter?", Federal Reserve Bank of St. Louis, *Review*, July 2002, p. 127.

that random chance contributes to inflation outcomes, this argument seems to downplay the direct effect that monetary policy has on inflation outcomes, however.[43]

A focus on price stability requires that monetary policy be less oriented toward another traditional goal—exchange rate stability. Economist Andrew Rose provides evidence that inflation targeting economies are not more prone to exchange rate volatility or current account imbalances than economies with other types of monetary regimes; however, this evidence is mostly not statistically significant. Furthermore, Rose argues that inflation targeting, although still fairly new, has so far proven to be more durable and less crisis prone than fixed exchange rate regimes. In fact, unlike many fixed exchange rate regimes, no inflation targeting regime has been involuntarily abandoned to date.[44]

Conclusion

Overall, there is conclusive evidence that economic performance improved for industrialized countries after the adoption of an explicit inflation target. As expected, inflation fell and became more stable after the adoption of the target, but this improvement did not come at the expense of significant macroeconomic instability as critics claimed it would. One sign of inflation targeting's success is that no country has involuntarily abandoned it to date. However, when compared with similar countries that did not explicitly target inflation, it is not clear that the performance of targeters was superior. The possibility that good economic performance may have been due to other factors that occurred at the time inflation targeting was introduced cannot be ruled out.

The evidence suggests that good monetary policy depends above all on the intentions and commitment of the central bank. Whether inflation targeting is a useful way to reinforce that commitment is subject to debate and probably hinges highly on the political institutions particular to each country. Furthermore, the execution of monetary policy under inflation targeting may not appreciably differ from the practice in other countries. Countries without formal inflation targets like the United States have been described as implicit inflation targeters, in the sense that there is a widespread perception that the Fed will increase interest rates whenever inflation exceeds 3%-4%. Countries that are already implicit inflation targeters may find little difference in performance following the adoption of an explicit target.

Many of the countries surveyed adopted inflation targets in response to the failure of the previous monetary policy regime. Sweden and the United Kingdom adopted targets soon after having their exchange rate forced out of the European Exchange Rate Mechanism (ERM). New Zealand adopted its target after experiencing several years of double digit inflation. Under such circumstances, these countries presumably had more to gain from a regime purportedly designed to promote stability and credibility.

If the introduction of an inflation target coincides with disinflationary monetary policy intended to reduce the inflation rate, temporary losses in output and employment are likely to occur. In the four economies surveyed in this report, most or all of the disinflation actually occurred before the

[43] Laurence Ball and Niamh Sheridan, "Does Inflation Targeting Matter?", Ben Bernanke and Michael Woodford, eds., *The Inflation Targeting Debate*, University of Chicago Press, (Chicago: 2005), p. 249.

[44] Andrew Rose, "A Stable International Monetary System Emerges: Inflation Targeting is Bretton Woods, Reversed," National Bureau of Economic Research, working paper 12711, November 2006.

inflation target was implemented. The disinflations mostly coincided with the worldwide recessions of the early 1990s, and it is not clear to what extent the disinflations were planned and to what extent they were the byproduct of those recessions. The recessions were brief, and it is difficult to find evidence that the disinflation left negative lasting effects on economic growth, although in some targeting countries average unemployment was higher in the 1990s than 1980s. Since U.S. inflation has been low for over a decade it is unlikely—barring changes in monetary policy—that a disinflationary period would need to accompany the introduction of an inflation target domestically. Thus, the temporary losses in output and employment experienced abroad would not be experienced in the United States and should not be used as an argument against inflation targeting here.

In practice, inflation targets have not taken the pure form that some of their proponents may have envisioned when stressing the regime's purportedly positive effect on transparency, accountability, credibility, and the de-politicization of monetary policy. Exceptions to the target have proven to be the norm and target ranges have been made relatively wide to prevent interest rate and exchange rate instability. Incidents where the inflation rate moved slightly outside the target range have not resulted in abrupt changes in policy. Likewise, target regimes do not live up to opponents' worst fears—central banks under targets have still been willing to use monetary policy to counteract economic slowdowns. At most, it could be argued that the targeters caused policymakers to counteract the slowdowns less aggressively than they should have. For example, in the 2001-2002 slowdown, the European Central Bank lowered interest rates more slowly and less aggressively than the Federal Reserve.

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Author Contact Information

Marc Labonte
Specialist in Macroeconomic Policy
mlabonte@crs.loc.gov, 7-0640

Gail E. Makinen