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Inflation Targeting—Central Bank Practice Overseas

Jane Sneddon Little and Teresa Foy Romano

Abstract:

This policy brief, which is based on an internal memo, summarizes the institutional and operational features observed in the 27 countries that have gained experience with inflation targeting (IT). It finds considerable convergence in many IT practices across countries over the past 10 to 15 years but much variation in policymakers' choices concerning such key issues as how they treat the borders of the target range. On the whole, most IT banks have chosen to practice inflation targeting in a more flexible and, thus, resilient fashion than many analysts once feared—seemingly without much loss of credibility. Currently, however, after a prolonged period of rapidly rising commodity and asset prices, followed by a period of sharp oil and asset price declines, IT is clearly facing the greatest challenges in its short history of relatively widespread use. Fortunately, one key lesson that emerges from our experience to date is that much of the ability of inflation targeting to help moor inflation expectations likely stems from the premium it places on improving transparency standards. These standards are available to all central banks, whether they choose to practice inflation targeting or not.

Jane Sneddon Little is a vice president at the Federal Reserve Bank of Boston. Her email address is jane.little@bos.frb.org. Teresa Foy Romano is a graduate student at Duke University; at the time this brief was written, she was a policy analyst at the Federal Reserve Bank of Boston.

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Introduction

Chairman Bernanke's widely discussed interest in inflation targeting has spurred considerable curiosity about how inflation targeting (IT) actually works in countries that have adopted this approach to monetary policy. Over what period, for example, do IT central banks attempt to meet their inflation target? And what happens when the target measure moves outside the target range? How often does it tend to do so? Intended as background material for discussions that are likely to develop over the course of the next year or so, this policy brief summarizes the institutional and operational features observed in the 27 countries that have had experience with inflation targeting. It finds considerable convergence in many IT practices across countries over the past 10 to 15 years—a finding that is not surprising, given the constraints facing central bankers and the requirements of an IT regime. But it also finds evidence that there is variation across countries in policymakers' choices concerning such key issues as the need to keep actual inflation near the target midpoint or within the target range. On the whole, however, as the record of frequent and persistent off-target outcomes suggests, most IT banks have chosen to practice inflation targeting in a more flexible and, thus, resilient fashion than many analysts had once feared—seemingly without much loss of credibility. But it remains to be seen how well IT regimes will weather the volatile commodity price swings of recent months, which clearly pose the most significant threat to inflation targeting since its widespread adoption over the past two decades. This brief concludes with a few observations for countries considering IT. It makes no independent attempt to evaluate IT as a monetary policy regime.

What Are the Hallmarks of Inflation Targeting?

Full inflation targeting is based on a clear commitment to pursue an explicit, quantified inflation target as the primary (but not necessarily exclusive) objective of monetary policy, a commitment that, given the usual lags between policy decisions and outcomes, must be demonstrated by a high degree of transparency and accountability in the ongoing conduct of policy—as some

banks learned *after* they had adopted IT.[1] Currently, 25 of the 30 countries listed in Table 1 practice full inflation targeting; in addition, Finland and Spain adopted inflation targeting in the mid '90s before their central banks became part of the European System of Central Banks. Many of these countries adopted IT to end a period of stubbornly high inflation. Also shown in Table 1, for comparison, are the Euro-zone, Switzerland, and Japan, which already maintain low, stable inflation and are not generally included in the ranks of the IT banks. Rather, they are sometimes described as "implicit inflation targeters,"[2] either because they do not have an explicit, quantified commitment to maintain low, stable inflation as the primary goal of monetary policy or because they deny that they practice IT.[3] In addition, they are sometimes viewed as less transparent than the full IT central banks.

Choices Required by an IT Framework

To establish an IT regime, central banks must choose a target inflation measure,[4] define a target outcome for that measure, and select a time horizon over which they will be accountable for

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[1] Mishkin and Schmidt-Hebbel (2001) list five pillars of IT: absence of other nominal anchors; institutional commitment to price stability; absence of fiscal dominance; instrument independence; and policy transparency and accountability. Pillars three and four are discussed below as prerequisites for transparency and accountability.

[2] Mishkin and Schmidt-Hebbel's phrase. Roger and Stone (2005) describe them as having an "implicit price stability anchor" misleadingly, as Geoffrey M. B. Tootell pointed out in a conversation at the Boston Fed, since maintaining low inflation allows the price level to drift.

[3] While the European Central Bank's primary objective is "to maintain price stability" (and, without prejudice to that objective, to contribute to a high level of employment and sustainable growth), and while it has a reasonably quantitative inflation target of below but near 2 percent, it has also adopted a monetary policy strategy that it characterizes as neither conventional monetary targeting nor direct inflation targeting and that gives a prominent role to a quantitative target for money growth. The ECB also lacks the transparency that characterizes the other IT banks. While the Schweizerische Nazionalbank (Swiss National Bank, henceforth SNB) meets most definitions of an inflation targeter—and in fact is sometimes listed as one—it does not specify a time horizon over which it is accountable for bringing inflation back to target after a shock. It also denies that it practices IT. As for the Bank of Japan, each year its board members review their "understanding of medium- to long-term price stability," which, expressed in terms of the CPI, currently falls in the range of between 0 and 2 percent, with a median of 1 percent. However, former Governor Fukui has emphasized that this policy guideline is a "shared understanding" among the board members, not part of an inflation targeting regime.

[4] While central banks almost universally cite "price stability" as a goal of monetary policy, none of the IT banks currently target the price *level* (which would imply a stationary price with low variance); rather, price stability has been interpreted by IT banks as low and stable inflation.

meeting the chosen target.[5] In addition, to work with such a regime, policymakers must also decide how they will actually respond when inflation deviates from its target and approaches the upper or lower boundary of the target range. While IT bank practice regarding the first set of issues seems to be converging, responses to the key question of how to treat deviations from target remain more varied, as will be discussed more fully below in the section on performance. (For a brief summary of the IT adoption experiences of New Zealand, Canada, and the United Kingdom, see Box 1).

Currently, all IT countries are targeting a measure of inflation based on the CPI.[6] Most use the headline inflation rate, sometimes defined to exclude interest costs, reportedly because central banks have found it hard to define a core measure that is readily understood and accepted by the general public.[7] For this reason several central banks—including the Czech National Bank and the Bank of Korea, among others—have chosen to change their target measure from an underlying index to the headline CPI. However, in the medium term, the distinction becomes moot, as headline and core measures tend to converge. And, although the number of countries that use the more stable core measure as their target is dwindling, the core CPI continues to play a key and publicly discussed role in the forecasting and policymaking decisions of most IT banks.

When choosing a measure of inflation to target, banks also need to consider both accuracy and degree of bias. In the United States, for example, the two most widely used measures of inflation are the CPI and the personal consumption expenditure deflator (PCE). The PCE measures the goods and services purchased by individuals and nonprofit institutions. In contrast, the CPI measures the out-of-pocket expenditures of urban households, a smaller set of

[5] In some cases, these choices will be made by the government or by the central bank and the government together, as discussed below.

[6] In the United Kingdom, the RPIX, the Retail Price Index minus mortgage interest payments, was the targeted measure prior to 2004.

[7] As Mishkin and Schmidt-Hebbel point out, a core measure excludes items that consumers, especially low-income consumers, care a lot about, exposing the central bank to accusations that it is uncaring or out of touch.

items than the set covered by the PCE. The two indices also differ in that the basket of items included in the PCE is chain-weighted—that is, it changes from quarter to quarter—while the composition of the CPI basket remains fixed.[8] This difference could be especially important when technological progress results in falling prices for such goods as computers, flat screen televisions, and cell phones. Failure to account for increasing spending on items with falling prices creates a bias in the CPI that leads it to rise more rapidly than the true cost of living. Many weighting differences between the two indices also occur in sectors where third-party payers are important. For example, the PCE gives a greater weight to medical services than does the CPI because the PCE includes health care expenditures made by government and employers on behalf of citizens/employees whereas the CPI includes only the patients' out-of-pocket medical expenditures. The information used to calculate the prices in the two indices also differs; while the CPI utilizes market prices for most items, the broader scope of the PCE necessitates that more prices be imputed from nonmarket transactions. By exception, while the CPI and PCE both use imputed prices for owner-occupied housing—a component often excluded from inflation measures in other countries—the weight of housing in the PCE is about half its weight in the CPI. (See Fixler and Jaditz 2002.) As this example suggests, the choice of a target measure is technically (and potentially politically) complex.

Most IT central banks have adopted a point target within a symmetric range, while a few have chosen a range with no point, a point with no range, or an upper bound without a lower bound (Table 1).[9] When choosing an inflation target, banks must consider that selecting a rate that is

[8] The U.S. Bureau of Labor Statistics currently publishes a chained consumer price index for all urban consumers (C-CPI-U), which allows for substitution within item categories as relative prices change, thereby reducing the index's substitution bias.

[9] The only IT country that has an upper bound without a lower bound for a target is Slovakia. Slovakia is a special case in that it is scheduled to join the Euro Area in 2009. The National Bank of Slovakia began inflation targeting in an effort to fulfill the Maastricht convergence criterion which requires the inflation rate be no more than 1.5 percentage points higher than that of the three lowest inflation member states of the European Union. Poland, Hungary, and the Czech Republic have also adopted an inflation target in order to fulfill the inflation requirement (although they have adopted a point target with a symmetric range). While the Maastricht convergence criterion does not explicitly require adopting an inflation target, it is likely that the remaining accession countries will do so in an effort to fulfill the inflation requirement.

too high could lead to economic distortions and ultimately damage growth. However, at very low inflation rates, the zero lower bound on nominal policy rates is more likely to become relevant and interfere with efforts to provide policy stimulus during periods of slow or negative growth. Weighing these considerations, most IT banks with a stable inflation target are currently aiming for 12-month inflation of between 1 percent and 3 percent, plus or minus 1 percentage point, with the size of the range varying with country attributes such as exposure to external shocks and policymakers' tastes.

It is important to recognize that choosing a numerical target and a specific inflation measure are inherently linked. The United Kingdom provides perhaps the best example of how these two choices are connected. In 2004, the Bank of England switched from targeting an RPIX rate of 2.5 percent, plus or minus 1 percentage point, to targeting the CPI.[10] The Office of National Statistics (ONS) reported that the disparity between the two measures was about 0.5 percentage point, due to formulaic and coverage differences. As a result, when the Bank of England switched from targeting the RPIX to the CPI, they also revised their numerical target down 0.5 percentage point to 2 percent, plus or minus 1 percentage point.

Still, for most IT adopters, it is not the targeted measure that changes, but rather the level of the inflation target that shifts lower over time—largely because one of the primary reasons countries adopt an IT framework is to institutionalize a clear commitment to disinflate to a rate consistent with stable prices. Of the 25 current inflation targeters, 12 have completed disinflation and now have reasonably stable targets, while seven (all emerging-market countries) are still in the process of disinflation.[11] These countries typically indicate a series of annual inflation targets, a long-term inflation objective, and a transition period over which they aim to bring inflation down to the long-term target range.

[10] The Office of National Statistics chose to call the measure the CPI, although the calculation is identical to that of the Harmonized Index of Consumer Prices (HICP) in the European Union.

[11] The eight countries still in the process of deflation are Colombia, Ghana, Indonesia, Philippines, Romania, Slovak Republic, South Africa, and Turkey.

To be workable, the period over which the central bank is accountable for meeting its inflation target must take into account the lags between policy action and its effect on inflation outcomes. Time horizons that are too short would make IT impossible; longer horizons give the central bank more flexibility to pursue objectives other than price stability but could undermine the bank's credibility. Balancing these constraints, most IT banks are accountable for attaining the targeted inflation rate within an ever receding 6 to 8 quarters or over the course of the business cycle.

Accountability and Transparency

As already emphasized, the long lags between policy action and inflation outcomes make it important that the operations and intentions of IT central banks be clear to the public. IT bank credibility and accountability depend on this clarity. Thus, not surprisingly, the IMF has found IT central banks to be somewhat more transparent than banks with other policy regimes, as measured by adherence to its Code of Monetary and Financial Policy Transparency (Table 2).

Institutional elements contributing to transparency range from central bank independence to the makeup of the policy-setting body. As already noted, most IT central banks operate under central bank laws that define price stability (or low, stable inflation) as the primary or sole objective of monetary policy.[12] Often, the government or the government and the central bank jointly set and announce the inflation target—as seems appropriate in a democracy. Such an arrangement may also enhance the credibility of the central bank's commitment by implying that the government's fiscal policy will be supportive. By exception, a few central banks, including the Czech National Bank and the Bank of Mexico, have adopted inflation targeting independently of the government and have set the target range without government or

[12] By exception, Norges Bank explicitly states that it operates a flexible inflation targeting regime giving (unspecified) weight to limiting the variability of output and employment as well as to promoting low, stable inflation.

legislative authorization.[13] However, almost all of the IT banks have had some degree of governmental involvement, the amount differing from country to country. In the case of New Zealand, for instance, the Reserve Bank of New Zealand Act gave the central bank the objective "of achieving and maintaining stability in the general level of prices," while mandating that the government and central bank jointly determine the specific inflation target and other policy objectives. Other IT arrangements are more flexible, giving the central bank wide latitude in establishing target ranges, choosing indices, and choosing time periods over which to meet the price stability objectives. The late Federal Reserve Governor Edward Gramlich suggested a possible correlation between the level of government involvement and the strictness of the IT regime. "Involvement has been the greatest in the strictest regime, New Zealand, and is noticeably less in the more flexible regimes" (Gramlich 2005). Alternatively, government involvement may have diminished over time, since New Zealand was the first IT adopter. Regardless of the degree of government involvement in establishing an IT regime, all IT central banks carry out monetary policy independently of the government (that is, they have instrument independence).[14] At most IT central banks, policy decisions are made by a monetary policy committee with a mix of central bank insiders and outsiders; such institutions tend to reduce the influence of single individuals and increase the likelihood of information-based decisions.[15]

Communications practices generally include the obvious elements. IT central banks set policy at regularly scheduled meetings and usually announce their decisions with a press conference and press release. About half publish minutes of Monetary Policy Committee meetings; only a few publish the votes of individual members. To implement policy, all IT central banks use a readily visible short-term interest rate on a market-based instrument as their operating target, and all take pains to explain how policy works and why policy actions were taken. For all of the

[13] Both central banks moved to inflation targeting on their own; however, in the Czech Republic subsequent legislation enshrined price stability as the main objective of the central bank. That has not happened in Mexico. In practice, most IT banks pursue additional (non-inflation) goals as well.

[14] Again by exception, in a few industrial countries, including the United Kingdom, the central bank acquired instrument independence after adopting inflation targeting.

IT banks, publishing an inflation report has become standard practice. Over time these reports have become more frequent,[16] detailed, and informative. Most inflation reports now incorporate a quantitative forecast for inflation and other macroeconomic variables, while the share of reports using fan charts to illustrate the degree of uncertainty for forecasted inflation and GDP outcomes has, on average, increased from just over 30 percent in 1998 to over 60 percent in 2008.

In other areas, however, transparency standards continue to evolve. For instance, most IT banks simply indicate the likely direction of future policy, while practice concerning the interest rate assumption underlying the inflation forecast (whether constant, market-based, or model-based) varies considerably. Currently, many banks assume that the policy interest rate remains constant and appear reluctant to disclose an endogenous model-based path, seemingly because they fear that confusion could result if events forced a change from the forecast. By exception, the central banks of New Zealand, Norway, and Sweden do publish the expected path of the interest rate over the monetary policy horizon. While New Zealand has been a pioneer in the publication of the central policy path, having adopted the practice in 1997, more recently Norges Bank—and later the Riksbank—went even further by providing not only the numerical expected future path of the policy rate, but also the confidence intervals around this projection and alternative state-contingent scenarios. But no IT bank has disclosed how it weighs price versus output or financial stability, although all IT banks do, in fact, appear to pursue more than one objective.[17]

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[15] Rogers and Stone (2005).

[16] In 2007 the IT banks published three to four inflation reports per year, on average. The United States, while not an inflation targeter, has also increased its communication with the public, moving from two quantitative forecasts a year to a quarterly release. The report includes the central tendency, range, and the distribution of monetary policy committee members' forecasts for real GDP, PCE (personal consumption expenditures), core PCE, and the unemployment rate. The length of the forecast has also increased from a two-year to a three-year projection horizon.

[17] Cecchetti and Ehrmann (2002) find that output deviations have positive weight in the objective functions of all IT banks. Bernanke et al. (1999) also conclude that IT allows central banks to maintain their concern for other important objectives like growth.

These trends in IT bank communications have influenced non-IT bank practices as well. In the United States—where monetary policy is governed by a broad dual mandate to achieve low, stable prices and maximum (sustainable) employment, rather than an explicit inflation target—policymakers have recently improved communication with the public by increasing the number of monetary policy reports per year from two to four. By extending the published forecast horizon out long enough to allow "appropriate" policy to take effect, they have also begun to clarify what the FOMC's implicit inflation target actually is. Previously, this target range had to be inferred from policymakers' discussions of their "comfort-zones."[18]

Accountability standards. IT countries typically measure IT bank performance by the gap between actual and targeted inflation, with accountability requirements varying with the extent of the deviation. When inflation is within the target range, the banks simply provide regular accounts of inflation outcomes and prospects plus an indication of policy actions needed to stay in range. When inflation strays outside of the target range or is expected to do so, accountability requirements turn more stringent. While only a handful of central banks face a formal requirement to provide a public explanation for inflation outside the target range, when this occurs every bank faces pressure to explain whether the outcome involves a policy mistake and how it plans to bring inflation back within range.[19] In a few countries, escape clauses define circumstances, such as an adverse supply shock, when monetary policy *should* allow a temporary burst of relatively high inflation; a few others set their target in terms of less variable core measures, but both of these practices are becoming less common. Over time, in fact, accountability practices have tended to become less formal as transparency practices have seemingly made them redundant. But it remains to be seen whether spillovers from recent

[18] The term "comfort zone" appeared in the headline of a September 2002 *New York Times* interview with former Federal Reserve Governor Laurence Meyer (Stevenson, 2002) and has subsequently been used by Federal Reserve officials on numerous occasions, including prominent speeches by Chairman Ben Bernanke (2005) and by Janet Yellen, President of the Federal Reserve Bank of San Francisco (2006).

[19] The Bank of England provides one example of an institution with a formal requirement to provide a public explanation for IT breaches; the Governor is required to write a letter to the Chancellor of the Exchequer for any month that average inflation moves outside of the target range. Thus, in June 2008 Governor King wrote such a letter upon learning that CPI inflation had averaged 3.3 percent in May.

increases in the volatility of oil and other commodity prices will encourage a reversal toward more formal accountability measures. For the record, no monetary policy committee member has ever been fired or fined for failing to meet an IT commitment.

Performance Relative to Target

According to Roger and Stone (2005), who examine the experience of 22 IT countries[20] between the date they adopted IT and mid-2004, deviations of actual 12-month inflation outcomes from the target have been notable and persistent, as Charts 1 and 2 suggest. According to the mean for all 22 IT countries, the IT central banks missed the target range about 45 percent of the time, with undershooting and overshooting accounting almost evenly for the time out of bounds (Table 3). More relevant for industrialized countries that may be considering an explicit inflation target, industrial countries and countries with stable inflation deviated from the target about one-third of the time. By comparison, the Euro Area missed their target of between 0 percent and 2 percent,[21] measured by the HICP, 62 percent of the time between January 1999 and the first quarter of 2008. U.S. inflation, on the other hand, deviated from a *hypothetical* target of 2 percent, measured by the total CPI (core CPI), plus or minus 1 percentage point, 36 percent (0 percent) of the time between July 1996 and the first quarter of 2008—or 64 percent (33 percent) of the time assuming a narrower +/- 0.5 percentage point target range.[22] Nevertheless, *on average*, the 22 IT countries achieved actual inflation outcomes very close to—just 0.1 percentage point above—the center of the target range (Table 4). For the industrial IT countries,

[20] The Slovak Republic, Indonesia, Romania, and Turkey have adopted IT since their writing.

[21] The ECB currently defines price stability as "below, but close to 2 percent over the medium term." However, since this does not define an explicit range, we impose a 2 percentage point band—which is common practice among IT banks—with an upper bound of 2 percent.

[22] Of course, the Federal Reserve had not committed to an explicit numerical inflation target over these years, and it is impossible to know how it would have behaved if it had done so. We chose 1996 as the starting point for our experiment in imposing a hypothetical IT regime in the United States to coincide with the informal discussion of a 2 percent inflation target that took place at the July 2–3, 1996, Federal Open Market Committee meeting. Several regional Bank presidents and members of the Board of Governors seem to have assumed that President Yellen was referring to the core CPI during her discussion of the matter. A discussion of the faults and merits of different inflation measures then occurred. For this reason, we look at the CPI and core CPI.

the mean deviation was -0.2 percentage points, while in the United States, the mean deviation from the hypothetical 2 percent target "adopted" in 1996 was +0.6 percentage points (+0.3 percentage points). Further, the persistence of the deviations from target, measured by the average length of time between changes in the sign of the deviations, was typically 16 to 20 months—a time span that corresponds well with the 6 to 8 quarters it generally takes for monetary policy to influence inflation.

It should be noted, however, that the averages just described hide considerable variation. Australia, with its narrow band, has allowed inflation to remain out of bounds much of the time, missing the target range 61.7 percent of the time. In contrast, the United Kingdom, with a broader target range, has only transgressed its limits in eight months since adoption—in the first three months after adoption, in one month of 2007, and most recently in May through August of 2008. Widening Australia's target band to a range of 2.5 percent plus or minus 1 percentage point—which brings the Reserve Bank of Australia's target width in line with the majority of IT banks—reduces the amount of time spent outside the target range to 38.3 percent. Similarly, in the United Kingdom, deviations from the midpoint reversed direction in a little more than seven months on average, whereas in Australia, deviations above or below the mid point generally persisted for a year and a half. Obviously, these banks have chosen very different approaches to IT. Whether these choices involved different credibility and welfare costs remains an important question.

What Do Inflation Targeting Countries Gain?

Turning to questions of comparative performance, Chart 1 suggests that some of the IT banks have achieved better inflation outcomes under inflation targeting than they did in the years before they adopted this regime. It even suggests that these banks may have made greater relative gains against inflation than the low-inflation United States made under a dual mandate (shown in Chart 2). Indeed, inflation levels and volatility, as well as interest rates, have declined for IT countries after adoption; output volatility has not worsened and may have

improved after adoption of IT; and exchange rate pass-through appears to have fallen under an IT regime. However, countries that did not adopt IT also experienced improvements around the same time as the IT countries. Neumann and von Hagen (2002) find that for some performance measures, while both IT and non-IT countries improve over time, the improvements are larger for the IT countries. They conclude that inflation targeting promotes "convergence"; it helps poorly performing countries catch up with countries that are doing well. However, Ball and Sheridan (2003) claim that if one controls for reversion to the mean, then the apparent benefits of inflation targeting disappear. While Vega and Winkelried (2005) agree that reversion to the mean is an important phenomenon, they find that by considering wider treatment and control groups, IT matters for mean inflation in both industrialized and developing countries. They also find that the observed fall in the variance of inflation, while seen among IT and non-IT countries, has been particularly strong for IT countries, suggesting that IT has contributed to the fall in inflation volatility.

In examining the survey data for long-term inflation expectations shown in Chart 3, deviations from target do not appear to have unhinged expectations. Levin, Natalucci, and Piger (2004) evaluate the extent to which an explicit inflation objective exerts a measurable influence on expectations formation and inflation dynamics for five industrialized IT countries relative to seven non-IT industrialized countries. They find that for countries without an explicit inflation target, private sector inflation forecasts at horizons up to 10 years are significantly correlated with a three-year moving average of lagged inflation. This correlation is largely absent from the five IT countries, indicating that these central banks were generally successful in breaking the link between expectations and previous realized inflation. Financial market measures of inflation expectations, which are based on the forward rates of nominal and inflation-indexed bonds, provide higher frequency data by which to gauge how well inflation expectations are anchored. In an analysis of long-term bond yields, Gürkaynak, Levin, and Swanson (2006) find that far-ahead forward nominal rates and inflation compensation in the periods after IT adoption in Sweden and after the start of central bank independence in the United Kingdom have been invariant to domestic economic news. However, in the United States and prior to

operational independence in the United Kingdom, they responded significantly.[23] This result suggests that in IT countries the inflation target may serve to anchor expectations whereas in non-IT countries lagged inflation may serve that role. The evidence from both the financial market and survey measures suggests that to date the deviations from target have not damaged the credibility of IT banks' commitment to their inflation target—most likely because these banks have generally adopted a sensible degree of flexibility and have succeeded in making their policy decisions persuasively transparent to the public. However, with the rapid commodity price increases of mid 2007 to mid 2008, inflation already exceeds the upper bound of the target range in over 90 percent of the IT countries; thus, it remains to be seen whether long-term inflation expectations will remain well anchored in an era of volatile commodity prices and whether IT can contribute to the crucially important goal of keeping inflation stable and low.

Concluding Observations.

When inflation targeting was first introduced in the early 1990s, economists and policymakers worried that IT would prove too restrictive, encouraging central banks to keep inflation within range at the expense of other objectives. But in practice, IT has proved fairly flexible and resilient. Apparently, sufficiently long time horizons, sufficiently wide target ranges, and adequate transparency have allowed most IT central banks to miss their targets frequently, by large margins, and for several months without notable damage to their credibility. Further, to date, no country has been forced to abandon IT, probably because flexible and evolving practices and, until recently, a benign economic environment have reduced the conflict between adhering to IT and meeting other objectives (such as output, employment, and financial stability) to workable levels. But now it remains to be seen whether IT can be helpful in keeping

[23] However, far-ahead forward inflation compensation in Sweden and in the United Kingdom (after gaining independence) reacts significantly to the U.S. NAPM report, although in the United Kingdom it shows much less sensitivity than it did prior to independence. (In Sweden far-ahead forward inflation compensation also reacts to retail sales.)

inflation expectations anchored during less benign periods that witness large relative price shocks.

Indeed, IT banks face an inherent tension between achieving flexibility and maintaining credibility. If the central bank is too rigid in its adherence to its inflation target—even in the face of shocks—it can generate unwanted economic volatility or, on occasion perhaps, unhealthy asset price developments. But if the IT regime is too flexible and inflation often misses its target, expectations could become detached from the target, thereby lessening the credibility of the central bank's commitment. Thus, under the (debatable) assumption that average practice might be "appropriate" practice, a country considering adopting an IT regime might want to start with a somewhat wider target range to minimize the chance of "misses" well above the "norm" for mature economies. Similarly, most central banks have found it desirable to respond fairly quickly when inflation has begun to move away from the center of the target range; they have usually not waited for inflation to approach the edges of the range before reacting. As a result, the duration of the misses has generally not exceeded the expected lags between policy change and policy outcome. But whether the duration of the expected lags defines the optimum duration of the misses—or staying within target bounds 70 percent of the time minimizes the costs of IT, particularly at a time of large relative price shocks—remains an important question requiring further investigation.

Clearly, IT is facing the greatest challenges in its short history of relatively widespread use. After a string of energy and other commodity price shocks pushed headline inflation well above and then likely below IT targets for significant periods, the impact of IT regimes on inflation expectations is yet to be determined. In addition, a series of asset price booms in an era of modest CPI inflation has prodded a growing number of observers to question whether central banks can or should commit to giving primary emphasis to pursuit of a specific inflation target. Fortunately, a key lesson that emerges from the experience to date is that much of the ability of inflation targeting to help moor inflation expectations likely stems from the premium it places

on improving transparency standards. And these standards are available to all central banks, whether they choose to practice inflation targeting or not.

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Box 1. Selected Country Summaries

New Zealand:

In the years leading up to New Zealand's adoption of an inflation target in 1990, the country experienced almost a decade of double-digit inflation, low output growth, and monetary policy decisions heavily influenced by political considerations. This brought the government, the Treasury, and the Reserve Bank to consider a nominal anchor in the mid-1980s. At the time, a nominal anchor generally took the form of either a pegged exchange rate or money supply target. However, "the problems other countries were experiencing with unstable money demand seemed to rule out money targeting, particularly since [these countries] were engaging in a program of reform that included extensive financial liberalization,"[1] while pegging the exchange rate would have meant accepting whatever inflation rate was deemed appropriate by the central bank whose currency was targeted.

Against this background, the idea of targeting inflation directly began to take hold. According to former Governor Brash, by 1988 the inflation rate was, "for all intents and purposes, the nominal anchor." The question then arose about how to institutionalize this monetary policy regime to achieve credibility and earn gains from committing to it.

The Reserve Bank Act of 1989 mandated price stability as the single goal for monetary policy, and a Policy Targets Agreement (PTA), signed by the Governor and the Minister of Finance on behalf of the elected government, set out specific targets by which monetary policy performance could be assessed. The Act granted the Reserve Bank operational independence to meet the target determined by the government (the Bank already had *de facto* independence). It stipulated that a new PTA was to be agreed upon by the Governor and the Minister of Finance each time a Governor was appointed or reappointed. The first PTA, signed in 1990, defined price stability to be between 0

[1] Brash (1998)

percent and 2 percent as measured by the CPI and aimed to be within that range by December 1992.

Subsequent PTAs have modified the inflation target band. In 1996, the Reserve Bank widened their target band by increasing the upper bound from 2 percent to 3 percent. In 2002, the target band was narrowed, bringing the lower bound from 0 percent to 1 percent. The news release accompanying the PTA attributes better-anchored inflation expectations to the narrowing of the target band.

The new monetary policy regime increased the transparency and accountability of the Reserve Bank. In addition to the PTA's outlining the target and measure, the Bank publishes a quarterly *Monetary Policy Statement,* which outlines current economic developments and the Bank's forecasts for macroeconomic variables. In 1997, the Bank increased transparency even further by publishing the expected path of the interest rate over the monetary policy horizon. The Governor is held personally accountable for achieving the inflation target set out in the PTA. If the Treasurer or the Reserve Bank's Board of Directors believes that the Governor's performance in meeting this target has been inadequate, then the Governor can be dismissed. To date, no Governor has ever faced dismissal.

Canada:

In February 1991, the Minister of Finance and the Bank of Canada jointly announced that the Bank would target the CPI inflation rate for a five-year period. At the time, the inflation rate was over 5.5 percent year-over-year. The Bank aimed to bring the total CPI progressively lower, first to 3 percent, then to 2.5 percent, and finally to 2 percent, with a symmetric band of +/- 1 percentage point around the point target. By the end of 1993, inflation had been reduced to 2 percent and the government and the Bank decided to extend the inflation target until the end of 1998. The Bank of Canada's inflation targeting policy has subsequently been renewed, most recently in November 2006 for a

five-year term lasting until December 31, 2011. Due to the lags in the effect of monetary policy, policy actions are directed at moving inflation to the target midpoint over a six to eight quarter horizon. In this way, policy strives to keep the inflation trend at the 2 percent target midpoint. While the overall target is defined in terms of the total CPI, the Bank uses a core measure of inflation as a short-term operational guide for monetary policy.

While Canada implemented an inflation target in 1991, its communications and accountability framework has evolved over time. It was not until 1995 that the Bank of Canada began publishing the *Monetary Policy Report*—perhaps in part to explain why the Bank did not lower rates despite headline inflation falling below the target's lower bound. The Bank of Canada published two editions of the *Monetary Policy Report* (MPR) annually between 1995 and 1999, before adding the release of two *Monetary Policy Updates* between *MPR* releases in 2000. That same year, the Bank adopted a system of eight pre-specified dates each year for announcing any changes to the official interest rate it uses to implement monetary policy. The system replaced the announcement of changes to the Bank Rate that could, in principle, be announced on any business day. The Bank of Canada noted that the changes were made to "reduce uncertainty in financial markets" and to "increase the Bank's transparency, accountability, and ongoing dialogue with the public."

Since the inception of the inflation targeting regime, the CPI has deviated from the 1 to 3 percent band. The Bank of Canada's policy in the case of the CPI "persistently deviating from the 2 percent target midpoint" is to give the matter special attention in its *Monetary Policy Report*. The *Report* explains why inflation has deviated to such an extent from the midpoint, what steps are being taken to ensure that inflation moves back to the midpoint, and the timeframe in which this will take place.

United Kingdom:

The United Kingdom's adoption of an inflation target in the aftermath of sterling's exit from the Exchange Rate Mechanism (ERM) in September 1992 required the country to develop an alternative monetary policy framework. The government looked to the inflation targeting experience of New Zealand, and in 1992, the Chancellor of the Exchequer announced an inflation target. The government chose to target the Retail Prices Index excluding mortgage interest payments (RPIX), with a target range of 1 percent to 4 percent and the intention that the measure be in the lower half of the band by 1997. In 1996, an inflation point target of 2.5 percent was announced with a range of 1 percentage points on both sides of the midpoint.

At the time of adoption, the Bank of England did not have operational independence. However, a regular monthly meeting between the Chancellor and the Governor of the Bank of England and their advisors was instituted, allowing for monetary policy to be more forward looking than it had been in the past.[2] The minutes of those meetings were published, revealing the rationale behind the decisions, and allowing the Governor to voice his disapproval if he thought the Chancellor's decision inappropriate. This increased transparency was reinforced by the Bank's publication of a quarterly *Inflation Report* containing analysis of inflationary trends in the economy.

Although the institutional changes introduced subsequent to the adoption of IT placed some constraints on the Chancellor's ability to base monetary policy decisions on political rather than economic considerations, it was not fail-safe, given the scope for differences in view on inflation projections. Since the public could, therefore, never be completely sure that policy decisions were based on economic rather than political considerations, the monetary policy arrangement lacked full credibility.

[2] Bean (2003) argues that prior to IT adoption, monetary policy decisions were "often taken in response to a crisis or else with half an eye on political considerations."

After coming into office in 1997, the new Labour government announced that the Bank of England would have operational independence for the conduct of monetary policy. The changes to the regime were laid out in the *Bank of England Act*, passed in 1998, which charged the Bank "to maintain price stability, and subject to that to support the economic policy of (the) government, including the objectives for growth and employment." While the responsibility for interest rate decisions moved to the Bank's newly formed Monetary Policy Committee, the Chancellor retained responsibility for setting the inflation target. The Bank of England increased its transparency by continuing the release of the quarterly *Inflation Report*, publishing the monthly MPC meeting minutes, and recording individual votes.

Table 1
Inflation Target Parameters

Country	Inflation Targeting Adoption Date[1]	Target Horizon	Target Measure	Point Target (in percent)	Target Range (in percent)
Australia	Apr. 1993	Business Cycle	CPI	None	2-3[2]
Brazil	Jun. 1999	Annual/multi-year	CPI (Broad)	4.5	+/-2.0
Canada	Feb. 1991	Indefinite	CPI	2.0	+/-1.0
Chile	Sep. 1999	Indefinite	CPI	3.0	+/-1.0
Columbia	Sep. 1999	Annual/long-term	CPI	4.0	+/-0.5
Czech Republic	Jan. 1998	Annual/multi-year	CPI	3.0	+/-1.0
Euro Area	Jan. 1999[4]	Med-term	HICP	None	<2.0
Finland	Feb. 1993-Dec. 1998	Indefinite	CPI	2.0 by 1995	None
Ghana	May 2007	Annual	CPI	None	6-8
Hungary	Jun. 2001	Med-term	CPI	3.0	+/-1.0
Iceland	Mar. 2001	Indefinite	Headline CPI	2.5 (from 2003)	+/-1.5
Indonesia	Jul. 2005	Annual	CPI	5.0	+/-1.0
Israel	Jun. 1997	Indefinite	CPI	None	1 -3
Japan	Mar. 2006[4]	Med-term to Long-term	CPI	None	0-2.0
Mexico	Jan. 2001	Annual/long-term	CPI	3.0	+/-1.0
New Zealand	Mar. 1990	Business Cycle	CPI	None	1-3
Norway	Mar. 2001	Indefinite	CPI	2.5	None
Peru	Jan. 2002	Indefinite	CPI	2.0	+/-1.0
Philippines	Jan. 2002	Annual	CPI (Ann. Ave.)	None	4-5
Poland	Oct. 1998	Indefinite	CPI	2.5	+/-1.0
Romania	Aug. 2005	Annual	CPI	3.8	+/-1.0
Slovakia	Jan. 2005	Med-term	HICP	None	<2.0
South Africa	Feb. 2000	Annual/med-term	CPIX	None	3-6
South Korea	1998	Annual/med-term (from 2001)	CPI		3.0-5.0
Spain	Jan. 1995-Dec. 1998	Med-term	CPI	None	3.5-4 by early 1996 0-3 (to 1997)
Sweden	Jan. 1993	Indefinite	CPI	2.0	+/-1.0
Switzerland	2000[4]	Med-term	CPI	None	0-2.0
Thailand	May 2000	Indefinite	Core CPI	None	0-3.5
Turkey	Jan. 2006	Annual	CPI	7.5	+/-2.0
United Kingdom	Oct. 1992	Indefinite	CPI	2.0	+/-1.0[3]

From Roger and Stone (2005), central bank websites and the IMF.

[1] Date of effective adoption of full-fledged inflation targeting. The dating of the adoption of full-fledged inflation targeting is mainly from Schaechter and others (2000), Mishkin and Schmidt-Hebbel (2001), and Truman (2003).

[2] Australia describes its target as a "thick point."

[3] Officially, there is not a range, but deviations of more than 1 percent from target require an official explanation.

[4] The Euro Area, Japan, and Switzerland are not full-fledged inflation targeters, but rather they pursue other policy goals in addition to price stability.

Table 2
Inflation Outcomes Relative to Target or Center of Target Ranges[1]

	Key Monetary and Financial Transparency Code Principles[2]					
	Ultimate Objectives Specified in Legislation	Transparency of Policy Framework	Transparency of Policy Operations	Clarity of Policy Decisions	Reporting on Policy Performance	Reporting on Policy Objectives and Assumptions
Full-fledged inflation targeting (11)	0.94	0.97	1.00	0.97	1.00	1.00
Implicit price stability anchor (3)	0.78	0.89	0.89	1.00	0.89	0.89
Inflation targeting lite (14)	0.74	0.67	0.71	0.59	0.86	0.76
Currency board/full dollarization (5)	1.00	1.00	0.80	1.00	0.87	1.00
Exchange rate peg (10)	0.77	0.77	0.89	0.74	0.48	0.82

[1] From Roger and Stone (2005); IMF, Standards and Codes Gateway.

[2] Averages of assessments of each principle across countries in each regime. The assessments are scored as follows: 1= Fully observed, 0.67=Broadly Observed, 0.33=Partly Observed, and 0=Not Observed; assessments of Not Applicable and Not Assessed are excluded. Number of assessed countries per regime is shown in parentheses.

Table 3

Inflation Outcomes Relative to Edges of Target Ranges[1]
Date of IT Adoption to Early 2008

	Frequency of Deviations (in percent)			Magnitude of Deviations (percentage points)			Duration of Deviations (in months)		
Country	Total	Above	Below	Average	Above	Below	Average	Above	Below
Target Measure of Inflation									
All 22 IT Countries*[2]	43.5	19.3	24.2	1.2	1.2	-1.2	8.3	7.0	9.2
Stable Inflation Targets*[2]	32.2	10.6	21.7	0.9	0.7	-1.0	6.2	3.7	8.3
Industrial Countries*[2]	34.8	12.3	22.5	0.9	1.0	-0.8	8.2	7.3	8.8
Australia	61.7	30.0	31.7	1.1	1.3	-0.8	10.1	7.7	14.3
Canada	26.9	6.6	20.3	0.8	0.7	-0.8	3.8	2.6	4.4
Euro Area	61.9	61.9	–	0.4	0.4	–	7.0	7.0	–
United Kingdom	2.7	2.7	0.0	1.2	1.2	0.0	1.7	1.7	0.0
United States- 2pp band[3]	35.7	35.7	0.0	0.6	0.6	0.0	5.7	5.7	0.0
United States- 1pp band[4]	63.6	55.2	8.4	0.7	0.8	-0.2	7.6	9.9	2.4
Core Inflation									
All 22 IT Countries*[2]	42.7			1.0			9.7		
Stable Inflation Targets*[2]	28.9			0.7			7.8		
Industrial Countries*[2]	31.6			0.8			9.2		
Australia	43.3			0.8			9.8		
Canada	8.6			0.9			4.3		
Euro Area	13.3			0.3			15.0		
United States- 2pp band[3]	0.0			0.0			0.0		
United States- 1pp band[4]	32.9			0.1			6.7		

Sources: European Central Bank, Bank of England, Bank of Canada, Reserve Bank of Australia, Federal Reserve, IMF, (*) from Roger and Stone (2005)

[1] Equally-weighted averages for corresponding statistics for individual countries in relevant groups. In the case of the ECB, statistics on deviations above the 2% ceiling are reported.

[2] From Roger and Stone (2005). Stable inflation countries consist of Canada (1/95–6/04), Chile (1/01–6/04), Czech Republic (1/02–6/04), Iceland (1/04–6/04), Israel (1/03–6/04), Mexico (1/03–6/04), New Zealand (1/93–6/04), Poland (1/04–6/04), Spain (1/98–12/98), Australia, Finland, Korea, Norway, Peru, Sweden, Thailand, and the United Kingdom (countries without dates report statistics utilizing data from the time of inflation target adoption until mid-04). The industrial countries include Australia, Canada, Finland, Iceland, Israel, Korea, New Zealand, Norway, Spain, Sweden, and the United Kingdom. Statistics based on data from time of adoption until mid-2004 are reported.

[3] The United States hypothetical inflation target is 2% with a range of +/- 1pp. The date of adoption is assumed to be July 1996.

[4] The United States hypothetical inflation target is 2% with a range of +/- 0.5pp. The date of adoption is assumed to be July 1996.

Table 4

Inflation Outcomes Relative to Target or Center of Target Ranges[1]
Date of IT Adoption to Early 2008

Country	Adoption of Inflation Targeting	Mean Deviation from Range Center[2] (percentage points)	Median Deviation from Range Center[2] (percentage points)	Standard Deviation around Mean Outcome (percentage points)	Persistence of Deviations from Range Center[3] (months)
Target Measure of Inflation					
All 22 Countries[5]		0.1	-0.1	1.4	17.3
Stable Inflation Targets[5]		-0.4	-0.5	1.0	15.1
Industrial Countries[5]		-0.2	-0.3	1.1	15.5
Australia	Apr. 1993	0.1	0.1	1.3	18.0
Canada	Feb. 1991	-0.2	-0.2	0.7	7.9
Euro Area	Jan. 1999	0.0	0.1	0.4	5.7
United Kingdom	Oct. 1992	0.1	0.2	0.5	7.5
United States[4]	Jul. 1996	0.6	0.7	0.6	11.0
Core Inflation					
All 22 Countries[5]		0.0	-0.1	1.3	19.4
Stable Inflation Targets[5]		-0.4	-0.5	0.8	16.1
Industrial Countries[5]		-0.1	-0.2	1.0	17.2
Australia	Apr. 1993	0.2	0.1	0.9	25.7
Canada	Feb. 1991	-0.3	-0.2	0.5	13.1
Euro Area	Jan. 1999	-0.4	-0.4	0.4	37.7
United States[4]	Jul. 1996	0.3	0.3	0.4	14.3

Sources: Haver, European Central Bank, Bank of England, Bank of Canada, Reserve Bank of Australia, Federal Reserve, Roger and Stone (2005)

[1] Equally-weighted averages of corresponding statistics for individual countries in relevant groups. Individual country statistics are based on monthly (quarterly for Australia and New Zealand) differences between 12-month inflation rates and centers of target ranges (or the inflation target ceiling for the ECB).

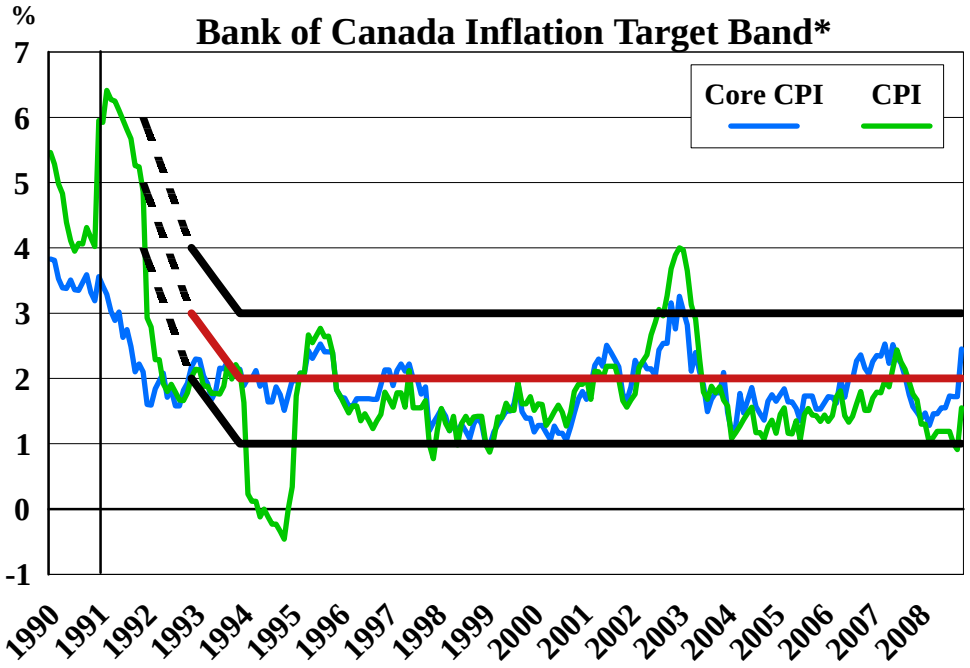
[2] In the case of the ECB, the mean and median deviations from the 2% ceiling are reported.

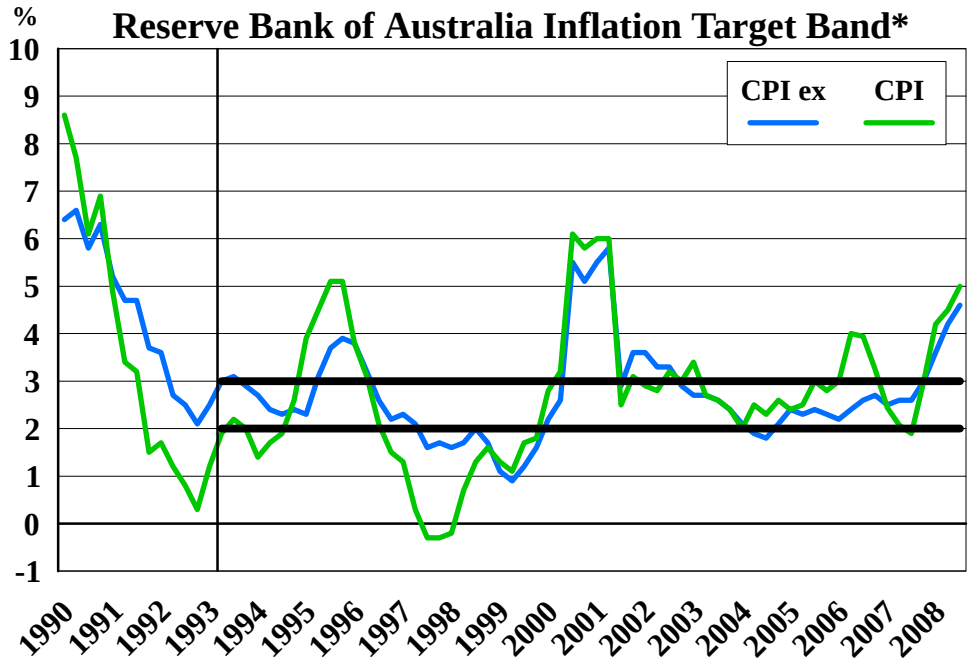
[3] Persistence is defined as the average number of months between changes in the sign of deviations of inflation from the center of the target range, or in the case of the Euro Area, the 2% ceiling.

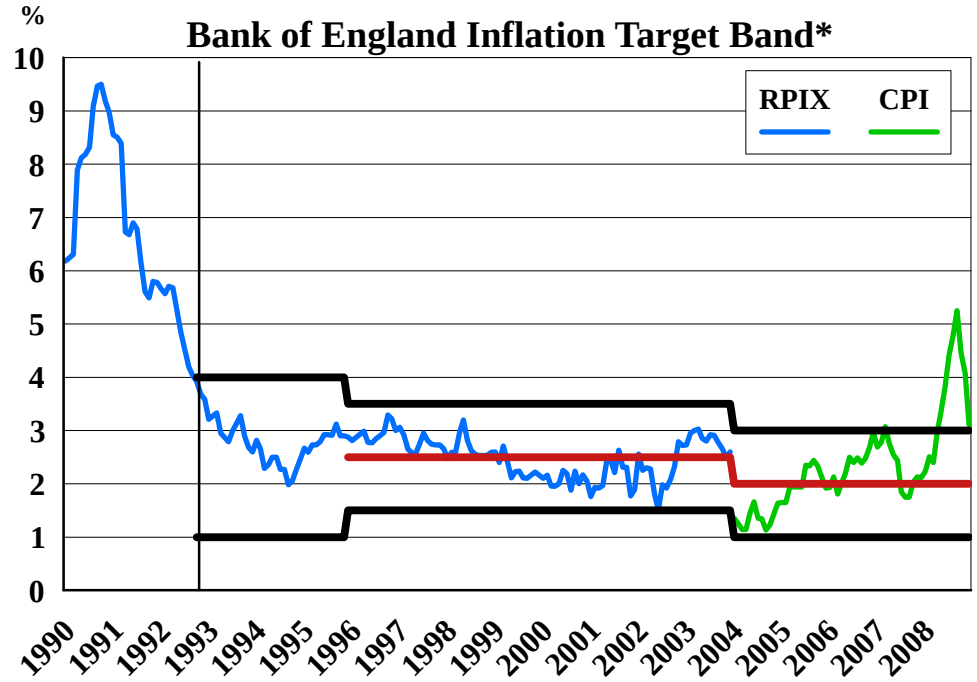
[4] The midpoint for the U.S.'s hypothetical inflation target band is 2%.

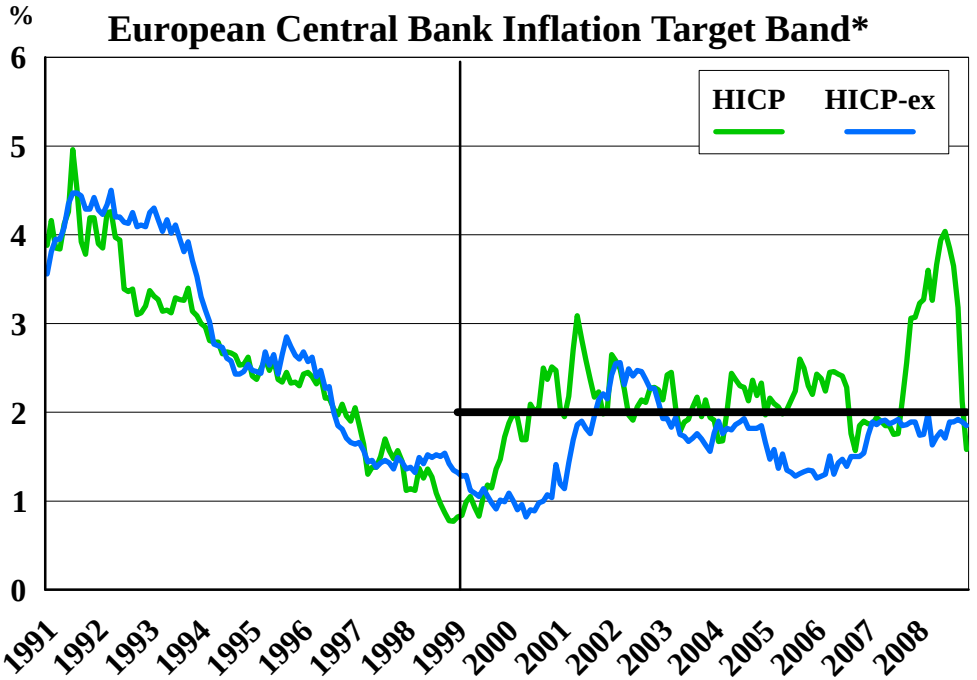
[5] From Roger and Stone (2005). Stable inflation countries consist of Canada (1/95–6/04), Chile (1/01–6/04), Czech Republic (1/02–6/04), Iceland (1/04–6/04), Israel (1/03–6/04), Mexico (1/03–6/04), New Zealand (1/93–6/04), Poland (1/04–6/04), Spain (1/98–12/98), Australia, Finland, Korea, Norway, Peru, Sweden, Thailand, and the United Kingdom (countries without dates report statistics utilizing data from the time of inflation target adoption until mid-04). The industrial countries include Australia, Canada, Finland, Iceland, Israel, Korea, New Zealand, Norway, Spain, Sweden, and the United Kingdom. Statistics based on data from the time of adoption until mid-2004 are reported.

Chart 1







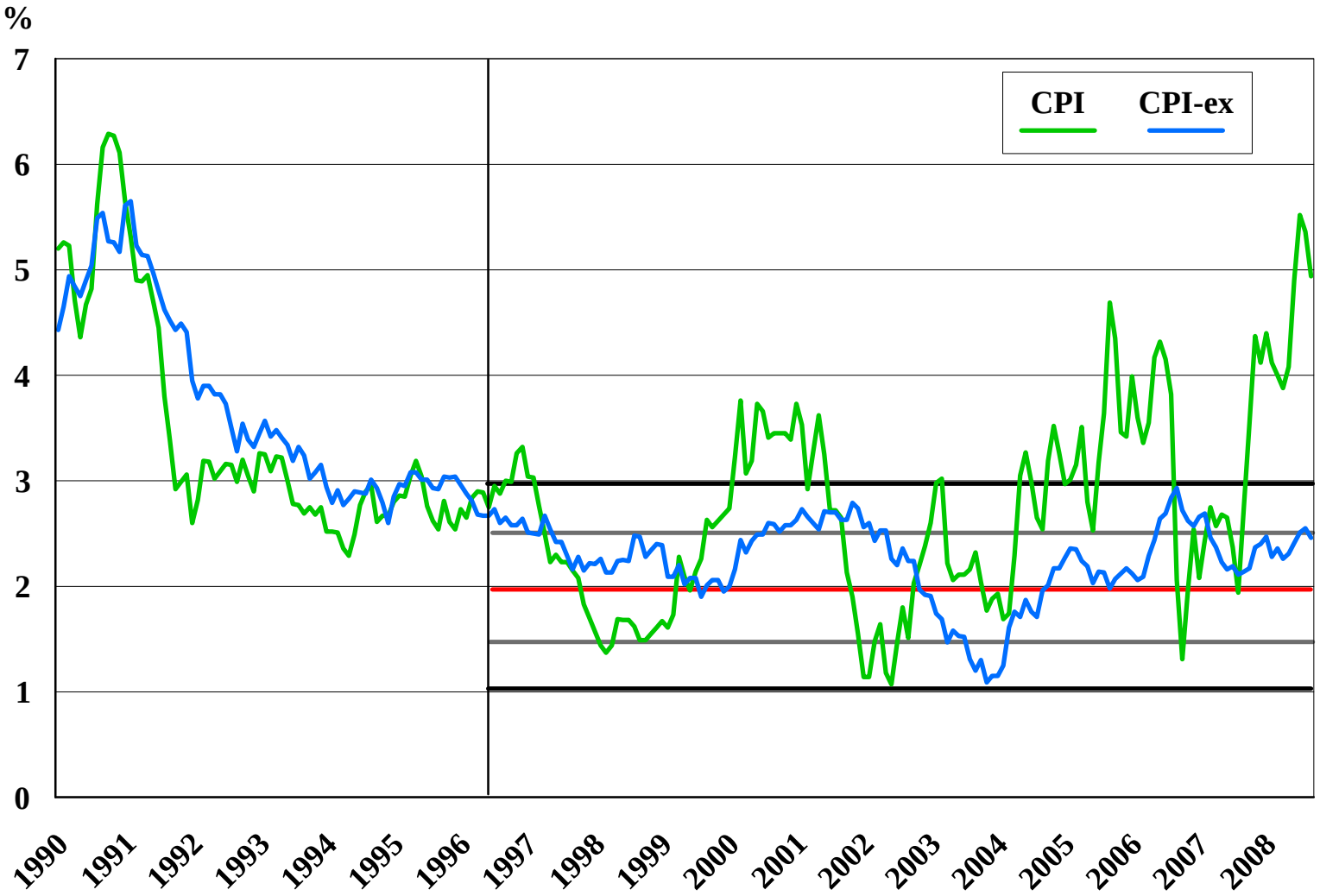


Sources: Bank of Canada, Office of National Statistics, Statistical Office of European Communities, Reserve Bank of Australia.

* All percentage changes are year-over-year. The thin black vertical lines denote IT adoption; thick black lines denote the edges of the target band, except in the case of the Euro Area where they represent the IT ceiling; red lines denote the point target.

Chart 2

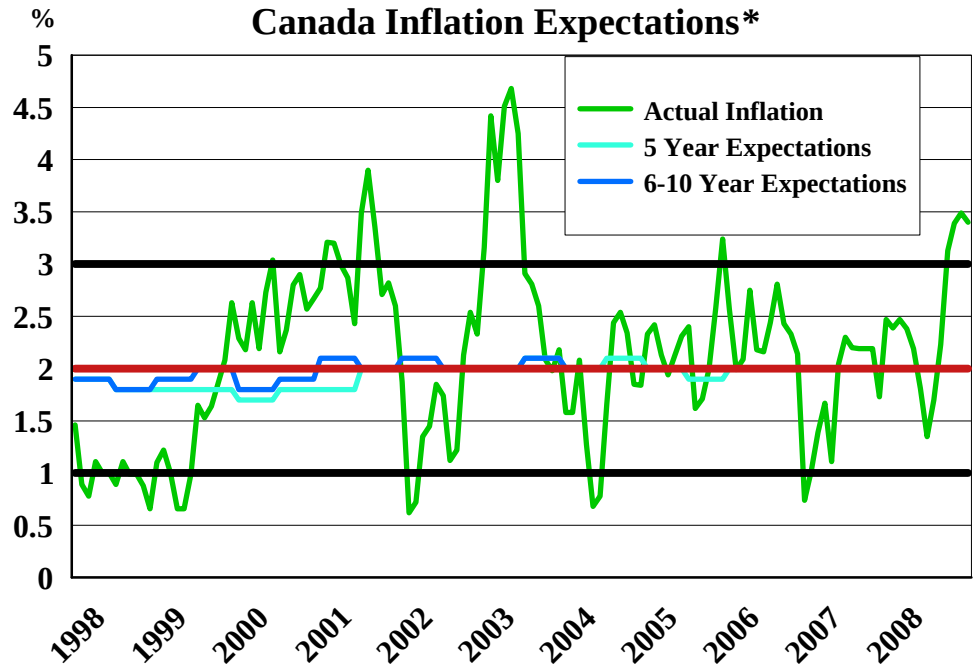
Hypothetical Federal Reserve Inflation Target Bands*

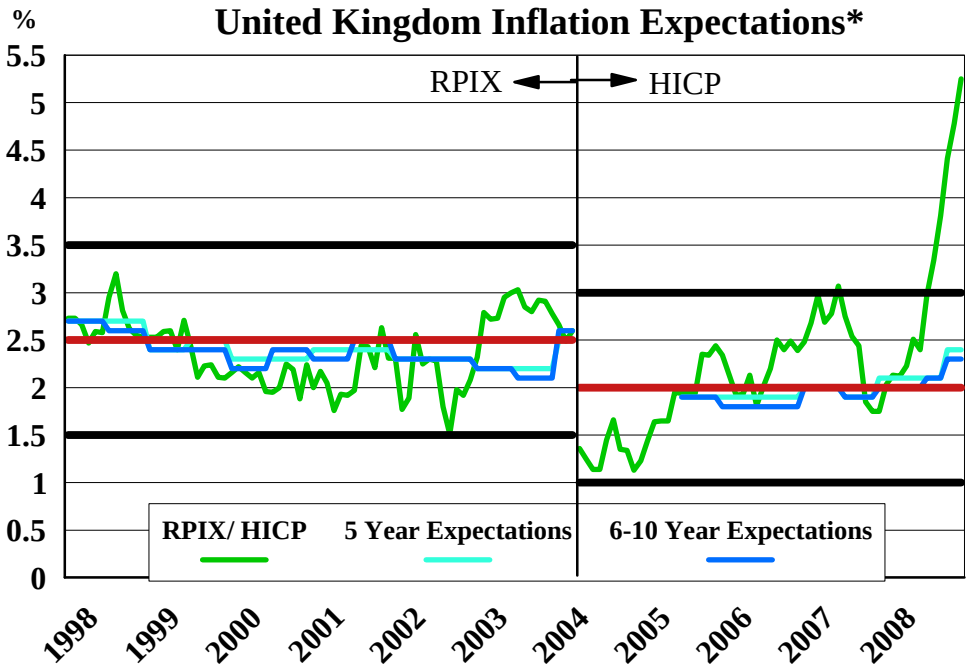


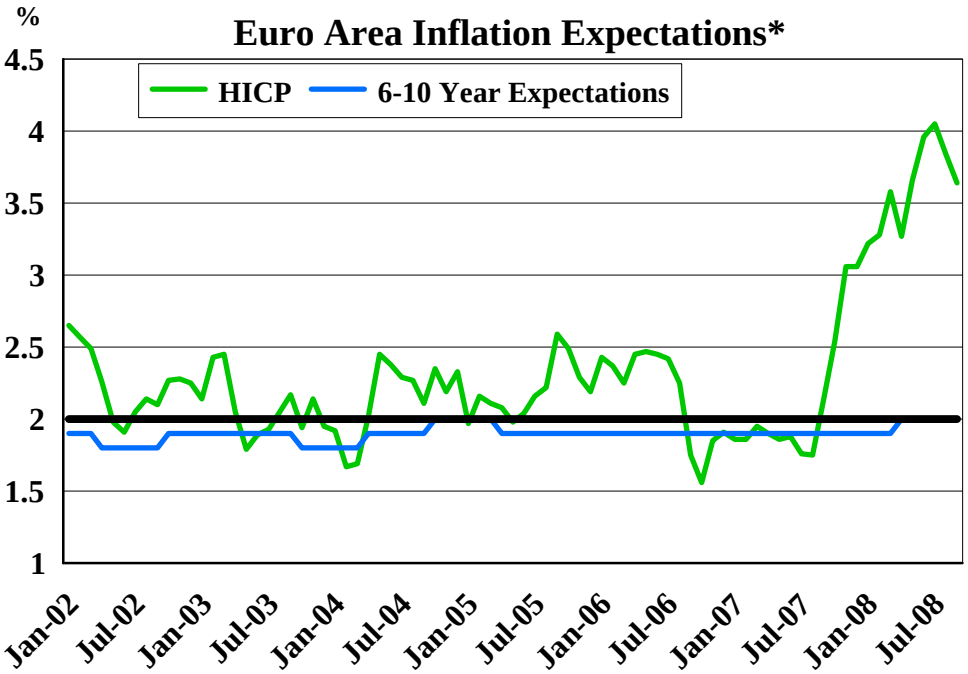
Source: Bureau of Labor Statistics

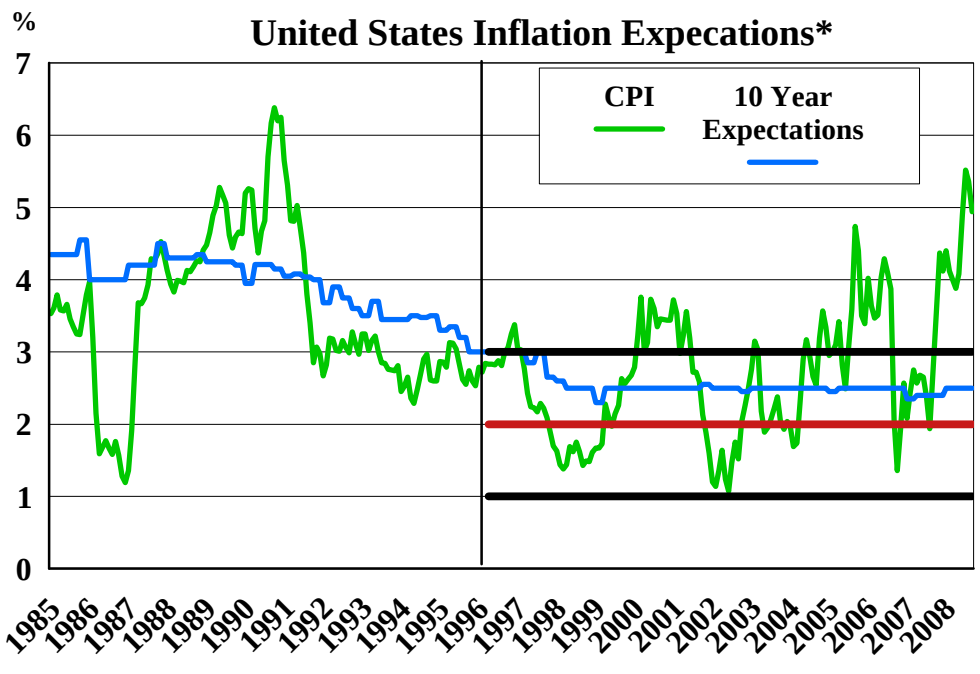
*Percentage change is year-over-year. The thin black vertical line denotes the hypothetical IT adoption date of July 1996; the thick black lines denote the edges of the wider +/-1 percentage point target band; grey lines denote the edges of the narrower +/- 0.5 percentage point target band; the red line denotes the point target.

Chart 3









Source: Consensus Economics, Bank of Canada, Bank of England, European Central Bank, Survey of Professional Forecasters, Federal Reserve.

*All percentage changes are year-over-year. The thick black lines denote the edges of the target band, except in the case of the Euro Area where they represent the IT ceiling; red lines denote the point target.