

Credibility with Flexibility: The Evolution of Inflation-Targeting Regimes, 1990–2006

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- *Most industrialized economies now have an explicit inflation objective as a key component of their monetary policy framework.*
- *Although definitive guides to the appropriate design of an inflation-targeting framework were lacking in the early 1990s, the frameworks have nevertheless changed relatively little since their inception.*
- *Supported by improved credibility, design changes have tended to increase flexibility within the frameworks, allowing for a more nuanced response to economic shocks.*

Inflation targeting is about 15 years old, so there is now much to learn from the collective experience of the industrialized countries that have adopted inflation targeting as the centrepiece of their monetary policy. The impact of inflation targeting (IT) on inflation and other economic variables has been studied extensively. This article focuses on changes in the *design* of IT regimes.¹ Which countries, having introduced inflation targeting at some point, subsequently changed the original makeup of their IT regime, and why? Lessons from their experience can help to identify unexpected problems and highlight the preferred features of an IT regime.

A key issue in the design of an IT regime is how much flexibility it allows. There is widespread agreement that it is not possible for central banks to achieve a specific numerical inflation target all—perhaps even most—of the time. Indeed, it is not even considered desirable. A too-rigid determination to hit the target, even in the face of economic shocks, can generate detrimental volatility in both interest rates and economic outcomes. Yet central banks want to maintain confidence in the IT regime, even if measured inflation is off target, possibly for extended periods. This leaves IT central banks with a significant problem: If they both expect and condone divergences from the target—the essence of flexibility—how can they maintain the credibility of the IT framework?

IT central banks usually resolve this tension by specifying a set of components for the IT regime that go beyond a simple numerical target. This can include ranges around the target (or ranges without a target),

1. As part of the work to inform the renewal of the agreement on Canada's inflation-control target, this article focuses on what can be learned from the experience of industrialized countries other than Canada.

caveats for particular circumstances, varying policy horizons, and different price indexes for the target, all of which may be combined with various institutional arrangements and communications initiatives. Together, these elements form an inter-related framework that becomes part of the monetary authority's overall strategy for communicating with the public and financial markets.

Striking the right balance has not been easy for many central banks. Nevertheless, the rising credibility of the relatively new IT frameworks has, over time, facilitated their flexible application and influenced the design choices of the authorities. This article begins with the introduction of inflation targeting in industrialized economies and then examines how countries have drawn on their own experience and the expanding literature on inflation targeting to change their IT frameworks over time.

The Spread of Inflation Targeting

Today, inflation targeting is a broadly accepted approach on which to base monetary policy, yet it was quite revolutionary in the early 1990s.² At that time, dissatisfaction with both exchange rate and money-growth targets fuelled the search for alternatives, but the analysis of inflation targeting was relatively limited.³ Indeed, little of the extensive literature on inflation targets that is now available preceded their introduction in the first half of the 1990s. As a result, the precise framework adopted by early IT countries depended heavily on the judgment developed from past experience and on the prevailing circumstances.

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2. Some observers have identified various antecedents to the current IT regimes, as well as important related work in the literature (e.g., on the trade-off between output and inflation and early work on the benefits of low inflation). Nevertheless, the adoption of inflation targeting in the early 1990s represented a sharp, and somewhat surprising, break from previous generally accepted practice.

3. This is in part because the focus was on finding intermediate targets on which monetary policy had a more direct and timely influence.

The first wave: 1990 to 1994

A “first wave” of inflation targeters adopted the then-novel framework in the first half of the 1990s.⁴ As a group, these countries had a relatively unsatisfactory history of inflation (see Chart 1). The initial countries, New Zealand and Canada, wished to facilitate disinflation, in part by promoting a reduction in inflation expectations. As low rates of inflation took hold among the industrialized economies, the emphasis shifted to locking in the gains and preventing a reacceleration of inflation.

As New Zealand's inflation rate fell in the late 1980s, there was some uncertainty as to how far this decline should be pursued, and concern that inflation expectations were stabilizing at a relatively high level (around 7 per cent).⁵ When, in 1988, the then-finance minister began to ruminate publicly about desired inflation of “around 0 or 0 to 1 per cent” his comments were greeted with some surprise (Reddell 1999, 67). Despite this somewhat ambivalent reaction, revised central bank legislation was enacted in 1989. It was followed in March 1990 by the first Policy Targets Agreement (PTA) between the finance minister and the Governor-designate of the central bank, which specified an explicit 0 to 2 per cent inflation objective.

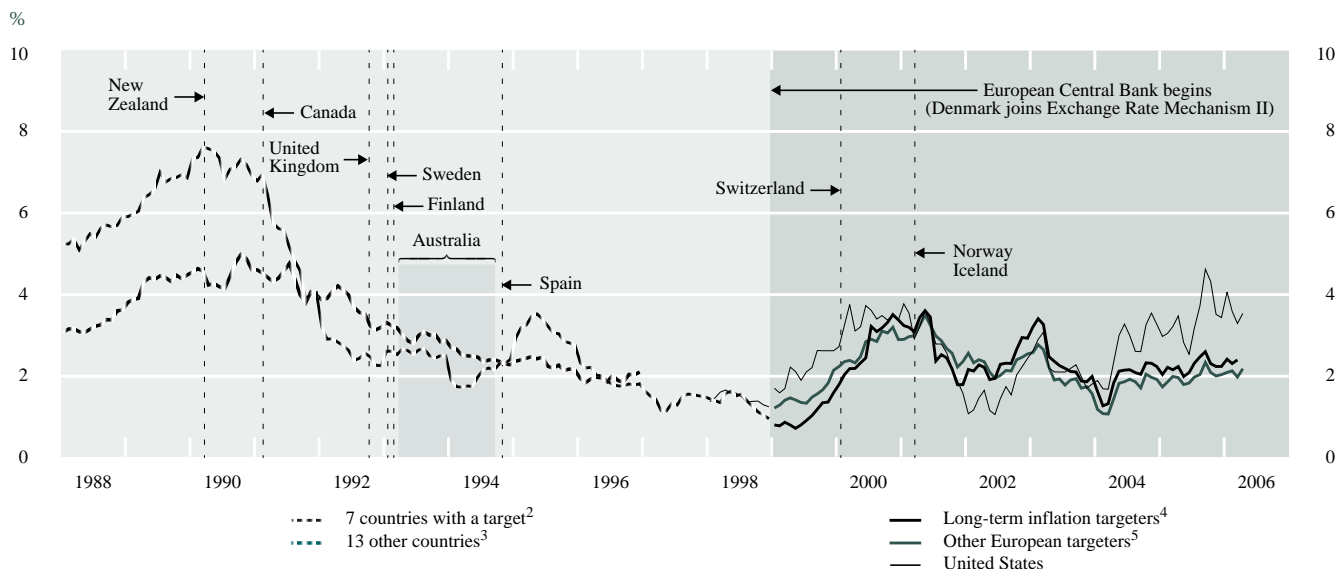
New Zealand was followed by Canada in February 1991, when the Bank of Canada and the government jointly announced the adoption of explicit targets for reducing inflation. As the Bank had been without an explicit framework for monetary policy since the abandonment of monetary targeting in 1982, Governor John Crow made the case in 1988 for lowering inflation towards the longer-run objective of price stability, although no numerical definition was given (Crow 1988; see also Thiessen 2000 for a longer perspective). As in New Zealand, there was a desire to lower expectations to foster disinflation. This desire was heightened by concern about the possible impact of a large price-level shock stemming from the introduction of the Goods and Services Tax at the beginning of 1991 (as well as from the sharp rise in oil prices following the Iraqi invasion of Kuwait in 1990).

4. We include as inflation targeters those industrialized countries that have become generally identified as such in the literature, although some countries may not define themselves thus. Discussions on the definition of an inflation-targeting country abound. See, for example, Mishkin and Schmidt-Hebbel (2001).

5. A particularly comprehensive analysis of the beginning of inflation targeting in New Zealand, and the circumstances which led to it, can be found in Reddell (1999). See also Sherwin (1999).

Chart 1
Inflation Outcomes

CPI Y/Y¹



Note: Vertical lines indicate start of inflation targeting.

1. Aggregate series are unweighted averages of CPI inflation in the specified countries.
2. 7 countries: Australia, Canada, Finland, New Zealand, Spain, Sweden, and the United Kingdom
3. 13 countries: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Switzerland, and the United States
4. Long-term targeters: Australia, Canada, New Zealand, Sweden, and the United Kingdom
5. Other European targeters: euro zone (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain), Denmark, Norway, and Switzerland

Pressure on the exchange rate arrangements in place within Europe, and the subsequent loss of the exchange rate as a nominal anchor for policy, prompted several European countries to move to inflation targeting. It was introduced in the **United Kingdom** soon after that country's departure from the Exchange Rate Mechanism⁶ in September 1992. The new framework announced in October by the Chancellor of the Exchequer (who remained responsible for interest rate decisions) specified an inflation target of 1 to 4 per cent. In a similar fashion, **Sweden** adopted inflation targeting soon after its fixed exchange rate regime was abandoned in November 1992 (with the krona quickly declining by about 15 per cent). In the context of a very weak economy and a faltering banking system, inflation was already low, but a new basis was needed on which to formulate monetary policy. In January 1993, the Riksbank announced that it would focus on a 2 per cent inflation target, with a tolerance interval of ± 1 percentage point. Governor Bäckström later observed that, given the need to put the new framework

rapidly in place, "not all aspects of the new framework, such as how monetary policy should react to various types of shocks, could be thoroughly examined."⁷

The turbulence among European currencies in the early 1990s was particularly problematic for **Finland** and its strong post-war commitment to a fixed exchange rate regime. Like Sweden, Finland faced a deepening recession and a growing banking crisis. Persistent pressure on the markka developed, and it was floated in September 1992. The Bank of Finland adopted inflation targeting six months later, following a period of some policy confusion, with the objective of stabilizing inflation at 2 per cent by the end of 1995. The announcement "was not well received by the public," which responded with skepticism, despite inflation already being close to the announced target (Åkerholm and Brunila 1995).

The adoption of an IT regime in **Australia** followed a relatively informal process, leaving some uncertainty as to its precise timing. In March 1993, the Governor

6. The Exchange Rate Mechanism was originally established in 1979 by the European Community to specify limits on the amount that the value of member countries' currencies could move against each other.

7. See Bäckström (2003). Heikensten (2002) describes subsequent efforts to solidify the new framework.

of the central bank voiced his view that, from the perspective of price stability, inflation of “an average of 2 to 3 per cent over a period of years . . . would be a good outcome” (Stevens 1999). Subsequent speeches added progressively more detail to the framework, including the view that the target should be assessed “on average, over the cycle,” reflecting the position that inflation was hard to control precisely. This tentative beginning led to some difficulty in convincing market participants that Australia had a meaningful target. The original specification was “initially widely thought to be a bit too soft” (Stevens 2003). This uncertainty was resolved in 1996 when the agreement between the Governor and the Treasurer was formalized by the first *Statement on the Conduct of Monetary Policy* (subsequently updated in 2003).

The Governor of the central bank of **Spain** announced the adoption of an inflation target in November 1994, following the implementation in June of a revised law that had granted the central bank full autonomy, in line with the requirements of Spain’s pending participation in the European Monetary Union (EMU). The central bank was also at least partly motivated, as in Canada, by concern over the possible impact of a price-level increase arising from an increase in the Value-Added Tax, which took effect in January 1995.

The second wave: 1999 to 2001

A “second wave” of inflation targeters began when 11 countries (including Finland and Spain, noted above) created the EMU and, as a result, the euro zone. The **European Central Bank** (ECB) began operations on 1 January 1999, with a monetary policy framework that was already fully delineated. The ECB’s Governing Council interpreted the legislated objective of price stability as requiring an inflation rate for the euro area of “below 2 per cent” over the medium term. Note, however, that the ECB does not consider itself an inflation targeter, at least not in the way countries such as New Zealand, the United Kingdom, and Sweden do. Emphasis is given to “a broadly based assessment of the outlook for price developments,” drawing on a range of information, together with a “second pillar” focusing on monetary developments.

Switzerland had used monetary targeting as a nominal anchor for policy, shifting to multi-year monetary targets in the early 1990s as a way to respond more flexibly to shocks. Problems persisted, however, and by the late 1990s, monetary targets were no longer considered best practice (e.g., they were not a good vehicle for explaining policy decisions to the public). At the end of 1999, the Swiss National Bank (SNB)

announced that policy would be based on price stability as defined by inflation of less than 2 per cent, although money was to play an important role. The SNB did not view its new approach as inflation targeting, although Rich (2000, 21) suggests that “the differences between the SNB’s new approach and inflation targeting involve mainly questions of semantics.”

In **Norway**, attempts to maintain short-term exchange rate stability became increasingly untenable in the 1990s, influenced, in part, by large swings in the price of oil. Inflation concerns mounted in response to a prolonged economic upturn, and, in March 2001, the government introduced the *Regulation on Monetary Policy*, which indicated that the policy objective should be price stability, with an operational inflation target of approximately 2 1/2 per cent over time. The government’s decision to adopt an IT regime was also linked to a fundamental change in the fiscal policy framework, which limited the scope for using public finances to manage aggregate demand. In March 2001, inflation targeting was also introduced in **Iceland** through a joint declaration by the central bank and the government. Price stability is defined as 2 1/2 per cent, and the central bank is required to issue a public report if inflation deviates more than 1 1/2 per cent above or below this.

A third wave? 2006 to –

Two major industrialized countries have yet to adopt explicit inflation targeting, or at least to define an inflation rate consistent with price stability—the United States and Japan. In both countries, however, inflation targeting as a basis for monetary policy has been the subject of active debate for several years. In the **United States**, the Federal Open Market Committee (FOMC) discussed inflation targeting on numerous occasions in the mid-1990s, spurred perhaps by the adoption of inflation targeting among the first wave of countries described above. More recently, the debate has received impetus from the replacement of Chairman Alan Greenspan by Ben Bernanke, who is considered generally supportive of a more explicit inflation target for U.S. monetary policy.

U.S. monetary policy in recent years has been widely regarded as successful, acquiring considerable credibility in the pursuit of low inflation. Some observers are therefore skeptical about the benefits to be gained from an explicit IT regime. They suggest that the perceived policy constraints imposed by a specific target are problematic, in part because of the Fed’s legislated “dual mandate” of price stability and full employment. Nevertheless, inflation targeting has received

considerable support among both academics and policy officials, who tend to view a specific target as a means of further enhancing an already successful framework. Supporters note that inflation targeting as actually practised is implemented flexibly and is consistent with output stabilization.⁸ Since Chairman Bernanke's term began in February 2006, public commentary has emphasized an intermediate option, which focuses on the announcement of a numerical definition of price stability that would be relevant over the longer term (see Meyer and Sack 2006a, 2006b, or Gramlich 2003 for an earlier discussion).

The monetary authorities in **Japan** have also discussed inflation targeting on several occasions in recent years, as revealed in the recorded minutes of their monetary policy meetings. Substantial changes to the Bank of Japan Act implemented in 1998 clarified the objective of price stability, but did not define it quantitatively. Suggestions by some observers that Japan adopt an explicit IT framework have been made in a very different environment than in the United States. With persistent deflation over the period 1998 to 2005, inflation targeting was thought to be a means of returning to a low but positive inflation rate.

Although the Bank of Japan adopted various monetary policy measures in the first half of the 2000s (Ito 2004), it did not include explicit inflation targeting. In March 2006, however, an announcement of changes to the Bank's operating procedures was accompanied by a statement that members of the Bank's Board of Directors considered price stability to be consistent with measured inflation in a range of 0 to 2 per cent over the medium-to-long term. They emphasized that this did not imply a policy of explicit inflation targeting, but was simply a reference range for price stability.

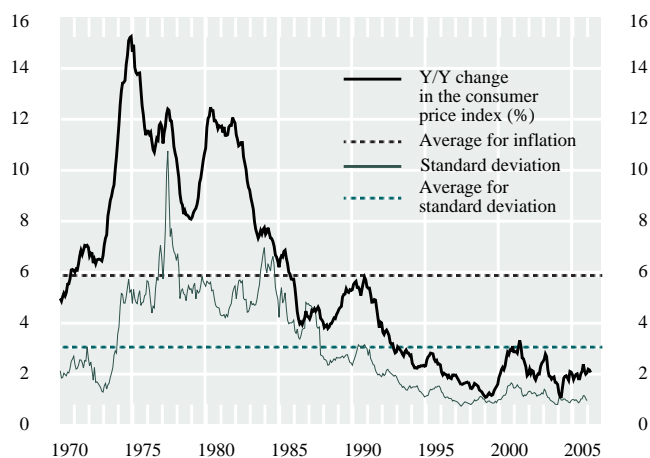
Early experience with IT frameworks

As described above, the proximate cause of the shift to inflation targeting has varied across countries and has included such factors as the loss of previous nominal anchors, the desire to lower inflation expectations during a disinflationary period, concern over the impact of increases to indirect taxes, monetary union in Europe, and fiscal reforms. The collapse of fixed exchange rate regimes has in some cases led to a particularly rapid shift in the policy framework. Nevertheless, underlying most countries' shift was a growing consensus on the desirability of low inflation. Inflation targeting has

8. Many supporters argue that an IT regime actually promotes output stabilization by reducing uncertainty and allowing the monetary authorities to act more aggressively to stabilize output, owing to gains in credibility.

Chart 2

Inflation in 20 Industrialized Countries



Note: Unweighted average of Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States

also spread to an expanding group of emerging-market economies, despite earlier fears that it would be too difficult for these countries to successfully implement an IT regime (see box).

The frameworks might therefore have been expected to undergo extensive revision as experience was gained and the relevant literature expanded.

Numerous analyses have examined outcomes for inflation under IT regimes in the industrialized economies, and for other variables, such as inflation expectations and volatility in output and policy instruments (for relevant surveys, see Kuttner 2004; Mishkin and Schmidt-Hebbel 2001; and Roger and Stone 2005). In general, two broad results emerge. First, inflation targets have successfully achieved and maintained low inflation, but it is difficult to discriminate between the outcomes of IT and non-IT regimes. Indeed, the 1990s saw a general shift to low inflation, with an evident convergence in inflation rates across countries (Chart 2). Second, inflation expectations appear to be well anchored in both IT and non-IT countries, but there is evidence that the impact of economic shocks on

Inflation Targeting in Emerging-Market Economies

Despite the serious inflation problems in the developing world, or perhaps because of them, inflation targeting was initially considered inappropriate for emerging-market economies. Implementing an IT framework was perceived as a daunting task, requiring, among other things, a level of policy expertise, smoothly functioning markets, and institutional infrastructure that did not appear to exist in most of these economies. Other monetary regimes, such as an exchange rate peg, were suggested as more suitable. Over time, however, the emerging economies have come to be seen as the largest potential beneficiaries of inflation targeting, which would provide them with the clear nominal anchor and, ultimately, the policy credibility they lacked. Following the successful disinflation achieved within the developing world during the mid-1990s (see Chart B1), inflation targeting was also viewed as a way of “locking in” the hard-won progress. Between 1997 and early 2002, at least 13 emerging-market economies (including Israel, the Czech Republic, Poland, Brazil, Chile, Colombia, South Africa, Thailand, Korea, Mexico, Hungary, Peru, and the Philippines) adopted an explicit IT regime.¹ In 2005–06, at least four other economies also moved to inflation targeting (the Slovak Republic, Indonesia, Romania, and Turkey).

Although explicit inflation targeting was adopted recently among the emerging economies, it is possible to assess its impact, given the large pool of non-IT emerging economies that can be used for comparison (this is very difficult among the industrialized countries, since only a few of them do not have an inflation target or a definition of price stability). A recent study by the International

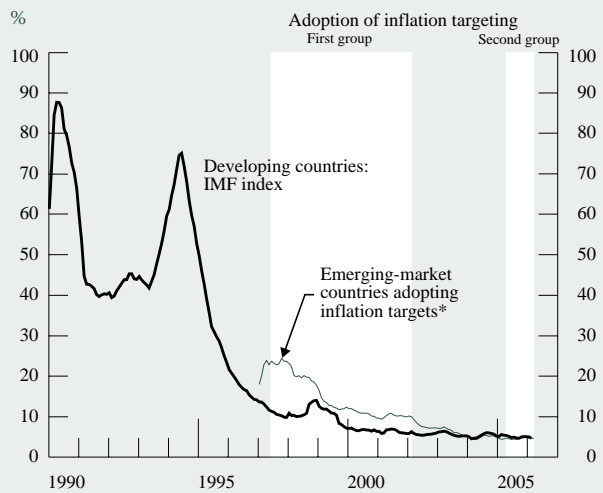
1. We adopt the classification of developing countries with IT regimes as defined in IMF (2006).

Monetary Fund (IMF), for example, compared macroeconomic performance among the first 13 emerging-market economies identified above against 29 comparable non-IT emerging-market countries (IMF 2006). It finds evidence that macroeconomic performance in the economies with inflation targeting has been superior to that in countries which use other monetary policy regimes. While further analysis is necessary to confirm these results, they suggest that inflation targeting can indeed be successfully applied among a broader group of countries than earlier believed.

Chart B1

Inflation in Emerging-Market Economies

(Y/Y-CPI)



* Unweighted average of Brazil, Chile, Colombia, Czech Republic, Hungary, Indonesia, Israel, Korea, Mexico, Peru, Philippines, Poland, Romania, Slovak Republic, South Africa, Thailand, and Turkey

inflation expectations is lower in IT countries (see Gürkaynak, Levin, and Swanson 2006; and Levin, Natalucci, and Piger 2004).

Overall, countries have been far more successful in minimizing the deviations of outcomes from targets than might have been expected, based on earlier experience. Yet inflation targeting remains a reasonably new policy regime, one that Kenneth Kuttner (2004) describes as “still very much in its adolescence.” The frameworks might therefore have been expected to undergo extensive revision as experience was gained and the relevant literature expanded. In the next sec-

tion, we discuss how the various components of the IT frameworks have evolved.

Components of the IT Framework

Inflation targeting is one way to help the public and financial markets understand the central bank’s objectives and actions. In response to criticism that this regime may lead to a narrow emphasis on controlling inflation over short time horizons, all IT central banks stress that they implement the targets with some degree of flexibility—a necessary response to uncertainty about the future behaviour of economic variables

and, in particular, shocks to the economy. This reflects the fact that inflation targeting is not simply about controlling inflation, but is ultimately about achieving good outcomes in the economy.

In some cases, economic shocks may pose relatively little difficulty for the monetary authorities, such as demand shocks that push prices and output in the same direction. Here, stabilizing the price level would also work to stabilize output at its potential (although an important consideration is how quickly to achieve this). However, the problems that can be associated with a narrowly implemented IT regime (one that rigidly adheres to a numerical target over a short period) are more apparent in the face of cost-push shocks, or supply shocks, which can shift output and inflation in opposite directions. In such cases, there is a risk of responding to a one-time shift in the price level as opposed to a trend inflationary disturbance. In a narrowly implemented IT regime, where the central

bank focuses on returning inflation to the target level as soon as possible, the shock to output may be exacerbated. Another type of shock, which some analysts suggest that central banks (both IT and non-IT) should explicitly incorporate into their policy response, is asset-price misalignments.⁹ Some proponents of placing a stronger emphasis on asset prices argue that they can be accommodated within the traditional IT framework by lengthening the policy horizon over which inflation is returned to the target.

The challenge of dealing with shocks in an IT regime is further complicated by uncertainty over the nature of the shock itself, since “shocks do not come with labels” (Trichet 2004, 4). Thus, the overall design of the various elements of the framework, and their inter-relationships, becomes critical. For example, combining a relatively short policy horizon with a narrow target

9. For a discussion of this issue, see Selody and Wilkins (2004).

Table 1
Current Inflation-Targeting Frameworks

	New Zealand	Canada	United Kingdom	Sweden	Australia
Date adopted	March 1990	February 1991	October 1992	January 1993	March 1993
Current target	1–3 per cent range (no specified midpoint)	2 per cent midpoint in 1–3 per cent range	2 per cent (± 1 per cent, but not a target range)	2 per cent, ± 1 per cent	2–3 per cent on average over the business cycle
Target variable	CPI (with caveats for some deviations)	CPI (operationally use core CPI)	CPI (based on the European Union harmonized index)	CPI (but UNDI _X often emphasized)	CPI
Policy horizon ^a	Medium term	6–8 quarters	Medium term	2 years	Medium term
Target set by	PTA (most recently in 2002) between RBNZ Governor and Minister of Finance	Government and central bank (5-year agreement, last set in 2001)	Remit from Chancellor of the Exchequer (at least every 12 months)	Central bank	Joint statement (most recently in 2003) by the Governor of the Reserve Bank and the Treasurer
	Finland ^b	Spain ^b	Euro zone ^c	Switzerland ^c	Norway ^d
Date adopted	February 1993	November 1994	January 1999	January 2000	March 2001
Current target	2 per cent	Close to 2 per cent	Below, but close to, 2 per cent	Less than 2 per cent	Approximately 2 1/2 per cent (± 1 per cent, but not a target range)
Target variable	Adjusted CPI	CPI	HICP	CPI	CPI (emphasize a core measure of the CPI)
Policy horizon	Date-specific	Date-specific	Medium term	2–3 years	1–3 years
Target set by	Central bank	Central bank	Central bank	Central bank	Government

Note: CPI = consumer price index, PTA = Policy Targets Agreement, UNDI_X = measure of underlying inflation, HICP = harmonized index of consumer prices
RBNZ = Reserve Bank of New Zealand

a. The policy horizon may represent different things within an IT regime. Here it indicates the time period that is most commonly emphasized by the central bank.

b. In January 1999, both Finland and Spain became members of the euro zone.

c. The European Central Bank and Swiss National Bank do not consider inflation targeting the goal of their monetary policy regimes.

d. Iceland introduced inflation targeting at the same time as Norway, with the same numerical inflation target.

range to minimize divergences from the target in the face of shocks could lead to instability in policy instruments and induce undesired fluctuations in output.

Dealing with shocks in an IT regime is further complicated by uncertainty over the nature of the shock itself.

These concerns must be accommodated, however, in a way that does not seriously compromise the credibility of the regime by creating doubts over the willingness of the monetary authorities to achieve the target. In the following sections, we examine how policy-makers have designed the elements of their IT frameworks (some of which are summarized in Table 1, as they currently exist) and adjusted them as they gained

experience to meet the dual criteria of credibility and flexibility.

The numerical target: points and ranges

The numerical target itself will influence the overall credibility of the IT regime. Set it too high, and the authorities may not be viewed as serious about achieving a low inflation environment. Too low, and the target may be viewed as unrealistic and have a reduced impact on expectations. In practice, views on what is realistic will vary over time as experience accumulates and expectations adjust.

To reflect the impossibility (and undesirability) of consistently maintaining inflation at a particular value, some central banks have specified a target range rather than a point target, or a range around the target. Yet the interpretation of ranges can be problematic. Is the objective to be within the band, or at its centre? Are the bands simply indicative, or does movement outside the range imply an aggressive monetary

Table 2
Selected Changes to IT Regimes (A)

	Numerical target	Target variable
New Zealand	<ul style="list-style-type: none"> The initial band of 0–2 per cent was widened to 0–3 per cent in 1996 and changed to 1–3 per cent in 2002. The 2002 PTA indicated that outcomes would be evaluated “on average over the medium term.” 	<ul style="list-style-type: none"> Various consumer price indexes were used to avoid incorporating the immediate price impacts of interest rate changes; a new total CPI introduced in 1999 largely removed these effects. The wording for specific caveats was broadened to reinforce the idea that those cited were only some of a possible range of shocks.
United Kingdom	<ul style="list-style-type: none"> The initial 1–4 per cent target range effectively became “2.5 per cent or less” in 1995, and then 2 1/2 per cent “at all times” in 1997. In 1997, deviations of greater than 1 per cent were given special significance, but not considered a “hard edge.” The target became 2 per cent in 2003 to reflect a new target price index. 	<ul style="list-style-type: none"> The CPI excluding mortgage costs (RPIX) was replaced by the European Union’s HICP in 2003, which excludes both house prices and Council Tax (the new price series led to a change in the target, from 2 1/2 to 2 per cent).
Sweden	<ul style="list-style-type: none"> The initial target and target range have not been changed, but beginning in 1999, a formal explanation was required if inflation moved outside of the range. 	<ul style="list-style-type: none"> At various times the central bank highlighted different price indexes (e.g., that excluding mortgage-interest costs and indirect taxes), and in 1999 clarified that other price indexes would be used as operational guides. In 2003, the bank highlighted a series that excluded energy as an especially important guide.
Australia	<ul style="list-style-type: none"> The authorities have clarified that the 2–3 per cent target average means that inflation, when calculated over the cycle, “would have a 2 in front of the decimal.” 	<ul style="list-style-type: none"> The original target was defined as “underlying inflation,” although a specific measure was not identified; after 1998, focused on a price measure that adjusted for housing costs.
Euro zone (European Central Bank)	<ul style="list-style-type: none"> The initial definition of price stability as “below 2 per cent” was changed to “below, but close to, 2 per cent” in 2003. 	<ul style="list-style-type: none"> Targeted total CPI as defined by HICP—sometimes emphasizes that energy prices have caused large movements, but otherwise have made relatively little use of “core” indexes that exclude certain components.
Norway		<ul style="list-style-type: none"> The intent to diminish the influence of temporary disturbances was formalized with the development of a new operational price index (published since 2001) that excludes energy and indirect taxes.

Note: CPI = consumer price index, PTA = Policy Targets Agreement, HICP = harmonized index of consumer prices

policy response, the so-called “hard edge”? In practice, IT central banks have tended to downplay any automatic response implied by the edges of the range (sometimes by giving them little emphasis).

The key changes that have been observed in the numerical targets of IT regimes are summarized in the first column of Table 2. Inflation targeters have demonstrated a clear preference for a target at or around 2 per cent. They have not lowered their inflation targets over time (aside from the use of indicative targets during disinflationary periods at the beginning of IT regimes), despite considerable success in controlling inflation and improved monetary policy credibility.¹⁰ This may be disappointing to those who believe that additional gains can be had from further lowering inflation. Note that some observers emphasize the importance of maintaining a positive rate of inflation, given their concerns over measurement bias and the risk of deflation (in concert with the zero lower bound on nominal interest rates).

Ranges are intended as communication vehicles rather than as “tripwires” for policy action.

Most central banks also employ a range, sometimes without a midpoint. While generally intended to provide greater clarity as to the tolerance levels with respect to the variance of inflation, the edges of the ranges are not regarded as “hard.” Transgressing them is not expected to induce a sudden break in policy behaviour, designed to quickly bring inflation back to the midpoint, but it is generally expected to bring about detailed public explanations.

A further signal that ranges are intended as communication vehicles rather than as “tripwires” for policy action is indicated by their nature. Rather than being based on explicitly defined confidence intervals with respect to inflation outcomes, ranges are generally given in round numbers, typically plus or minus 1 per cent, and are thus relatively easy to explain. Indeed, if viewed primarily as a communication tool, the precise size of the band may not be very important.

10. The reduction of the U.K. inflation target from 2 1/2 per cent to 2 per cent in 2003 was the result of a technical change associated with the targeted price index. See King (2004).

The target variable (and caveats)

Specifying a target begs the question of which prices are to be targeted. The communications aspect of inflation targeting argues in favour of highly visible price indexes that are readily understood by the public. Maintaining credibility also suggests that the choice of price index should not appear manipulative, attempting to hide inconvenient realities.

But inflation targeting also raises the issue of how to deal with transitory inflation shocks. Price movements that do not have medium-term implications for inflation should not typically affect monetary policy. Such deviations may nevertheless strain credibility. Aside from using ranges to explain their behaviour, authorities may choose to focus on price indexes that explicitly exclude transitory effects. For example, they may choose a measure of “domestic” inflation that excludes the direct effects on inflation of changes in exchange rates, or a measure of “core” inflation designed to exclude a range of shocks that are likely to have a transitory impact on inflation. In some cases, the authorities may retain a broad price index (usually the total consumer price index) as the overall objective, but set policy according to a narrower price index, i.e., an operational target that is felt to be more informative over the short term.

Central banks have, over time, developed a more nuanced picture of the different types of possible transitory shocks.

Over time, a number of IT central banks have refined their target variable in an effort to “remove” the impact of perceived temporary shocks (see the second column of Table 2 for a summary of the key changes that have been observed in the target variables). IT authorities have been relatively conservative, however, in the adjustments they make to price indexes, most likely because of the potential measurement problems that may be introduced as well as the implications for communication. In general, central banks have opted for broad series, generally excluding the direct effects of interest rate changes and indirect taxes (and preferably produced by a separate statistical agency rather than by the central bank itself, to minimize the potential for perceived manipulation).

Although central banks have, over time, developed a more nuanced picture of the different types of possible transitory shocks, they have tended to avoid highly specialized indexes, again, most likely in the interests of better communication. They have generally not, for example, emphasized indexes that exclude the direct effects of changes to exchange rates. It is also interesting that, despite the oft-repeated concerns regarding measurement bias, there has not been a shift towards indexes that might reduce this problem (e.g., chain-linked price indexes). Again, these series may be viewed as adding a degree of complexity (including the effects of revisions to past data) that could make communication more difficult.

The policy horizon

Transitory shocks can also be addressed by clarifying the period over which inflation is expected to return to its target. This period may be defined by the monetary policy lags, i.e., the horizon over which monetary policy can influence inflation (sometimes referred to as the control horizon). Alternatively, it may be defined as the period over which it is desirable to bring inflation

back to the target (the policy, or targeting, horizon), with the difference influenced by the relative weight that the authorities place on other objectives (such as the stabilization of output).

An IT central bank may deliberately adopt a policy horizon longer than its control horizon. In general, a medium-term horizon for achieving the inflation objective suggests that other objectives are being accorded at least some weight. It may not be a simple task, however, for an outside observer to evaluate these relative weights.

Important changes that have occurred in the policy horizons of IT regimes are summarized in the first column of Table 3. The tendency has been to somewhat lengthen the policy horizon for the achievement of inflation targets, giving more attention in particular to the medium term, despite the degree of ambiguity such a choice may introduce. These revisions do not appear to have resulted from changing views regarding monetary policy lags, but may more accurately reflect the authorities' greater experience and increased appreciation of the shocks that can occur. An important motivating factor in some instances appears to be

Table 3
Selected Changes to IT Regimes (B)

	Policy horizon	Institutional structures
New Zealand	<ul style="list-style-type: none"> The 2002 PTA placed considerable emphasis on the “medium term.” 	<ul style="list-style-type: none"> Joint PTAs with the government were a key mechanism introduced at the beginning of inflation targeting, although the wording was altered over time to give increased clarity to the central objective of price stability. The clause relating to the desire to avoid “unnecessary instability in output, interest rates and the exchange rate” added to the 1999 PTA was not viewed as compromising the price-stability objective.
United Kingdom	<ul style="list-style-type: none"> The inflation objective was originally set in terms of the length of the current Parliament, but subsequent changes effectively emphasized a medium-term focus. 	<ul style="list-style-type: none"> The revisions to the Bank of England Act in 1998 included operational independence for the central bank, as well as the creation of a Monetary Policy Committee.
Sweden	<ul style="list-style-type: none"> The policy horizon has changed from 1–2 years to 2 years. There has been a steady clarification of circumstances that could lead to sustained deviations beyond the horizon. A process providing for central bank warnings of the need to extend the policy horizon, if necessary, was introduced in 1999. 	<ul style="list-style-type: none"> Increased government support for the central bank’s inflation-targeting approach appeared in budget statements beginning in 1996. Formal institutional independence was introduced for the central bank in 1999.
Australia	<ul style="list-style-type: none"> The horizon has always been put in the context of the medium term, but, beginning in 1996, it was further clarified that outcomes should be evaluated on the basis of “on average over the cycle.” 	<ul style="list-style-type: none"> In 1996, the Governor and Treasurer released the <i>Statement on the Conduct of Monetary Policy</i>, which indicated the government’s support for the inflation target and its recognition of the independence of the Reserve Bank of Australia (reiterated in the 2003 <i>Statement</i>).
Norway	<ul style="list-style-type: none"> In 2004, the initial two-year policy horizon for achieving the target was subsequently changed to “a reasonable time horizon” of “normally 1–3 years.” 	
Finland		<ul style="list-style-type: none"> The new Bank of Finland Act provided for independence of the central bank, beginning in 1998.

Note: PTA = Policy Targets Agreement

the desire to allow for the impact of possible asset-price bubbles.

Lengthening the explicit or implicit horizon does not appear to have compromised credibility. Indeed, such a shift may have been possible precisely because credibility has increased. The public statements of IT central banks may also shift among the control horizon (determined by the monetary policy lags); the inflation forecast horizon, in cases where the central bank publishes an economic projection; and the policy horizon over which deviations from the target are expected to be fully eliminated.¹¹ Although this might represent a challenge for clarity of communication, it does not appear to have harmed credibility.

Supporting institutional and policy structures

It is widely recognized that appropriate institutional and policy structures, particularly the clear support of the government, are important elements of a successful, credible IT regime. Such support has generally translated into increased independence for the central bank and has included policy and communication initiatives undertaken by the government. The evolution of institutional structures used to help establish the credibility of the IT regime in several representative instances is described in the second column of Table 3.

A concern may exist, however, when objectives other than inflation are raised. It is sometimes the case that the relevant government statements or legislation also make reference to apparently competing objectives, such as employment or output growth. It appears, however, that market participants have interpreted such competing statements as indicating that the monetary authorities will place some weight on output stabilization, but not at the expense of significantly undermining price stability.

Communication and the publication of forecasts

Ranges, measures of underlying inflation, explicit caveats, and policy horizons beyond the immediate future are all methods for providing flexibility in the face of uncertainty and transitory shocks. Yet the same flexibility may also threaten the credibility of the IT regime, particularly where the monetary authorities do not (and are perhaps unable to) reveal the weight they are giving to other intermediate objectives

11. The Sveriges Riksbank (Sweden's central bank), in a recent clarification (2006), noted that it had extended its forecast to three years, longer than the two-year policy horizon, in part so that the effects of shocks persisting beyond the policy horizon could be shown more easily.

(e.g., output stabilization or instrument stability). In this situation, the supporting institutional structures discussed above are critical. At least as important are effective communications that publicly explain the authorities' decisions and behaviour.

Communications associated with policy frameworks and objectives have increased enormously over the past 15 years among IT and non-IT central banks alike.¹² As observed by Kuttner, "all inflation targeters talk a great deal" (2004, 94). There is now a significant commonality in the approaches currently taken (with, for example, detailed inflation reports almost universal). One area that continues to evolve significantly, however, is the publication of forward-looking economic information, including forecasts of inflation. Owing to monetary policy lags, the IT framework places heavy emphasis on inflation forecasts, so that policy-makers are able to act in a timely fashion. Svensson (1999, 2005) argues that, properly implemented, an inflation-targeting approach is essentially an application of inflation-forecast targeting. Central banks have steadily increased the amount of forward-looking information that they publish, including, to an increasing degree, their internal forecasts of inflation and other macroeconomic variables. Table 4 summarizes some of the key features of the published inflation forecasts of IT central banks.¹³

The central banks of both New Zealand and Norway have moved markedly far with respect to forecast disclosure. The publication of an interest rate path has been a singularly problematic issue, in part because of concerns that it may be interpreted as a commitment to a particular path by the authorities, and because it is difficult to convey the underlying uncertainty and conditionality of the outlook. Nevertheless, the RBNZ bases its forecast on an endogenous trajectory of interest rates (i.e., rates that are not completely independent but reflect what is happening in the other variables) consistent with attaining the inflation target at its chosen horizon. The Norwegian central bank had been using the market term structure of interest rates (adjusted when it has a significantly different view). In late 2005, however, it started publishing its own

12. See Issing (2005) and Berg (2005) for extensive tables comparing the communication activities of all the central banks discussed here. See Poole (2005) for a more detailed discussion of FOMC transparency.

13. See Berg (2005) for a similar comparison of central bank forecast reporting across a somewhat different grouping of central banks (especially Table 3). In Table 4, we focus on IT banks that report the interest rate assumption that was used. Australia and Canada also publish inflation forecasts.

Table 4

Selected Published Inflation Projections

	Interest rate assumption	Exchange rate assumption	Conveying uncertainty	Approximate horizon	Projection for output gap reported
New Zealand	Endogenous	Endogenous (with eventual return to long-run average)	Alternative scenarios are described (in boxes in the <i>Report</i>) as required.	3–4 years	Yes
United Kingdom	Market-implied (also alternative scenario with a constant interest rate)	An average between a constant level and the path implied by UIP	Fan charts	2–3 years	No
Sweden	Market-implied	Adjustment to long-run equilibrium	Risk assessment includes fan charts around the base scenario; also an alternative inflation scenario.	2–3 years	No (project some measures of resource utilization)
Euro zone ¹	Constant ²	Constant	All figures reported in ranges	2 years	No
Switzerland	Constant	Constant	Also report inflation tendencies based on money indicators	3 years	No
Norway	Endogenous	Endogenous (but use a conservative view of future movements)	Fan charts; alternative scenarios; comparisons with monetary policy rules	3–4 years	Yes

Note: UIP = Uncovered interest parity

1. The projection reported is that of the European Central Bank staff. The Governing Council does not issue a separate projection.

2. Short-term interest rates are held constant, while long-term rates are based on market expectations.

forecast for the interest rate for the following three years.¹⁴

Central banks have steadily increased the amount of forward-looking information that they publish.

To summarize, communication is the glue that holds the IT framework together. Given the ever-present tension between the reality of a numerical target (or range), and the impossibility of constantly achieving it, communication tools such as inflation reports are crucial to explaining the impact of temporary shocks. The use of these tools has increased substantially in IT countries.

It can be argued that clarity about the central bank's objectives is maximized when the inflation forecast (and attendant uncertainty) is made public, so that

14. The endogenous interest rate path is based on a set of six criteria that define an appropriate and reasonable path (see the most recent Norges Bank *Inflation Report*). The recent shift to an endogenous path for the policy rate has reportedly progressed smoothly, although the differences to date between the endogenous path and market-implied rates have been small (see Bergo 2006 and Qvigstad 2006).

private sector agents can assess central bank actions. In effect, the forecast is a summary statistic for all of the information variables upon which policy is set. While there are different ways to obtain information on the central bank's objectives, forecasts may be a particularly effective way of revealing underlying preferences. They may also have drawbacks, however, and an unresolved issue is the appropriate level of detail to be included in published forecasts.

Conclusion

In some respects, inflation targeting in the industrialized economies emerged in an ad hoc fashion. Economic theory in the early 1990s did not provide a definitive guide to the most suitable specification for an IT regime. Nor was it clear what were the optimal conditions under which to adopt an IT framework. Thus, the early specification of IT frameworks, and the timing of their introduction, included heavy doses of professional judgment, to some extent influenced by the exigencies of the day.

From this perspective, it may seem surprising that the original IT frameworks appear to have worked extremely well. With frameworks that have typically changed only modestly since their inception, all IT countries have achieved low inflation and have substantially lowered inflation expectations. This may suggest that, as long as a monetary authority can

establish a credible commitment to low inflation, the precise details of the IT framework are of comparatively little importance. However, the details form part of a broad communications package that is critical to the establishment and maintenance of credibility, given the flexible application of inflation targeting followed by all IT central banks.

It appears that central banks were able to arrive reasonably quickly at a framework that was broadly right for the existing environment. However, changes have occurred over time in several key areas, most significantly in the policy horizon. It had tended to lengthen somewhat, with greater emphasis on the medium term. Greater emphasis has also been given to the kinds of shocks and price movements to which the central bank would either not respond or that would cause it to allow sustained deviations from the target.

The design changes that have been adopted since IT regimes were first introduced were generally not the result of perceived errors with the original specification. Rather, it appears that, as credibility has been established, IT central banks have been able to move towards a more flexible IT regime that is viewed as

more pragmatic, without concern about a loss of credibility. It has also allowed for a more nuanced approach to addressing large but transitory shocks within an IT framework. The remaining variations among the IT frameworks of the relevant central banks probably reflect different institutional realities and historical happenstance rather than strong differences in views of the underlying economic theory.

An important consideration underpinning the choice of many of the elements of the framework has been the ease with which they can be communicated to the public, making it easier to explain the IT central bank's objectives and policy actions. The considerable effort that central banks have put into public communication initiatives and the improved understanding of the IT framework that has emerged over time will likely facilitate future design changes that the authorities may wish to make. As discussed in Murray (2006), these could include increased attention to large asset-price movements, lower numerical targets, or price-level targeting as opposed to the inflation targeting that is now common.

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