Thórarinn G. Pétursson[1]

Formulation of inflation targeting around the world

A rapidly growing number of countries have adopted inflation targeting as the nominal anchor of their monetary policy since New Zealand pioneered the regime in early 1990. Today, 21 countries are on inflation targets. This article discusses the characteristics of these countries and compares them with those that do not follow inflation targeting. It deals with various aspects of the formulation of inflation targeting among the targeting countries and the evolution of the regime in individual countries.

1. Introduction

Economists have long realised the importance of establishing a credible nominal anchor for inflation expectations. Doing so contributes to a low and stable rate of inflation, which is widely agreed to be the primary objective of monetary policy. At the same time, it is generally felt that the monetary policy framework needs to offer sufficient scope for responding to temporary shocks, which can help to dampen business cycles without jeopardising the credibility of the main goal.

However, these two aspects have proved difficult to integrate in practice. The gold standard was regarded as too inflexible an anchor, while pure discretion with no clearly defined target led to excessive inflation without delivering any sustainable long-run economic benefits. Targeting money supply growth was considered to provide a credible anchor, but its relation to price inflation became increasingly unstable as the development of financial markets gained momentum. Consequently, money supply targets became virtually useless as a reliable guide for conducting monetary policy. Fixing the exchange rate of the domestic currency was another way to anchor monetary policy. In effect, this was done by importing the credibility of the anchored currency. Deregulation of capital movements exposed the problems in this framework, and in recent years countries have increasingly abandoned unilateral fixed exchange rates in favour of hard pegs (e.g. a common currency such as the euro) or a floating exchange rate with a different monetary policy anchor.

One example of such an anchor is a formal inflation target, which has been adopted by a growing number of countries in recent years and is now applied in all continents of the world. Many others have adopted various aspects of inflation targeting, and some are considering moving to a fully fledged inflation target in the next few years. The reason for the growing popularity of this framework is that it is seen as combining the two aspects of establishing a credible and transparent nominal anchor for monetary policy and at the same time providing sufficient flexibility to respond to temporary shocks without undermining its credibility. The experience of inflation-targeting countries suggests that the

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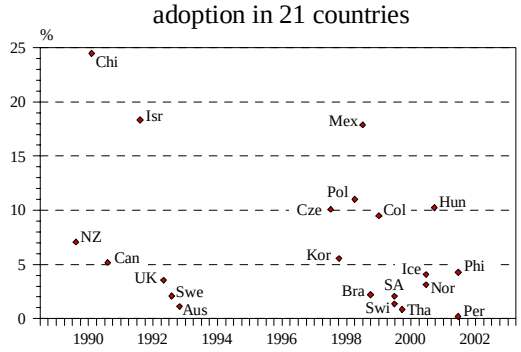
1. The author is Head of Research at the Economics Department of the Central Bank of Iceland, and an Assistant Professor at Reykjavík University. He would like to thank Gudmundur Sigfinnsson for assistance with acquiring the data and Arnór Sighvatsson, Ásgeir Daníelsson, Björn Hauksson, Ingimundur Fridriksson, Jón Steinsson, Kristjón Kolbeins, Lúdvík Elíasson, Már Gudmundsson, Tómas Örn Kristinsson and participants at a seminar at the Central Bank of Iceland on November 24, 2003, for their constructive remarks. The views presented here are those of the author and do not necessarily reflect the views of the Central Bank of Iceland. This article is the first part of a research project on the formulation and experience of inflation targeting around the world. The second half is forthcoming in Icelandic in the Central Bank of Iceland's journal *Fjármálatíðindi*.

policy works. They have managed to improve their monetary policy and in some cases have played a leading role in creating a new benchmark for how to formulate monetary policy.

New Zealand was the first country to adopt an inflation target, in March 1990. The number of inflation-targeting countries has been growing rapidly since. By the end of 1993, five countries had a formal inflation target, and five years later there were ten in all. Another five years later their number had roughly doubled again, and 21 countries today base their monetary policy on a formal inflation target.

Chart 1

Inflation rate at inflation target adoption in 21 countries



Sources: See Table 1.

Chart 1 illustrates this development and shows the prevailing rate of inflation when the target was adopted. The group comprising emerging market economies has grown most in recent years. Until 1998 only two emerging market economies were on inflation targets, but eleven more have joined since then and only three more industrial countries. The group of inflation-targeting countries and the timing of their targets is discussed in more detail in section 3.

Three years have now elapsed since the Central Bank of Iceland moved on to an inflation target. It is safe to say that, despite considerable initial setbacks which were partly due to a backlog of problems connected with the earlier framework, the benefits of the new policy have become clear. The Central Bank has been more successful in informing the general public and politicians about its main tasks, which has increased understanding of and confidence in monetary policy. Not least, this has shifted the discussion on monetary policy within the Central Bank itself towards matching more closely what monetary policy can and cannot achieve. Both within the Bank and outside it, the focus has shifted from short-term to longer-term inflation prospects, which reflects much better how monetary policy really works.

The structure of this article is as follows: The next section defines the main features of inflation targeting and the necessary preconditions, if any, for adopting it. Section three examines which countries have adopted an inflation target, their main reasons for changing their monetary policy regimes and the characteristics that distinguish them from similar non-targeting countries. It also ponders possible candidate countries for fully fledged inflation targeting in the next few years. Section four describes different inflation-targeting frameworks and implementation, and the final section presents some concluding remarks.

2. Inflation targets: definition and preconditions

2.1. Definition of the inflation target

An inflation-targeting regime is not as simple to define as it may seem on first impression. Monetary policy within what is generally referred to as the inflation-targeting countries has diverse characteristics, many of them common to this group but others practised by many countries generally not considered as inflation targeters.

Accordingly, various definitions of the basic features of inflation targeting have been proposed.[2] As a rule, an inflation target involves the formal establishment of price stability as the primary objective of monetary policy, with precedence over any other listed objectives. The idea is to signal a clear message about the main task of monetary policy and the criteria to be used for assessing the central bank's performance. Price stability is further defined with a numerical inflation target, preferably some years ahead. This does not imply that price stability is

2. Inflation targeting has been defined in a variety of ways, from very broad terms, e.g. in Leidermann and Svensson (1995) and Cottarelli and Giannini (1997), to a detailed list of conditions, e.g. in Mishkin (2000a). Alternative definitions can also be found in, e.g., Mishkin and Schmidt-Hebbel (2001), Masson et al. (1997), Bernanke et al. (1999) and Truman (2003).

a more important objective than other economic policy goals, but merely that it reflects what monetary policy is capable of achieving and what not.[3]

The problem with this definition of inflation targeting is that price stability is the primary monetary policy objective of most central banks today, and many of them which are not generally termed inflation targeters publicly announce numerical targets, as discussed in the next section. An obvious example is the European Central Bank, which has price stability as its sole monetary policy objective, more specifically a rate of inflation below (but as close as possible to) 2%. The ECB is not normally regarded as being on an inflation target, an interpretation that the bank itself has stressed (see the citations in Truman, 2003).

One distinguishing feature of inflation-targeting countries may be the emphasis given by their central banks to greater transparency and accountability. Greater central bank transparency and accountability have accordingly been identified as important characteristics of inflation targeting. Although the emphasis on transparency and accountability has increased in most countries (see Eijffinger and Geraats, 2002), this has been most apparent where the central bank is responsible for attaining a clearly defined numerical target (see Debelle, 2001).

Another frequently mentioned characteristic of inflation targeting is the lack of a proper intermediate target; all relevant information is used to achieve the inflation target, thereby in effect casting the central bank's inflation forecast in the role of intermediary target (see Svensson, 1997, and Mishkin, 2000a). This distinguishes inflation targeting from a fixed exchange rate and money supply targeting, which inevitably make developments in the exchange rate and money aggregates the most important guideline for policy decisions. Under inflation targeting, all economic data that can possibly affect inflationary developments matter. This also means that the inflation target does not depend on a steady relationship between inflation and a single aggregate such as money supply. This relation has proved to be highly unstable, which makes money supply targeting very difficult to implement.

Central bank instrument independence has also sometimes been emphasised as another chief characteristic of inflation targeting (e.g. Mishkin and Schmidt-Hebbel, 2001). However, with the general trend towards central bank independence this can no longer regarded as a distinctive feature of inflation-targeting countries (see Pétursson, 2000b), although they have certainly been at the forefront of these developments.

Another difficulty with any precise definition of inflation targeting is the fact that the countries themselves apply the framework to varying extents (see further in section 4). For example, central bank independence has not always been granted at the same time as the inflation target is adopted – this was not done for the Bank of England until 1997 and Sveriges Riksbank until 1999, although both adopted inflation targeting some years earlier.

Nor was monetary policy always particularly transparent when inflation targeting was introduced. In many cases publication of inflation reports did not begin until several years after the country moved on to the target. The Bank of Israel, for example, only began publishing an inflation report in 1998 and the Banco Central de Chile in 2000, six and ten years respectively after they had formally begun targeting. Official inflation forecasts were often not published until some time after targeting was adopted, e.g. in Sweden, and certain inflation-targeting central banks still do not do so. Similarly, fixed and publicly announced meetings for monetary policy decisions were not arranged in Australia and Canada until some time after the target was introduced, and they have still not been established in Iceland (see section 4).

Finally, it should be added that the survey by Schmidt-Hebbel and Tapia (2002) found that only twelve of the sampled twenty inflation-targeting countries interpreted their inflation forecasts as intermediate monetary policy targets.

The framework therefore seems to have been initially quite simple and gradually enhanced as the central banks gained experience of using it. Brazil and Iceland, and perhaps the Czech Republic, are

3. Although economic growth cannot be systematically maintained above the growth of potential output, a sensibly formulated monetary policy which produces a low and stable rate of inflation can enhance the efficiencies of the market economy, thereby helping to dampen business cycle volatility and boost potential output growth. In practice this is monetary policy's main contribution to improved general welfare.

probably the only countries to move to a fully fledged inflation targeting regime from the very outset.

On the basis of the above, inflation targeting would seem best described as a general framework that incorporates the best elements of different forms of different monetary policy regimes,[4] rather than a genuinely new policy regime or a formal rule (Bernanke et al., 1999). Nonetheless, the chief characteristic of inflation targeting can be said to involve a public announcement of a numerical target to which the central bank commits itself to keep inflation as close as possible by implementing a forward-looking monetary policy. The bank's inflation forecast two years ahead plays a key role in communicating information about monetary policy and its likely next steps; furthermore, the commitment to publish regular inflation forecasts based on credible analysis imposes an important constraint on the central bank. Other policy features include a firm emphasis on institutional support for the target and transparent decisions and accountability on the part of the central bank, to signal its commitment to the inflation target.[5] That said, the framework remains sufficiently flexible to take into account short-term developments in the real economy. Inflation targeting therefore combines the advantages of a strict monetary policy rule and a pure discretionary monetary policy; indeed, Bernanke et al. (1999) describe inflation targeting as "constrained discretion", where the target imposes the constraint while the interpretation and implementation provide the flexibility.[6]

2.2. What are the preconditions for inflation targeting?

It is often claimed that, before moving on to an inflation target, countries need to meet certain minimum criteria for institutional infrastructure, market conditions and economic conditions in general. Emerging market economies in particular have been advised along these lines.[7]

With respect to institutional support for the inflation target, it is often emphasised that the central bank mandate needs to stipulate clearly that price stability is the primary objective of monetary policy and that any other goals, if specified, should be put aside in cases of conflict. It is also deemed important for the central bank to have full instrument independence to attain this goal, along with a minimum knowledge of the transmission mechanism of monetary policy and reasonably accurate inflation forecasting skills, since in effect the bank's inflation forecast serves as the intermediate target, as discussed above.

An adequately efficient and developed financial system is often considered important as well, to ensure that the central bank's market operations are transmitted effectively through the economy.[8] Financial stability is another important consideration, to enable the central bank to concentrate on attaining the target without having to tailor monetary policy to the need to divert a possible financial crisis.

Finally, general economic stability is often seen as a necessary precondition for introducing an inflation target. Fiscal discipline is particularly important, to preclude inflationary funding of the treasury deficit. This is especially relevant when market funding is limited and the treasury relies heavily on seigniorage financing – for example, in

4. This is obvious, for example, from discussions among the governors of central banks in the inflation-targeting countries recorded in Sterne (2002).

5. While all these features can be found in the monetary frameworks of other central banks, inflation targeting is the only framework in which they are all present within a single framework. For example, the Bundesbank can be regarded as a pioneer in numerical target setting and the US Federal Reserve in forward-looking monetary policy. Both principles typify the inflation targeting framework.

6. Thus inflation targeting does not involve turning the central bank into a home for "inflation nutters", to quote Mervyn King, now Governor of the Bank of England (King, 1996). Academic research into monetary policy often distinguishes between strict inflation targeting, where only inflation matters, and flexible inflation targeting which also takes into account other variables, see Svensson (2001). No inflation-targeting central bank follows the strict form, although it may be argued that the Reserve Bank of New Zealand and Bank of Israel came close to it in the early years of their framework. See Pétursson (2004).

7. These conditions have been especially underlined in IMF research, such as Masson et al. (1997), Schaechter et al. (2000) and Carare et al. (2002).

8. It may be added that Gudmundsson et al. (2001) consider that Iceland lacked the foundation for adopting an inflation target until its foreign exchange market had developed to the stage where the króna could be floated (see also Pétursson, 2000a). As it happens, the question of whether a small economy such as Iceland can actually implement an independent monetary policy with a floating exchange rate regime remains unresolved, cf. Gudmundsson (2001b, 2003). Nonetheless, nothing indicates that small countries are economically disadvantaged or experience greater exchange rate volatility than large ones, see Gudmundsson (2001b) and Pétursson (2004).

cases of relatively underdeveloped financial markets, breakdowns in the tax collection system or heavy levels of indebtedness. Sometimes it is also claimed that the economy must be in reasonable external balance in order to increase the likelihood that the central bank can focus on its inflation target, and that the rate of inflation must be relatively low when the target is adopted.

Even though all these conditions are preferable and some even necessary, they do not imply that countries can only move onto an inflation target if they fulfil them all in advance. Certainly they all make an effective and successful monetary policy more likely, but this is true of any monetary policy regime, not just inflation targeting (see Debelle, 2001, Amato and Gerlach, 2002, Sterne, 2002, and Truman, 2003). Hence it cannot be claimed that a country would be better off without an inflation target if it has not met all these conditions, since that ignores the possibility that it could just as easily encounter problems under alternative regimes. Experience also shows that inflation targeting has produced good results for countries that did not fulfil all the above criteria in advance. The rule seems to be rather that they gradually meet the conditions after adopting the target, as pointed out above.

Knowledge of the transmission mechanism of monetary policy and inflation forecasting capabilities were often limited at the outset, for example in Eastern European countries which had scant tangible experience and data following the structural changes that took place with their transition to market economies. The same applies to the development of their financial markets and other economic institutions. There are also examples of countries that have moved on to an inflation target in the wake of a currency crisis (e.g. Sweden and the UK, and by some criteria Iceland could be ranked with this group) and sometimes with a relatively high rate of inflation, as shown in Box 1. Amato and Gerlach (2002) found that countries had a fairly weak fiscal position when they adopted inflation targeting, but it subsequently improved and they generally outperform the others (see Table 2 in the following section).[9]

Furthermore, inflation targeting can arguably contribute to reforms in other areas of the economy, for example by bringing new emphases in central banking and by focusing the discussion on monetary policy inside and outside the central banks. Inflation targeting therefore appears to foster an understanding of what monetary policy is capable of achieving and what it is not. Understanding of the central bank's role in general economic policy has increased, providing a buffer against political pressure. Other economic policy implementation may also improve. For example, inflation targeting may contribute to greater fiscal discipline, by forcing the government to take into account the impact of its expenditure decisions on inflation prospects and thereby interest rates. Indeed, in most cases attaining the inflation target is the joint objective of the central bank and the government, as the following section shows.

3. Inflation-targeting countries: economic structure and the path to targeting

3.1. Timing and background

Twenty-three countries can be said to have followed an inflation target, on the basis of the general characteristics discussed above: the 21 listed in Table 1, plus Finland and Spain, which abandoned the regime when they joined EMU in 1999. Switzerland is usually included in this group since in effect its policy regime shares all the characteristics of inflation targeting outlined above (see, however Truman, 2003, who excludes Switzerland), even though the Swiss National Bank does not regard itself as such (see Rich, 2000).

There is more discrepancy in the exact timing of the adoption of inflation targeting in some of the countries. Largely this is because the regime was adopted gradually, with the central banks taking their time in adjusting their structure to the new regime, even though its introduction was announced well in advance. In some cases it also took some time to adopt all the main targeting features discussed above. This makes exact timing of adoption somewhat difficult and different dates can be argued for, based

9. In all fairness, the IMF experts have also underlined that these conditions are only conceived of as preferable criteria for successful inflation targeting and are equally appropriate for other monetary policy frameworks. However, these conditions generally tend to be interpreted as prerequisites for moving on to an inflation target.

Table 1 Inflation targets: timing and background

Country	*Date of adoption*	*Previous anchor*	*Main reason for inflation target adoption*
Australia	April 1993	None	Provide a new monetary anchor and lock in disinflation
Brazil	June 1999	Exchange rate	Forced off a fixed exchange rate regime, search for a new anchor within IMF programme
Canada	February 1991	None	Provide a new monetary anchor and bring down inflation
Chile	September 1990	Exchange rate	Provide a new monetary anchor; gradual disinflation
Columbia	September 1999	Exchange rate	Dissatisfaction with earlier framework, search for a new anchor within IMF programme
Czech Republic	January 1998	Exchange rate and money supply	Forced off a fixed exchange rate regime, bring down inflation with future EU membership in mind
Hungary	June 2001	Exchange rate	Increasing incompatibility of fixed exchange rate regime and disinflation; bring down inflation with future EU membership in mind
Iceland	March 2001	Exchange rate	Dissatisfaction and problems with fixed exchange rate regime, considered the only realistic option as long as EU/EMU membership is ruled out
Israel	January 1992	Exchange rate	Lock in disinflation and define the slope of the exchange rate crawling peg
Korea	April 1998	Money supply	Part of extensive reforms following the Asian crisis; price stability set as the sole monetary policy objective
Mexico	January 1999	Money supply	Problems with earlier fixed exchange rate and monetary target; provide a new nominal anchor
New Zealand	March 1990	None	Part of extensive reforms, dissatisfaction with earlier outcomes; provide a new nominal anchor
Norway	March 2001	Exchange rate	Final phase in gradual movement towards flexible exchange rate and stronger emphasis on price stability
Peru	January 2002	Money supply	Formalisation of earlier regime; greater transparency of policy
Philippines	January 2002	Exchange rate and money supply	Formalisation and simplification of earlier regime; greater transparency and focus on price stability
Poland	October 1998	Exchange rate	Considered the most effective way to bring down inflation as a precondition for subsequent EU membership
South Africa	February 2000	Money supply	Formalisation of earlier policy; greater transparency of policy
Sweden	January 1993	Exchange rate	Forced off a fixed exchange rate regime; search for a new anchor to secure price stability
Switzerland	January 2000	Money supply	Dissatisfaction with earlier regime; however, the central bank does not consider itself on a formal inflation target
Thailand	May 2000	Money supply	Inflation targeting considered more appropriate with floating exchange rate than money supply targeting
UK	October 1992	Exchange rate	Forced off a fixed exchange rate regime; search for a new anchor to rebuild credibility

Based on data at the end of 2003.

Sources: Carare and Stone (2003), Fracasso et al. (2003), Fry et al. (2000), Hoffmaister (2001), Jonas and Mishkin (2003), Kongsamut (2001), Mishkin and Savastano (2001), Mishkin and Schmidt-Hebbel (2001), Rich (2000), Schaechter et al. (2000), Soikkeli (2002), Truman (2003) and central bank websites.

on which of these criteria are deemed necessary for the regime to be defined as formal inflation targeting. One alternative would be the date when the central bank has adopted all of the above features. Another would be the first announcement of a numerical target, even if the bank has not adopted any other inflation targeting features and even formally adhered to another monetary policy at the same time.

This article broadly follows the dates given by Fracasso et al. (2003), which again follow the timing convention in Mishkin and Schmidt-Hebbel (2001), except where some central banks have suggested alternative starting dates (Korea, New Zealand, Peru and Thailand). There are, however, three exceptions. Fracasso et al. (2003) define the starting date of inflation targeting in New Zealand as being April 1988 when a numerical object for inflation was first announced in New Zealand's government budget statement. Following Mishkin and Schmidt-Hebbel (2001), this paper defines the starting date as March 1990 when the first Policy Targets Agreement between the Minister of Finance and the Governor of the Reserve Bank of New Zealand was published.[10] Chile is another exception. This paper follows Truman (2003) in defining the starting date as September 1990, when the Banco Central de Chile issued its first inflation target, rather than January 1991 as in Fracasso et al. (2003) which is the first calendar year of the new regime. Others, such as Schaechter et al. (2000), define the starting date as September 1999, when the crawling exchange rate peg that had been maintained alongside the inflation target was finally abolished.[11] The third country is Australia. This paper follows Schaechter et al. (2000) in defining the starting date as April 1993 when the Reserve Bank of Australia announced the adoption of the new framework, rather than September 1994 when the exact numerical target was first publicly announced (cf. Bernanke et al., 1999).

As Table 1 shows, it is often the case that countries switch from an exchange rate peg to inflation targeting (ten countries), although it is worth noting that three did not specify any nominal anchor before moving on to an inflation target.[12] The main reason for adopting an inflation target varies. In four cases (Brazil, Czech Republic, Sweden and the UK) the central banks were forced by market forces to abandon their previous regime. Seven countries experienced growing discontent with their earlier regime and faced increased incompatibility between the ultimate goal of price stability and the official anchor (Columbia, Hungary, Iceland, Israel, Mexico, New Zealand and Switzerland). Finally, in ten cases the inflation target represented a natural conclusion to a process of monetary policy evolution over various lengths of time, or the formalisation of a de facto policy (Australia, Canada, Chile, Korea, Norway, Peru, the Philippines, Poland, South Africa and Thailand).[13]

3.2. Structure and size of inflation-targeting countries

As Table 1 shows, inflation targeting has been introduced by prosperous industrial countries in Western Europe, North America and Oceania, Eastern European transition economies or developing and new market economies in Africa, Asia and South America. In all they comprise more than 10% of IMF member states and account for almost 20% of global output.

Table 2 shows that these are generally small or medium sized industrial countries, or medium to large emerging market economies. As a rule, inflation-targeting countries seem more open to international trade and have less fiscal debt than similar economies following a different regime. They also tend to be wealthier and have more advanced

10. An alternative starting date could be July 1989 when a new act for the Reserve Bank was first introduced (e.g. Schaechter et al., 2000), or December 1989 when the new act was passed by parliament (Truman, 2003). This example clearly depicts the various issues concerning the exact timing of inflation targeting adoption in some countries.

11. Later dates are sometimes assumed for Israel and Poland, based on the introduction of fully fledged inflation targeting in June 1997 and March 1999 respectively. Earlier dates than those assumed here are also sometimes cited for target adoption in Columbia, Mexico, Peru and the Philippines, based on when their central banks began declaring numerical inflation objects for one year ahead, which was 1994 in Peru and 1995 in the others.

12. New Zealand followed a fixed exchange rate regime, while Australia and Canada had tried a money supply anchor towards the mid-1980s. Until the mid-1990s Mexico and Thailand followed fixed exchange rate regimes, but after speculative attacks on their currencies they switched to targeting money supply and then inflation a few years later.

13. Inevitably, this classification is fairly imprecise, since in many cases the determining factor of targeting adoption can be identified as a combination of all these reasons. The classification is meant to be descriptive rather than a precise definition of the basic reason for switching to an inflation target.

Table 2 Inflation-targeting countries: Structure and size

Country	*Population (million)*	*GDP (US$ billion)*	*GDP per capita in US$ thousand*	*Open-ness*[1]	*Stock market turnover*[2]	*Treasury debt*[2]
Australia	19.4	369	19.0	44.4	65.3	15.4
Brazil	172.4	509	3.0	27.4	12.8	99.7
Canada	31.1	694	22.3	82.5	66.5	58.5
Chile	15.4	66	4.3	67.3	6.4	15.6
Columbia	43.0	82	1.9	38.4	0.4	29.8
Czech Republic	10.2	57	5.6	143.7	5.9	16.7
Hungary	10.2	52	5.1	123.3	9.3	53.1
Iceland	0.3	8	27.3	81.4	17.6	38.7
Israel	6.4	110	17.3	86.9	21.2	97.8
Korea	47.3	427	9.0	82.2	164.8	10.4
Mexico	99.4	624	6.3	57.0	6.4	23.2
New Zealand	3.8	50	13.1	69.1	16.7	31.0
Norway	4.5	166	36.8	74.2	31.5	20.5
Peru	26.3	54	2.1	33.0	1.6	43.8
Philippines	78.3	71	0.9	95.5	4.4	65.5
Poland	38.6	183	4.7	59.8	4.1	38.9
South Africa	43.2	114	2.6	52.7	61.0	46.8
Sweden	8.9	210	23.6	87.0	143.7	45.9
Switzerland	7.2	247	34.2	86.6	121.8	26.7
Thailand	61.2	115	1.9	125.7	31.0	29.8
UK	58.8	1,424	24.2	56.4	131.4	49.5
Median	26.3	115	6.3	74.2	17.6	38.7
Industrial countries	8.1	228	23.9	77.8	65.9	34.8
Emerging market countries	43.0	110	4.3	67.3	6.4	38.9
Other industrial countries[3]	10.6	230	23.2	72.0	44.1	55.3
G3 countries[4]	285.3	6,094	32.6	26.2	73.1	60.9
Other emerging market economies[5]	29.2	88	1.7	65.8	5.7	66.3

Data are from 2001, except for treasury debt which uses the most recent available data (over the period 1997-2001).

1. Imports and exports as a percentage of GDP. 2. % of GDP. 3. The median of 15 industrial countries which are not on an inflation target. 4. Median of euro area, Japan and the USA. 5. Median of 19 emerging market economies which are not on an inflation target.

Sources: EcoWin, International Monetary Fund (IFS) and World Bank: World Development Indicators.

financial systems. However, this does not apply when compared with the G3 countries (the euro area, Japan and the US).

This comparison could provide some indication of the factors affecting the selection of monetary policy regimes, and in particular whether these countries consider inflation targeting to be an appropriate policy framework. In general, inflation-targeting countries appear to be more advanced in terms of GDP per capita and stock market turnover, which may show that an effective inflation target regime requires an advanced institutional infrastructure and financial system, as discussed in the preceding section. Nor does government debt generally appear

as high among inflation-targeting countries. This may reflect a need to avoid fiscal dominance from threatening the inflation target and tarnishing its credibility. Finally, inflation-targeting countries appear to be more open for international trade, perhaps because of the difficulty of maintaining a fixed exchange rate in a relatively open economy that is prone to terms of trade shocks. Faced with a choice between monetary and inflation targets as their nominal anchor, these countries have opted for the latter because of the problems of targeting money supply. On the other hand, open economies possibly benefit more from exchange rate stability, since exchange rate volatility has more impact on the general level of prices in such cases.

Carare and Stone (2003), Gerlach (1999), Mishkin and Schmidt-Hebbel (2001) and Truman (2003) have studied whether the choice of an explicit inflation target can be explained by economic structure and historical experience in these countries. Truman (2003) finds that the probability of adopting inflation targeting increases with improved fiscal position. This finding is consistent with the finding in Table 2 that inflation-targeting countries generally seem to have lower levels of government debt, although Amato and Gerlach (2002) show that the government position was rather weak before targeting, as pointed out earlier. Truman (2003) also finds that poor economic performance and experience of a currency crisis in the past increases the probability of inflation target adoption. Both factors reflect dissatisfaction with and poor experience of earlier frameworks, which makes the government more likely to explore new policy avenues. The probability of moving on to an inflation target also seems greater, the more advanced a country's financial system (see Carare and Stone, 2003), supporting the conclusion from Table 2. Truman (2003), however, finds that this effect is statistically insignificant. Finally, Gerlach (1999) concludes that countries with a relatively undiversified exports base are more likely to adopt inflation targeting.[14] The reason is that the less diversified the export base, the greater the vulnerability to external shocks, making it difficult to maintain a fixed exchange rate. This makes a floating exchange rate regime more likely, and more often than not inflation targeting is chosen as the nominal anchor.[15]

It has frequently been claimed that countries that are highly dependent on international trade ought not to target inflation because they would find it more difficult to attain (see Truman, 2003). Calvo and Mishkin (2003), on the other hand, point out the possible advantages of an inflation target and floating exchange rate for open economies, since they are vulnerable to external shocks, cf. the findings of Gerlach (1999) cited above and the results in Table 2. Thus there does not appear to be any clear theoretical answer as to whether open economies are more likely to adopt explicit inflation targeting or not. This is also reflected in empirical research. While Mishkin and Schmidt-Hebbel (2001) find a significant positive relation, Gerlach (1999) finds a negative one (although it is on the borderline of statistical significance) and Truman (2003) no significant relation at all. Such inconsistency probably reflects the different country samples and periods used in these studies.

Similar uncertainty surrounds the effect of historical inflation on the probability of adopting inflation targeting. Countries that have been struggling with high inflation might be seen as more likely to move on to a target because of dissatisfaction with prior outcomes (see Neumann and von Hagen, 2002), a conclusion apparently supported by the findings of Mishkin and Schmidt-Hebbel (2001). However, Truman (2003) reaches the opposite conclusion, which he attributes to most countries having already brought down inflation before the target is adopted, see further Pétursson (2004).

Mishkin and Schmidt-Hebbel (2001) and Truman (2003) argue that the more independent the central bank, the greater the probability of adopting an inflation target, since independence increases the likelihood that the regime will be a success. Mishkin and Schmidt-Hebbel (2001) find that instrument independence significantly increases the probability

14. Gerlach (1999) uses the share of commodities in the export base to measure export diversification. His findings suggest a high correlation with the country's export product range and diversity relative to the average of other countries. These measures are also found to be closely linked to volatility in export revenues and the terms of trade.

15. Interestingly, the model used by Gerlach (1999) yielded close to 100% probability that Iceland and Norway would move on to an inflation target two years before they actually did so.

of adopting inflation targeting, but that goal independence significantly reduces the probability of target adoption, which they interpret as showing that the adoption of inflation targeting tends to go hand in hand with the transfer of decisions on monetary policy objectives to the government. Truman (2003) does not find any significant relation between inflation targeting adoption and overall central bank independence, which is consistent with the findings of Mishkin and Schmidt-Hebbel (2001). Gerlach (1999) argues, however, for a negative relation between overall central bank independence and the probability of moving on to an inflation target. He suggests that an inflation target can act as substitute for formal independence, as it may be easier for the central bank to withstand political pressure if it has a clearly defined target to aim for.

3.3. Potential candidates for inflation targeting

By definition, the list of inflation-targeting countries can never be final. Some will leave and others join. Two have already left the group – Finland and Spain, as mentioned above – and a further three will do so within a few years when they join EMU (Czech Republic, Hungary and Poland). Later on, Sweden and the UK may leave for EMU, and possibly Iceland, Norway and Switzerland further along. In New Zealand there is a recurrent debate about a currency union with Australia (see, for example, Bjorksten and Brook, 2002), and there is also a discussion of whether Canada (and even Mexico) should adopt the US dollar in connection with NAFTA (see, for example, Buiter, 1999).

New countries could adopt inflation targeting as well. In fact a growing number are currently considering doing so. Money supply targeting has proved difficult in practice, due to unstable demand for money. The popularity of fixed exchange rates is also dwindling as countries weigh up the experience of speculative attacks on their own or other currencies and the ensuing economic costs (see Pétursson, 2000a, and Gudmundsson, 2001a). Emerging market economies are involved in most cases, as shown in Table 3 which lists countries that could conceivably move on to an inflation target in the next few years.[16]

Most of these central banks' mandates make price stability the main object of monetary policy and several have already started issuing official inflation targets. Some have also announced preparations for moving on to an inflation target in the next few years (Albania, Argentina and Turkey). Other candidates considered likely to move on to an inflation target in the next few years include Indonesia and Russia (see Truman, 2003).

Inflation targeting has also been discussed in Europe, Japan and the US.[17] As pointed out by Bernanke et al. (1999) and Truman (2003), these countries' monetary policy regimes broadly embrace all the chief features of inflation targeting; they are widely seen as targeting inflation in practice and have been urged to take the final step, to make their monetary policy fully transparent and thereby even more credible and efficient. Both the ECB and the US Federal Reserve are often described as inflation-targeting banks "in disguise" (see Bernanke et al., 1999).

Influential US economists, such as Ben Bernanke, Frederic Mishkin and Ted Truman, have urged their government to adopt a formal inflation target (see, for example, Bernanke et al., 1999, and Truman, 2003).[18] They emphasise that the US should consolidate its successful monetary policy of recent decades by defining a new formal monetary policy anchor when the current "anchor", Alan Greenspan, retires (see, for example, Mishkin, 2000b). Several

16. This is not an exhaustive list. Sterne (2002) names 54 countries that already issue an official numerical target (including those with a formal inflation target at that time) and Carare and Stone (2003) cite 21 countries with floating currencies that they consider potential candidates for inflation targeting. Table 3 comprises the countries named by Sterne (2002) and Carare and Stone (2003) which publish a numerical target on their central bank websites, have price stability as the main objective of their monetary policy, or have been publicly cited as future inflation-targeting candidates. Schaechter et al. (2000), Carare et al. (2002) and Carare and Stone (2003) discuss the challenges facing emerging market economies when moving on to an inflation target.

17. A detailed discussion of this debate, with an evaluation of the pros and cons of these central banks moving on to an inflation target, is found in Truman (2003).

18. Bernanke, formerly a professor at Princeton, is now a Federal Reserve Board Governor. Mishkin is a professor at Columbia and former Executive Vice President and Director of Research at the Federal Reserve Bank of New York. Truman served as assistant secretary of the US Treasury for international affairs and Director of the Division of International Finance of the Board of Governors of the Federal Reserve System before becoming a senior fellow at the Institute for International Economics. They have urged all these three central bank to move on to an inflation target and Truman has argued for joint adoption.

Table 3 Possible future inflation-targeting countries

Country	*Rate of inflation (%)*	*Monetary policy objective*
Albania	5.5	2-4% inflation target; aimed at formal adoption in the future
Algeria	1.4	Prime objective is price stability; target thought to be 3%
Argentina	25.9	Reduction in inflation; aimed at formal inflation target in the future
Armenia	1.1	Prime objective is price stability; aimed at 3% inflation
Croatia	5.0	Prime objective is price stability; aimed at 6-8% inflation in 2002
Dominican Republic	8.9	Prime objective is price stability
Euro area	2.3	Single objective is price stability; defined as inflation close to 2%
Georgia	4.7	Prime objective is price stability; aimed at inflation below 5%
Guatemala	8.1	Prime objective is to maintain inflation at 4-6%
Honduras	7.7	Objective is to bring inflation down to 6% this year
Indonesia	11.9	Prime objective is to maintain inflation at 9-11%
Jamaica	7.1	Prime objective is price stability; aimed at 5-6% inflation
Japan	-1.0	Objective is to bring inflation (deflation) up to 0%
Kazakhstan	3.4	Prime objective is price stability
Kenya	1.9	Prime objective is price stability; aimed at inflation below 5%
Kyrgyzstan	2.1	Prime objective is price stability
Mauritius	5.4	Objective is to maintain inflation at 4½-5%
Mongolia	8.0	Price stability is among objectives; aimed at 5% inflation
Romania	22.5	Prime objective is price stability; aimed at 22% inflation
Russia	15.8	Prime objective is to bring inflation down
Singapore	-0.4	Prime objective is price stability
Slovakia	3.3	Prime objective is to bring inflation down
Slovenia	7.5	Prime objective is to bring inflation down
Sri Lanka	9.7	Prime objective is price stability
Tanzania	4.6	Price stability is among objectives; aimed at 0-5% inflation
Turkey	45.0	20% inflation target for 2003 and below 10% in the coming years; aimed at formal adoption of inflation targeting in the future
Uganda	3.7	Prime objective is price stability
United States	1.5	Price stability is one of the prime objectives; target thought to be 2%
Venezuela	22.4	Prime objective is to bring inflation down

Average inflation rate in 2002 (or 2001 where data for 2002 are unavailable).

Sources: International Monetary Fund (IFS), Carare and Stone (2003), Sterne (2002) and central bank websites.

amendments to Federal Reserve legislation have been presented in Congress with the aim of introducing inflation targeting, but none has made it past the committee stage. The Federal Reserve Board has also debated the issue in recent years, but inconclusively.

The ECB and Bank of Japan have also been urged to change their current monetary policy framework in favour of an inflation target. The former has been encouraged to abandon one of its two monetary policy pillars (money supply) and focus instead on the other objective of maintaining inflation close to 2%. The Bank of Japan has been urged to adopt an inflation target in its battle against persistent deflation and the stagnant Japanese economy.

It is difficult to weigh up the probability that any of these major economies will move on to an inflation target in the next few years, and whether

policy implementation would improve as a result. Such a move seems likely to enhance transparency in all cases, and even efficiency and understanding of the role of monetary policy in general economic policy implementation, although to varying degrees. There is a very high probability that monetary policy implementation would improve in Japan and to some extent in the euro area, but this is less obvious in the case of the US, which overall has performed well in recent years.

4. Different inflation-targeting arrangements

In spite of the common characteristics described above, the exact formulation of the inflation-targeting framework differs among the targeting countries and has evolved in the course of time. Different features have been formalised to varying extents, with the central banks that were hardest hit by inflation and had the least credibility at the outset going furthest. In these cases, the central bank mandate was often changed before the inflation target was adopted. Banks that enjoyed more credibility did not necessarily go as far in formalising the framework, although their commitment to the target is by no means any less.

4.1. Legal framework

As discussed in Pétursson (2000b), central bank legislation has changed radically in much of the world in recent years, with the aim of increasing their independence to conduct monetary policy without government intervention. Central bank independence has usually been evaluated on the basis of five main criteria: the extent to which statutory objectives provide the central bank with a clear focus on price stability, access by the treasury to direct funding through the central bank, to what extent the central bank can determine policy rate changes without government interference, the role of the central bank in setting the ultimate goal of monetary policy, and the governor's term of office.

As Table 4 shows, price stability is the prime objective of monetary policy in the overwhelming majority of inflation-targeting countries. It is defined either as the sole objective, or the prime objective if it conflicts with others goals stated in central bank legislation. This is in line with the recent development of central bank legislation in many parts of the world.

It is interesting to note that the two countries where the mandate does not clearly define price stability as the primary objective of monetary policy have nonetheless been successful in operating within the inflation-targeting framework. This might indicate that a clear understanding of monetary policy priorities is more important for its success than the precise wording of the mandate (see also Truman, 2003). However, this requires the central bank to have even more support from other authorities in its interpretation of the mandate.

Table 4 also shows that in most cases, treasury access to direct funding in the central bank is either formally prohibited or very limited, since such access would severely hamper the bank in implementing an independent and effective monetary policy. Several countries have no provision of this kind in their central bank legislation, but mutual understanding prevails that such access should not be used.[19]

In light of the importance attached to full independence for central banks to determine monetary policy without government intervention (see Pétursson, 2000b, and Sterne, 2002), it is not surprising that virtually all mandates provide for full instrument independence. Sometimes there is a provision allowing the government to change the bank's decision (under conditions that are specified to varying degrees), but this needs to be done openly with the accompanying political costs. Within the inflation-targeting group, the bank with the least legal instrument independence is Norges Bank; critics of its current legislation include Svensson et al. (2002).

The degree of goal independence of central banks is more varied, reflecting divergent views on its justification (see Fischer, 1994). Sterne (2002) points out that inflation-targeting central banks themselves had different views on how important goal independence was, depending upon whether inflation was close to target or whether they were still in the disinflation process. Those who had established low

19. For example, Fry et al. (2000) award these countries top score for restriction of treasury funding in the central bank, even though they have no direct legal provision to this effect. Direct funding within the central bank is simply not customary in these countries.

Table 4 Legal framework for inflation targeting

Formal monetary policy objective (no. of countries)	*Country*
Price stability the sole monetary objective (3)	New Zealand, Peru, South Africa
Other objectives, but price stability takes priority (16)	Australia, Brazil, Chile, Columbia, Czech Republic, Hungary, Iceland, Korea, Mexico, Norway, Philippines, Poland, Sweden, Switzerland, Thailand, UK
Other objectives with no formal prioritisation (2)	Canada[1], Israel[2]

Direct treasury funding in the central bank (no. of countries)	*Country*
Funding prohibited (9)	Brazil, Chile, Czech Republic, Hungary, Iceland, Peru, Poland, Sweden, Switzerland
Limited authorisation for funding (9)	Canada, Columbia, Israel, Korea, Mexico, Norway, Philippines, South Africa, Thailand
No provision in law (3)	Australia, New Zealand, UK

Instrument independence (no. of countries)	*Country*
Unrestricted freedom of central bank decision-making (14)	Brazil, Columbia[3], Czech Republic, Hungary[4], Iceland, Israel, Korea, Mexico, Peru, Philippines[3], Poland[4], South Africa, Sweden, Switzerland
Independence on a day-to-day basis, but provision for the government to reverse decisions under exceptional circumstances (6)	Australia[3,5], Canada[5], Chile[4,6], New Zealand[5], Thailand[7], UK[5]
The government must ratify the bank's decisions (1)	Norway

Goal independence (no. of countries)	*Country*
Monetary objective defined by central bank (6)	Czech Republic, Mexico, Poland, South Africa, Sweden, Switzerland
Monetary objective defined by central bank in consultation with the government (3)	Chile, Hungary, Peru
Monetary objective defined jointly by central bank and government (5)	Australia, Canada, Columbia, Iceland, New Zealand
Monetary objective defined by government in consultation with central bank (5)	Brazil, Israel, Korea, Philippines, Thailand
Monetary objective defined by government (2)	Norway, UK

Governor's term of office (no. of countries)	*Country (no. of years)*
5-7 years (18)	Australia(7), Brazil(5), Canada(7), Chile(5), Czech Republic(6), Hungary(6), Iceland(7), Israel(5), Mexico(6), New Zealand(5), Norway(6), Peru(5), Philippines(6), Poland(6), South Africa(5), Sweden(5), Switzerland(6), UK(5)
3-4 years (3)	Columbia(4), Korea(4), Thailand(3)

1. A joint declaration by the central bank and government from May 17, 2001 states that the bank can best promote its general objectives by promoting price stability (see Truman, 2003). 2. Central Bank legislation under review (see Truman, 2003). 3. Representative of the government attends meetings with the right to vote. 4. Representative of the government attends meetings without the right to vote. 5. The government may temporarily overrule monetary policy decisions in the event of a serious dispute with the bank, if warranted by exceptional economic circumstances. 6. Decision rests with the finance minister if the bank cannot reach a decision. The bank may overturn his decision with a new vote after at least 15 days. 7. Decision rests with the finance minister if the bank cannot reach a decision.

Sources: Fry et al. (2000), Mishkin and Schmidt-Hebbel (2001), Schaechter et al. (2000), Truman (2003) and central bank websites.

inflation generally favoured government involvement in determining the final objective of monetary policy, since this would lend more credibility to it and deter the government from undermining it with imprudent fiscal policy. Inflation-targeting banks that were still in the middle of the disinflation process, on the other hand, rated goal independence highly as a safeguard against excessive government delays to the process. As Table 4 shows, in most cases both the central bank and the government are involved in determining the primary objective, although the ultimate decision obviously rests with the government in all these instances.[20]

Finally, the table shows that most central banks appoint their governors for a longer term than five years, i.e. beyond the political cycle of general elections. Such appointments are also among the longest known in the central banking world (see Pétursson, 2000b).

4.2. Formulation of the inflation target

Monetary policy under inflation targeting requires a number of technical issues to be resolved. The numerical target needs to be specified relative to a chosen price index. A time horizon also has to be set along with responses to target failures. If inflation exceeds a rate compatible with price stability at the outset of the regime, the adjustment process to the long-term target must be defined. All these decisions need to be taken in such a way as to ensure the regime's credibility, transparency and flexibility. As Table 5 shows, various approaches have been taken towards resolving these issues.

There are two conflicting viewpoints about the choice of reference price index (see Pétursson, 2002). Advantages of the headline CPI are that it provides the best available measure of the development of the general cost of living, and is also the measure of prices with which the public is most familiar. However, the headline CPI includes various volatile items that may even be outside the influence of monetary policy. A price index excluding such items should give a better measure of the underlying inflation trend, which could help central banks in formulating monetary policy. This should reduce the probability of an unwarranted policy response to the first-round effects of supply shocks which only have temporary effects on inflation.

In spite of the abovementioned complications in its use, the headline CPI remains the formal policy reference for most central banks. Most also take into account a variety of measures of underlying inflation to facilitate their monetary policy formulation. In some cases the reference price index has been changed as well. Examples are Australia and New Zealand after their headline CPIs were redefined in 1998 and 1999, the Czech Republic which switched in 2001 when the main grounds for using the core price index were no longer thought to apply (see Jonas and Mishkin, 2003), and the Bank of England which last December began basing its target on the European Union's harmonised CPI, for reasons including the British Government's plans for the UK to join EMU.

Table 5 also shows the numerical inflation target; the final target if this has already been attained, otherwise the official long-term target. Only two central banks cite a simple numerical target, and another nine define tolerance limits around it.[21] Ten define the target as a range with no specified midpoint.

In choosing between a simple numerical target and a range, there are two viewpoints. A wide range signals imperfect central bank control over short-term inflation and increases the probability that inflation will be kept within the defined target range. However, there is a risk that this will damage the credibility of the framework and the target's value as an anchor for inflation expectations. A narrow range implies a greater commitment by the bank towards the target, but also makes target misses more likely. The message could then be that the central bank considers itself to have much better control over short-term inflation variability than it actually does.

20. The same applies in effect to the six central banks that formally have goal independence. The government could invalidate the bank's decision simply by changing the legislation, although this is obviously a longer and more complex process than direct involvement in the decision-making.

21. Although the inflation-targeting framework in the UK also defines tolerance limits, the Bank of England has in recent years emphasised that in principle it only takes the numerical target into account. The interpretation given here is based on the Bank of England's own presentation of its targeting framework.

Table 5 Formulation of the inflation target

Country	*Price index*	*Numerical target*[7]	*Formal provision for review of the target*	*Time frame of target*	*Escape clause*
Australia	CPI[1]	2-3%	None	Open	No
Brazil	CPI	3¾% (±2½%)	Once a year	One year ahead	No
Canada	CPI	1-3% (2% midpoint)	Next in 2006	Several years ahead	Yes[10]
Chile	CPI	2-4%	None since 1999	Open	No
Columbia	CPI	3%	Once a year	Several years ahead	No
Czech Republic	CPI[2]	2-4%	None since 2001	Several years ahead	Yes[10]
Hungary	CPI	3½% (±1%)	None	Several years ahead	No
Iceland	CPI	2½% (±1½%)	None	Open	No
Israel	CPI	1-3%	None since 2002	Open	No
Korea	Core CPI[3]	2½-3½%	Once a year	Several years ahead	No
Mexico	CPI	3% (±1%)	Once a year	Open	No
New Zealand	CPI[1]	1-3%	Regularly	Open	Yes[10]
Norway	CPI	2½% (±1%)	None	Open	No[11]
Peru	CPI	2½% (±1%)	None	Open	No
Philippines	CPI	4-5%	Once a year	One year ahead	Yes[10]
Poland	CPI	2½% (±1%)	Once a year	Several years ahead	Yes
South Africa	Core CPI[4]	3-6%	Once a year	Several years ahead	Yes[10]
Sweden	CPI	2% (±1%)	None	Open	No[11]
Switzerland	CPI	0-2%	None	Open	Yes[10]
Thailand	Core CPI[5]	0-3½%	None	Open	No
UK	CPI[6]	2%[8, 9]	Once a year	Open	No

1. The reserve banks of Australia and New Zealand ceased using a core index as a reference price index after mortgage interest costs were removed from the headline CPI. 2. Previously based on headline CPI excluding regulated prices and the direct impact of indirect taxes and subsidies. 3. Headline CPI excluding agricultural products and oil. 4. Retail price index less mortgage interest payments. 5. Headline CPI excluding energy and unprocessed foods. 6. The EU's harmonised index of consumer prices (HICP). Previously based on the retail price index excluding mortgage interest costs. 7. The table shows only the current inflation target or official long-term target if this differs from the policy target at the end of 2003 (Brazil (currently 3¼% (±2%)), the Czech Republic (currently 2½-4½%), Columbia (currently 5½% (±½%)), Korea (currently 3% (±1%)), Philippines (currently 4½-5½%) and Poland (currently 3% (±1%))). 8. The target allows for a ±1% range, with the Bank of England obliged to write an open letter explaining the deviations. The Bank, however, does not want to define the range as tolerance limits for the inflation target. 9. Previously 2½%, the target was lowered when a new reference price index was introduced to accommodate differences between CPI and RPIX inflation (see note 2). 10. Deviations are allowed if caused by major terms of trade shocks (e.g. large-scale changes in oil prices), natural catastrophes and government measures to exert a direct influence on the general price level. New Zealand and Switzerland also specify that such escape clauses only apply if they do not exacerbate inflationary pressures. 11. Although Norway and Sweden do not have defined escape clauses, they do specify that deviations should be ignored if they are the result of mortgage interest costs, changes in indirect taxation and subsidies, and major supply shocks. Monetary policy implementation is therefore based on an index excluding these items, even though the formal target is the headline CPI. These provisions may thus be interpreted as escape clauses. The Bank of Canada also has specially defined escape clauses.

Sources: Mishkin and Schmidt-Hebbel (2001), Pétursson (2002), Schaechter et al. (2000), Schmidt-Hebbel and Tapia (2002), Truman (2003) and central bank websites.

A narrow range can also reduce the bank's flexibility to respond to real economy developments. Target misses in this case might also prove more damaging to the bank's credibility than the failure to meet a simple numerical target (cf. New Zealand's experience during its early years of inflation targeting).

Another argument in favour of a simple numerical target (with or without tolerance limits) instead of

a range is the risk that the upper tolerance limit, rather than the midpoint, will be interpreted as the target, so that inflation expectations could become anchored at a higher rate than the central bank had originally intended. This could prove critical in a disinflationary process where policy measures might run into opposition (from politicians, for example) if inflation is just within the upper limit. Opponents could then claim that inflation was within acceptable limits, despite being well above the target itself. The obvious recourse of narrowing the range accordingly would make an overshoot more likely, which could do more damage to the central bank's credibility than the failure to attain a simple numerical target, as mentioned earlier.

Thus there seem to be a number of arguments for preferring a numerical target to a range. The question remains whether a numerical target should be used alone or with upper and lower tolerance limits. Like a range, tolerance limits have the advantage of indicating imperfect central bank control over short-term inflation. The risk is that they will be interpreted as the limits within which the central bank is prepared to allow inflation to fluctuate without responding (see, for example the interpretation of Schaechter et al., 2000). Such an interpretation would suggest a discontinuity in the monetary policy reaction function. Inflation would only call for a monetary policy response when it approaches the limits. This is why the Bank of England, for example, has played down the role of its tolerance limits. The Bank of England (and Central Bank of Iceland) interpret the tolerance limits as indicating a sufficient deviation from the inflation target to warrant a public explanation from the bank. The tolerance limits therefore serve to enhance monetary policy accountability rather than to guide actual policy.

The inflation target is always based on the twelve-month change in the reference price index, and the most common target, or midpoint of the range, is in the interval 1-3%. No country has adopted a midpoint below 1%.[22] This is consistent with the findings of the academic literature on the rate of inflation that is compatible with price stability. These studies refer to measurement errors in the CPI and various economic arguments against a very low inflation target due to, for example, the risk of deflation.[23] The target range includes zero inflation in only two countries (Switzerland and Thailand) and there are examples of an inflation target being redefined to exclude the zero rate for fear of risking deflation.

The average inflation target is 2.7% for all the targeting countries, but 2.1% for the industrial countries in the group. The most common target is 2% or 2.5% for the entire group, and 2% for the industrial countries. Similarly, the most common range or tolerance limits are 1% in either direction. As is to be expected, limits are generally wider for developing countries or those that have experienced more volatile inflation, since the CPI in developing and transitional economies invariably gives greater weight to volatile components such as agricultural prices. Wider tolerance limits are used during the adjustment process in some cases, as shown in Box 1 which shows the evolution of the inflation targets in all the countries. It also shows the common practice among countries in the adjustment process towards the long-run target to use end-of-year targets (December-December inflation), rather than for each month or quarter. After the disinflation process is accomplished, this has frequently been converted to a target for the whole year, which should enhance transparency and accountability compared with, for example, an end-of-year target. In Australia (and recently New Zealand) the target refers to inflation over the business cycle.

The charts in Box 1 show that countries were at different stages in the disinflation process when they

22. The academic literature has explored the possibility of price level targeting instead of targeting the rate of inflation (see, for example, Svensson, 1999). A price level target would reduce uncertainty about future price level developments, but probably at the cost of more business cycle volatility (Fischer, 1994). Mishkin and Schmidt-Hebbel (2001) and Batini and Yates (2003) discuss the possibility of a hybrid system, combining both price level and inflation targets. While such a regime could combine the advantages of both approaches it could prove difficult in practice, especially as regards explaining monetary policy to the public at large. No central bank has adopted price level targeting since Sweden in the mid-1930s (Berg and Jonung, 1999). See also the overview in Steinsson (2001).

23. Mishkin and Schmidt-Hebbel (2001), Amato and Gerlach (2002) and Truman (2003) discuss different viewpoints on the optimum long-term level of the inflation target and whether it should be set higher for emerging market economies than for industrial countries, given that the former group generally experiences faster growth than the latter (the Balassa-Samuelson effect). An overview of different viewpoints on the choice of inflation target is also given in Pétursson (2000a).

moved on to inflation targeting. In five countries inflation was already at the long-term target (Australia, Norway, Switzerland, Thailand and the UK). The others defined adjustment paths towards the target, which have taken different lengths of time to attain (the adjustment process is discussed in more detail in Pétursson, 2004). Seven countries (Canada, Chile, Czech Republic, Hungary, Israel, South Africa and Sweden) did not officially define their target until some time after formally establishing the regime and thirteen countries defined an adjustment process for the target itself towards the long-term target. In one case (Iceland) the target was defined unchanged from the outset, but with a wider upper limit during the adjustment phase.

Provisions for a regular review of the inflation target vary from one country to another. Eleven make no provisions, while ten stipulate an annual review – generally those that have recently accomplished or are still undergoing a disinflation process. Exceptions are Canada, New Zealand and the UK, where the review coincides with a regular review by the government and central bank of how to interpret the provision on price stability in the central bank mandate. The advantage of a regular review is that it allows a newly elected government to reiterate its support for the inflation target. However, it also entails a risk of continual changes in the target definition, as New Zealand's experience perhaps illustrates.

The time horizon of the inflation target shows similar variations. The most common time horizon is open, i.e. it reflects the lags in the monetary policy transmission mechanism, which are generally considered to be roughly two years (see, for example, Pétursson, 2001). Central banks adopt an open time frame in an effort to avoid excessive fluctuations in their instruments; too short a time horizon may create control problems, i.e. it becomes difficult to attain the inflation target, risking increased interest rate variability, which exacerbates uncertainty and business cycle volatility. However, while the adjustment to the long-term target is under way, it is common for central banks to set short-term targets, often one year or several years ahead at a time.[24] This gives the banks scope to take advantage of unexpected disinflation (see Pétursson, 2004). These countries have commonly extended the target horizon when disinflation is accomplished.

Seven countries in Table 5 have specified escape clauses by defining allowed deviations from the target in advance. In most cases these involve price changes directly attributable to supply-side shocks, such as changes in indirect taxes and the terms of trade, to the first-round effects of which monetary policy should in general not respond (see Pétursson, 2002).[25]

Finally, it should be underlined that interpretation and implementation of the regime may change even if the legal framework remains unchanged. An example is the early years of inflation targeting in New Zealand, with the Reserve Bank apparently interpreting its target range as an "electric fence" that was not to be crossed under any circumstances (see Schaechter et al., 2000, and Svensson, 2001). After coming under heavy criticism for this approach, its interpretation of the target range has become much more flexible in recent years. Another example is Israel's first years of targeting (see Truman, 2003). The general rule would seem to be that if central banks adopt a target when the rate of inflation is relatively high and credibility low, the target is often interpreted strictly to begin with, while the bank is building credibility as an "inflation buster". As credibility grows over time, the banks seem to become more flexible in their interpretation of the framework.[26]

4.3. The decision-making process

Since monetary policy decisions generally reflect different views about the current position of the economy and its future developments, it is only natural for more than one individual to be involved in the decision-making process. Thus, most inflation-targeting central banks appoint a committee to make

24. Besides defining annual short-term targets, most countries have also defined a long-term inflation target. In many countries the time period to attain the long-run target is also specified in advance.

25. A central bank with no defined escape clauses that finds itself in such a situation would normally respond by publicly explaining the target miss.

26. The regime can thus be described as a strict targeting regime in the beginning, then changes to a flexible target. Australia, however, provides an example of a central bank that has always interpreted its target very flexibly.

monetary policy decisions, even when there is only one governor, as shown in Table 6. This is also consistent with recent results in experimental economics by Lombardelli et al. (2002) which suggest that committees achieve better results than individuals in monetary policy implementation.

The general format used is a monetary policy committee with the sole role of making monetary policy decisions. Some banks, for example the Bank of England, even appoint external members to their committees. In countries such as Sweden this function is assigned to the executive board who are also responsible for the bank's day-to-day operation.[27] Only in two cases are policy decisions made by the governor alone, although in both cases internal experts are informally involved in consultation with the governor.[28] Making decisions by a committee allows more viewpoints to be presented, as well as formalising the advisory process, thus enhancing the accountability of those influencing the final policy decision. Two central banks follow a middle path, assigning decision-making to a board of governors, with internal experts playing an advisory role. The table also shows that a simple majority is the most common format for committee decisions (fourteen cases), while five countries attempt to arrive at a decision by consensus.

Everywhere, except Iceland, policy decisions are taken at formal meetings that are held with regular frequency with a pre-specified schedule. This is done to increase the effectiveness of monetary policy even further and to steer attention away from day-to-day market developments towards the longer-term inflation outlook. Fixed meetings also enable central banks to explain an unchanged monetary policy stance, which is generally just as important as explaining interest rate changes. Meetings are most commonly held on a monthly basis, in twelve countries nine of which publish their minutes to make policy decisions even more transparent and ensure greater accountability on the part of committee members. Minutes are published either in full or in summary, sometimes along with the voting outcome and even how individual members voted.

4.4. Transparency and accountability

With greater central bank independence, an important part of economic policy is delegated to unelected experts. This makes it vital that the decision-making process is as transparent as possible and that the decision-makers are somehow accountable. This is particularly important under an inflation-targeting regime, since there are longer lags from policy decisions to inflation, and monetary policy is in some respects more flexible than under exchange rate or money supply targeting. Research has shown, for instance, that increased transparency makes monetary policy more predictable, thus reducing the noise in interest rates and inflation (see Fracasso et al., 2003, and Demertzis and Hallet, 2002). Other studies have shown that greater transparency can also dampen exchange rate volatility (Kuttner and Posen, 2000), reduce the output cost of disinflation (Chortareas et al., 2002) and even bring down inflation (Chortareas et al., 2000, Faust and Svensson, 2000, and Jensen, 2000). Debelle (2001) also points out that increased transparency can help to build credibility more quickly. For these reasons, inflation-targeting central banks have firmly emphasised greater transparency of monetary policy and accountability towards the public and government (see Fry et al., 2000, and Fracasso et al, 2003).

One of the most effective ways for a central bank to build confidence in its ability to attain the inflation target is to publish the analysis on which its decisions are based, so that the public, government and other experts can evaluate its credibility and capability. Accordingly, all inflation-targeting central banks have devoted a considerable effort to their inflation report (see Fracasso et al., 2003), as Table 6 shows. Most produce four reports a year, others three or only two, sometimes with two short updates in between. The lowest frequency is in Korea, which produces only one inflation report a year. It is thus apparent that monetary policy decisions are usually made more frequently than inflation reports. This implies that vital information on economic developments and monetary policy responses is communicated to the public through more channels than the inflation

27. It can therefore be argued that monetary policy decisions in Sveriges Riksbank are taken by a board of governors rather than a monetary policy committee with a single governor, as assumed here.

28. The governors in Israel and New Zealand consult a monetary policy committee which does not, however, play a formal role in final policy decisions. Svensson (2001) criticises this arrangement in his report on monetary policy in New Zealand.

Table 6 Monetary policy decisions, transparency and accountability

Monetary policy decisions (no. of countries)	*Countries (no. of members)*
One governor and a monetary policy committee (17)	Australia(9)[1], Brazil(9)[2], Canada(6)[1], Chile(5)[2], Columbia(7)[2], Czech Republic(7)[2], Hungary(6)[2], Korea(7)[2], Mexico(5)[2], Norway(7)[1], Peru(7)[2], Philippines(7)[2], Poland(10)[2], South Africa(8)[2], Sweden(6)[2], Thailand(7)[1], UK(9)[2]
Board of governors (2)	Iceland(3)[2], Switzerland(3)[1]
One governor (2)	Israel, New Zealand
Regular meetings and minutes (no. of countries)	*Country*
Pre-scheduled meetings on interest-rate decisions (20)	Australia[3], Brazil[3], Canada[4], Chile[3], Columbia[3], Czech Republic[3], Hungary[3], Israel[3], Korea[3], Mexico[5], New Zealand[4], Norway[6], Peru[3], Philippines[3], Poland[3], South Africa[7], Sweden[4], Switzerland[8], Thailand[6], UK[3]
Minutes made public (9)	Brazil, Chile, Czech Republic, Korea, Philippines, Poland, South Africa, Sweden, UK
Inflation reports (no. of countries)	*Country*
Quarterly inflation reports (13)	Australia, Brazil, Columbia, Czech Republic, Hungary, Mexico, New Zealand, Philippines, Poland, Sweden, Switzerland, Thailand, UK
Inflation report at other frequency (8)	Canada[9], Chile[10], Iceland[11], Israel[12], Korea[13], Norway[10], Peru[10], South Africa[12]
Numerical forecast published (no. of countries)	*Country (forecast horizon in quarters)[14]*
Numerical inflation forecast published (19)	Australia(8), Brazil(6), Canada(9), Chile(8), Columbia(6), Czech Republic(9), Hungary(6), Iceland(9), Israel(6), Korea(8), New Zealand(14), Norway(13), Peru(6), Philippines(6), South Africa(9), Sweden(8), Switzerland(12), Thailand(8), UK(8)
Numerical output forecast published (12)	Brazil, Canada, Chile, Hungary, Iceland, New Zealand, Norway, Peru, Sweden, Switzerland, Thailand, UK
Responses to deviation from target (no. of countries)	*Countries*
Official report if deviation is excessive[15] (6)	Brazil, Iceland, Israel, New Zealand, Philippines, UK
Governorship at stake if deviation is excessive (1)	New Zealand
Predefined horizon for returning to target (3)	Canada[16], Chile[17], Sweden[18]

1. Consensus decision. 2. Decision by voting. 3. Monthly meetings. 4. Eight meetings a year. 5. 23 meetings a year (twice-monthly except December). 6. Meetings every six weeks. 7. Six meetings a year. 8. Four meetings a year. 9. Semi-annually with two short interim updates. 10. Every four months. 11. Quarterly until 2004, then semi-annually with short interim updates. 12. Semi-annually. 13. Annually. 14. Forecast horizon in the banks' most recent inflation reports. 15. The report should state the reasons for the deviation, the bank's responses to it and the time required to return to target. 16. Within the next 1½-2 years. 17. Within the next two years. 18. Within the next 1-2 years.

Sources: Fracasso et al. (2003), Schmidt-Hebbel and Tapia (2002), Truman (2003) and central bank websites.

reports. In fact, Andersson et al. (2001) find that unexpected news in speeches by Sveriges Riksbank executives has a statistically significant impact on long-term interest rates in Sweden.

This can also be seen from Schmidt-Hebbel and Tapia (2002), who find that only half the central banks try to make monetary policy meetings and publication of their inflation reports coincide (always in six cases and sometimes in four). Policy meetings thereby become an independent and important source of information about the monetary policy stance, and the function of the inflation report is more to present

background information for the decision than information about the decision itself.

Since inflation targeting requires the policy stance at any time to be consistent with the inflation outlook over a fairly long horizon, it is not surprising that most central banks make their inflation forecast public. Of 19 banks publishing numerical inflation forecasts, 14 also report the confidence intervals, usually with fan charts. Only just under half publish numerical forecasts for output growth, which is interesting in light of its important role for the medium-term inflation outlook. However, most of the banks that do not publish a numerical output forecast give a general outline of economic prospects.[29] The average forecast horizon is just over two years and most banks publish a forecast for the next 6-8 quarters. Several publish a forecast over a longer horizon than two years: four for nine quarters and three for three years or beyond.[30]

Finally, Table 6 shows the banks' formal responses to large target misses. It turns out that very few have clear public provisions on how to respond, which is quite surprising given the general insistence on their own accountability. The central banks probably feel that repeated large target misses are undesirable for their reputations and those of the individuals responsible for monetary policy decisions. This may well impose adequate discipline. Three banks specify an explicit timeframe for returning to target (generally two years) and in six cases the central banks are obliged to write open letters stating the reasons for the deviation, the bank's responses and how long it will take to return to target. New Zealand has gone farthest in ensuring accountability of its decisions, with legal provisions to remove the governor from office if inflation exceeds the target range. Comparable provisions would clearly be difficult to implement at most of the other banks where monetary policy decisions are made by a committee, whereas in New Zealand the governor alone is responsible.

4.5. Monetary policy operation

Central banks can use short-term money market interest rates or a monetary aggregate as their operating target to affect the amount of liquidity in the financial system. As Table 7 shows, most central banks use short-term interest rates, either overnight rates or money market rates (of up to three months' maturity). Only three banks target banking system liquidity and these all previously targeted money supply as their nominal anchor.

All the central banks except the Bank of Canada use open market operations as their chief policy instrument, either in the form of repos or by direct purchases and sales of securities (treasury bills or short-term central bank debt instruments). Many use both methods. The Bank of Canada maintains a fixed volume of base money in the payment system, influencing market interest rates through a narrow interest rate corridor.

The table also presents the main reasons for potential central bank intervention in the foreign exchange market, as stated in their official publications (see Carare et al., 2002). Most want to keep this option open even though intervention has been rare in recent years, especially in the industrial countries. Exceptions include the Central Bank of Iceland and Sveriges Riksbank.

The potential threat that exchange rate developments pose to the inflation target is usually named as the reason for possible foreign exchange intervention, but a threat to financial stability is also cited. Only in Hungary does the central bank intervene in order to defend a specified exchange rate level, motivated by economic adjustment to the Maastricht criteria for joining EMU (see Jonas and Mishkin, 2003).[31] A more detailed discussion of the

29. Exceptions are Poland, which publishes neither an inflation nor an output forecast, and South Africa, which does not publish an output forecast (see Fracasso et al., 2003). Mexico presents a summary of market forecasts with very general references to its own forecasts.

30. The Reserve Bank of New Zealand is the only bank to publish a forecast for the development of its policy rate over the forecast horizon, i.e. the rate compatible with keeping inflation on target based on its response function, which Svensson (2001) urges other inflation-targeting banks to emulate. Others, such as the Bank of England and Sveriges Riksbank, also publish inflation forecasts based on interest rate forecasts derived from market yield curves. Some banks also publish details of different forecasts within the monetary policy committee, in the event of disagreements among members.

31. A number of central banks also mention building up of foreign reserves as a reason for intervention. A distinction is generally made between interventions aimed at influencing the exchange rate (sometimes termed direct intervention) and those made solely to adjust foreign reserves. See Ísberg and Pétursson (2003).

Table 7 Monetary policy instruments

Operating target (no. of countries)	*Country*
Overnight interest rates (9)	Australia, Brazil, Canada, Chile, Columbia, Korea, New Zealand, Norway, South Africa,
Short-term interest rates (9)	Czech Republic, Hungary, Iceland, Israel, Poland, Sweden, Switzerland, Thailand, UK
Banking system liquidity (3)	Mexico, Peru, Philippines
Main policy instrument (no. of countries)	*Country*
Open market operations with repos (11)	Australia, Columbia, Czech Republic, Iceland, New Zealand, Peru, Philippines, Sweden, Switzerland, Thailand, UK
Open market operations with treasury or central bank securities (9)	Brazil, Chile, Hungary, Israel, Korea, Mexico, Norway, Poland, South Africa
Interest-rate corridor through net position of payment system (1)	Canada
Possible intervention in FX market (no. of countries)	*Country*
If exchange rate developments threaten inflation target (4)	Brazil, Iceland, Norway, Sweden
Abnormal FX market volatility (2)	Australia, Czech Republic
Exceptional FX market conditions (7)	Australia, Brazil, Canada, Chile, Iceland, New Zealand, Norway
To build up foreign reserves (3)	Columbia, Iceland, South Africa
To defend an exchange rate target (1)	Hungary

Sources: Carare et al. (2002), Schaechter et al. (2000), Truman (2003) and central bank websites.

role of the exchange rate in monetary policy formation is found in Pétursson (2004).

5. Concluding remarks

In recent years a rapidly growing number of countries have adopted a monetary policy framework guided by a formal inflation target. At the end of 1993 five countries were on an inflation target, and five years later they had increased to ten. Another five years on they had roughly doubled again, and 21 countries currently follow an inflation target.

These countries have moved on to an inflation target for a variety of reasons. For some it was a natural conclusion to an evolving process lasting for various lengths of time, or a formalisation of a de facto policy. In other cases an earlier regime had finally been abandoned after it failed or produced unsatisfactory results. Common features of all these reforms, however, was the attempt to communicate the ultimate goals of monetary policy more clearly, to improve the framework for conducting monetary policy and to provide a clearer anchor for inflation expectations.

Inflation-targeting countries are highly diverse in size and structure and were in different positions in the business cycle when they adopted the target. In general they are either relatively small or medium-sized industrial countries, or relatively large emerging market economies. They tend to be more open to international trade and have a lower level of treasury debt than similar non-targeters, and also seem more prosperous and have fairly developed financial systems.

Other differences in institutional structure, the legislative position of their central banks, and the general level of confidence and understanding of the new regime can also be observed. Policy implementation and formulation have varied as well, and in some cases these have been altered in light of greater experience of the new regime. As more countries gradually adopt inflation targeting, the

chief characteristics of the regime that emerge seem to be a firm emphasis on price stability as the primary objective of monetary policy and a numerical target and institutional support for it that promote transparency and accountability of the regime. These changes have enhanced public confidence in, and understanding of, monetary policy. Discussion of monetary policy both inside and outside the central bank is therefore more aligned to its main objectives and to what monetary policy can and cannot achieve. This improves the central banks' ability to achieve their inflation targets with a smoother adjustment of the policy stance. In many respects, inflation targeting has enabled countries that had struggled with persistent inflation to break out of the spiral and bring their monetary policy into line with best global practices. These countries have even led the way in establishing a new benchmark for how to formulate monetary policy.

Having said this, it should be clear that inflation targeting is no panacea. Challenges to monetary policy will continue to arise, requiring carefully thought-out analysis and decisions on the part of the monetary authorities, and inevitably mistakes will continue to be made. Thus monetary policy will still need to decide on the causes and durability of shocks, and the issue of how to deal with supply shocks will not disappear. The same applies to the role of exchange rate developments in the formulation of monetary policy in a small, open economy, especially where the domestic financial system is relatively underdeveloped so that excessive exchange rate fluctuations can undermine its stability. Inconsistency between the inflation target and financial stability can also create conflict, as can inconsistencies between monetary and fiscal policy. The key is, however, that flexible inflation targeting provides a framework which increases the probability that monetary policy reaches the correct decisions and that these decisions are explained in a clear and credible fashion.

Furthermore, it is not certain that inflation targeting is suitable for all countries at all times and under all conditions, any more than any other monetary policy would be. Although the conditions for moving on to an inflation target must not be interpreted too literally, since in effect they apply to any given monetary policy framework, it is clear that some countries' institutional structure and market development could make the framework difficult to maintain. Nonetheless, it is safe to say that continued globalisation, market development and establishment of western-style economic institutions will lead more countries to adopt inflation targeting in the years to come.

Box 1 Inflation and the evolution of inflation targeting

This box presents inflation developments and the evolution of inflation targeting in the 21 countries, plus Finland and Spain, over the past two decades. Countries are arranged in chronological order based on when they moved on to an inflation target. The red lines show the numerical target and the green lines its range or tolerance limits.

Data extend to the end of 2003, but the charts to the scheduled end of the respective country's adjustment to the long-term target. This development is discussed in more detail in the main text and also in Pétursson (2004).

Chart 1 New Zealand

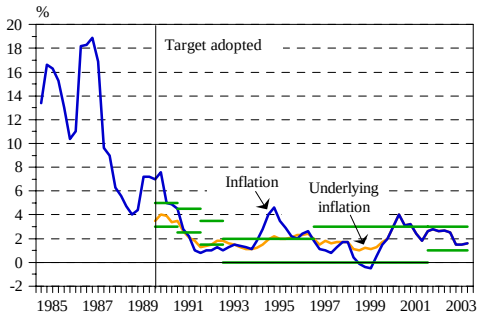


Chart 2 Chile

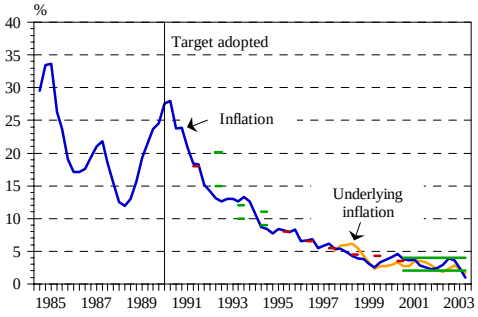


Chart 3 Canada

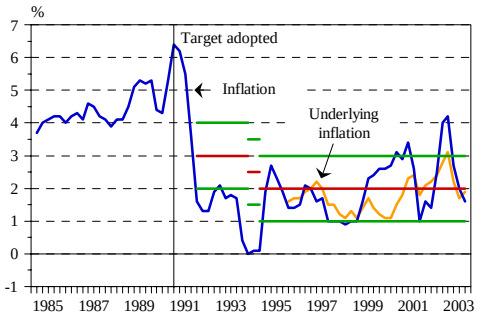


Chart 4 Israel

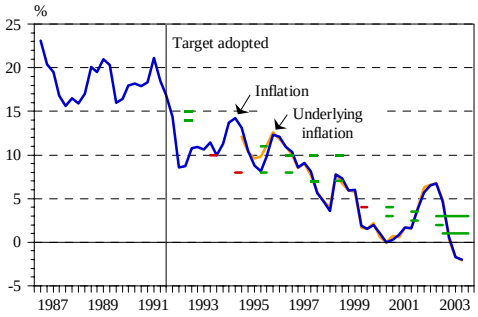


Chart 5 United Kingdom

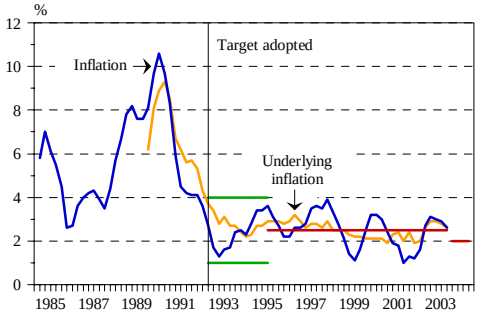


Chart 6 Sweden

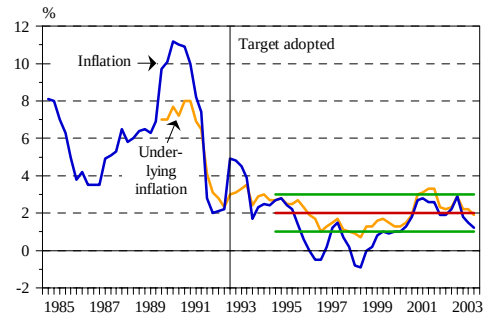


Chart 9 Spain

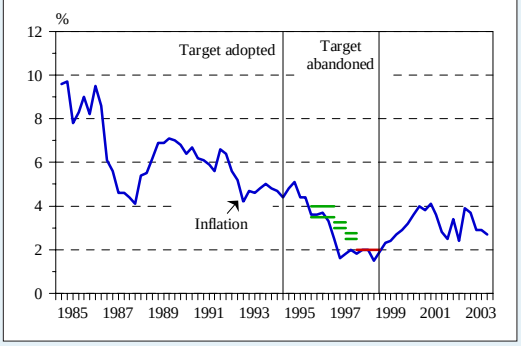


Chart 7 Finland

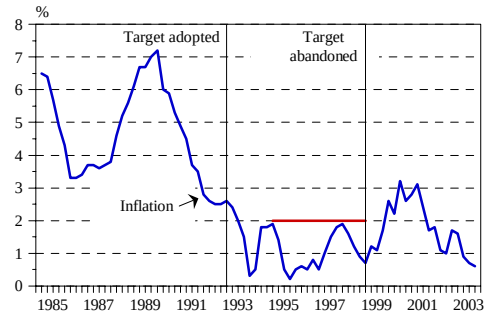


Chart 10 Czech Republic

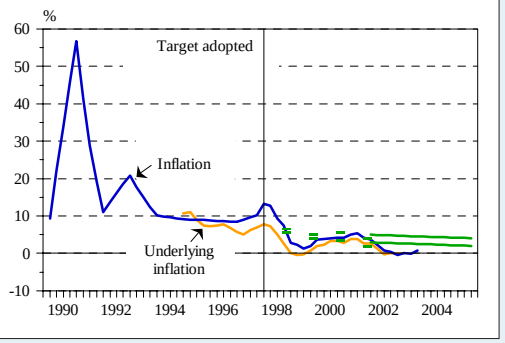


Chart 8 Australia

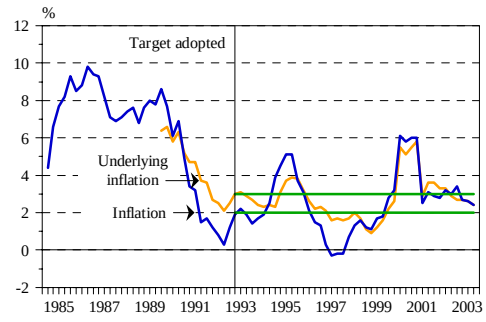


Chart 11 Korea

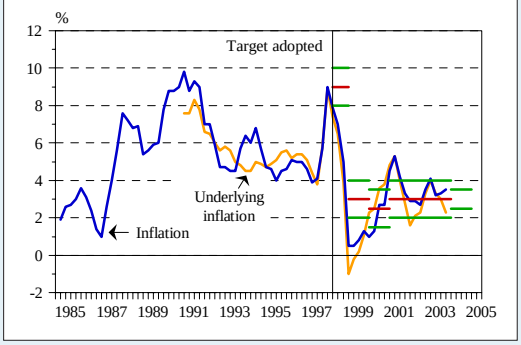


Chart 12 Poland

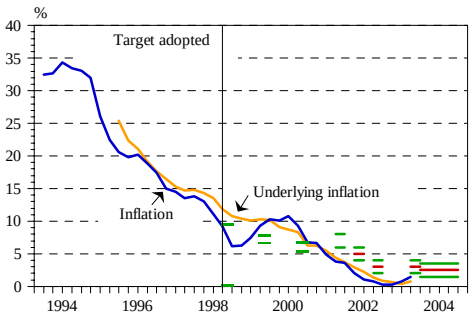


Chart 13 Mexico

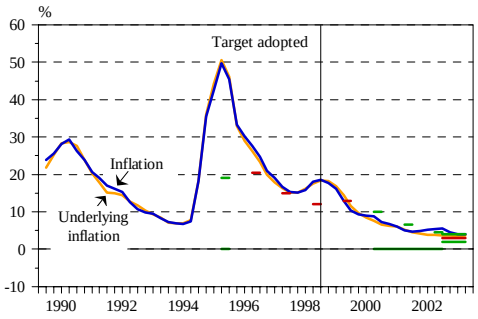


Chart 14 Brazil

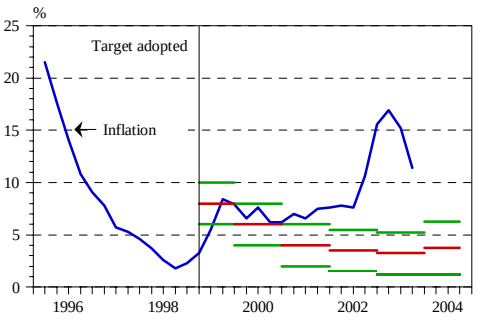


Chart 15 Columbia

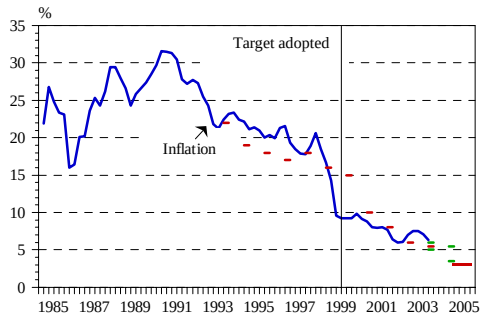


Chart 16 Switzerland

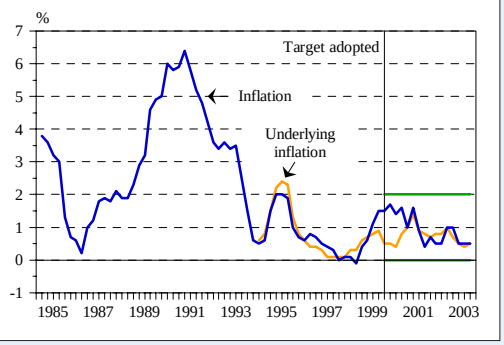


Chart 17 South Africa

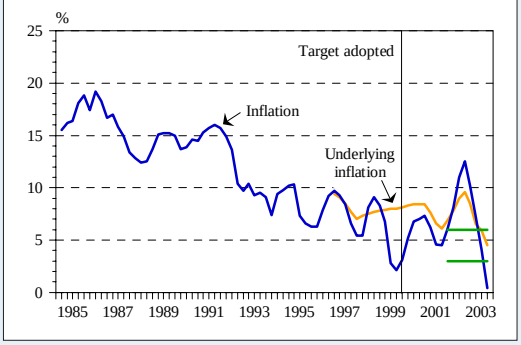


Chart 18 Thailand

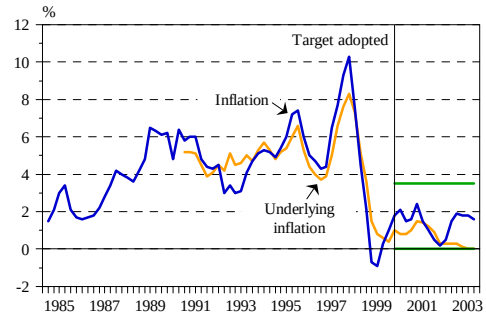


Chart 19 Iceland

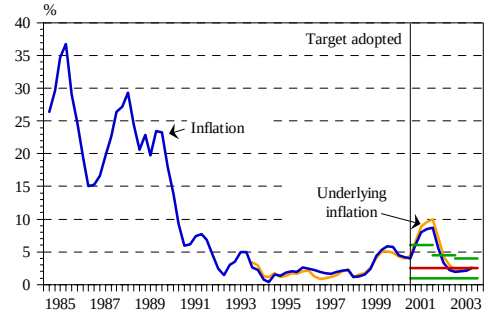


Chart 20 Norway

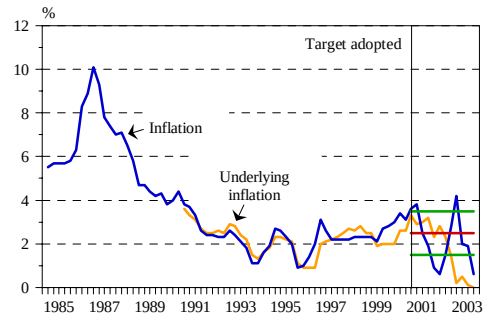


Chart 21 Hungary

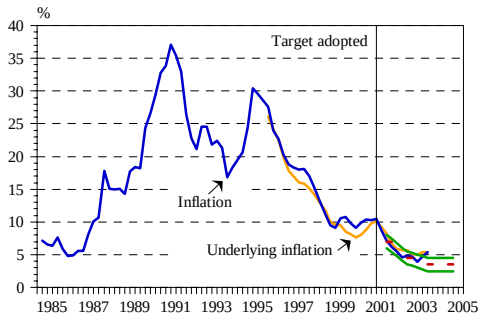


Chart 22 Peru

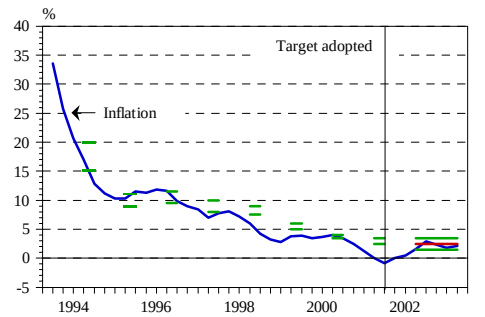
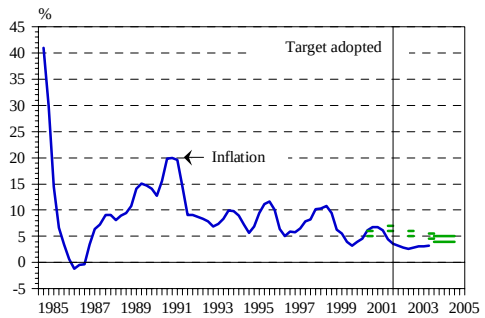


Chart 23 Philippines



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