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Inflation Targeting in Practice

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Abstract

In recent years, an inflation targeting framework for monetary policy has been adopted in a number of industrial countries. This paper discusses the practical issues that have arisen under the operation of the new framework, and highlights five features of the framework: the assignment of the target, the interaction with other policy goals, the definition of the target, accountability and the role of inflation forecasts. The economic performance of the inflation targeting countries thus far is summarized.

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Summary

In recent years, an inflation targeting framework for monetary policy has been adopted by New Zealand, Canada, the United Kingdom, Finland, Sweden, Australia, and Spain (in chronological order). Because the experience of most of these countries with monetary targeting or a fixed exchange rate had proved unsatisfactory, this new framework for the conduct of monetary policy was required.

In theory, an inflation target is relatively straightforward. The central bank forecasts the future path of inflation; the forecast is compared with the target inflation rate; the difference between the forecast and the target determines the required adjustment of the monetary policy instrument. However, the experience to date of the inflation targeting countries has identified a number of complex operational issues.

This paper highlights five aspects of the inflation targeting framework: the assignment of the target, the interaction with other policy goals, the definition of the target, accountability, and the role of inflation forecasts. It compares and contrasts the approaches that the countries have adopted in addressing these issues. As a result, the prerequisites for an inflation target framework can be distilled from the experience of these countries.

The economic performance to date of the new framework appears promising. Inflation has been brought down in all seven countries. However, a downward trend in inflation during this time was a feature of most industrial countries, and not solely those that practiced inflation targeting. Nevertheless, the inflation targeting framework has proven beneficial in addressing problems caused by lack of credibility in those countries that have adopted it.

I. INTRODUCTION

In recent years, an inflation targeting framework for monetary policy has been adopted by New Zealand, Canada, the United Kingdom, Finland, Sweden, Australia, and Spain (in chronological order). Table 1 summarizes the targeting frameworks that have been adopted.[2] In most of the countries, their experience with monetary targeting or a fixed exchange rate had proved unsatisfactory and a new framework for the conduct of monetary policy was required. Thus the use of inflation targets can be seen as a further step in the evolution of monetary policy strategies adopted by central banks.

In New Zealand and Canada, the first two countries to introduce inflation targets, the targets were initially introduced to aid the disinflationary process. The positive experience of these two countries with their inflation targets in large part prompted the adoption of similar frameworks by the other five countries. However, in these other countries, the inflation target was adopted when the inflation rate was already at a relatively low level.

A common feature of the inflation targeting countries is their relatively poor inflation record over the last 30 years compared to other industrial countries such as Germany, Switzerland, Japan and the United States. In part, because of their satisfactory inflation performance, this latter group of countries has not explicitly adopted inflation targeting. A distinguishing feature between these two groups of countries is that the inflation targeting group was generally perceived to lack monetary policy credibility. Consequently, one of the main reasons for adopting inflation targets is to enhance the credibility of monetary policy. In one sense, inflation targets are the track on which these countries seek to build their record of low inflation and monetary policy credibility.

While most central banks express a desire for low inflation, and hence could be described as having a target rate for inflation, the distinctive feature of the inflation targeting countries is that the inflation rate is the over-riding objective of monetary policy. In the event of conflict between the inflation rate target and any other objective of monetary policy such as the exchange rate or an unemployment rate target, the inflation target dictates the monetary policy response.

A number of rationales can be advanced for the adoption of inflation targets. Firstly, in recent years there has been a reemphasis on price stability as the primary goal for monetary

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[2]For a general discussion of inflation targeting, see Fischer (1996). For more information on individual country experiences, see the collection of papers in Haldane (1995), and in Leiderman and Svensson (1995), and also McCallum (1996). See also A. Fischer (1993) and Debelle (1996) for New Zealand and Canada, and for the United Kingdom, Stiehler (1995). Lane, Griffiths and Prati (1995) discuss inflation targets with regard to their possible application to Italy.

Table 1: Summary of Inflation Targeting Frameworks

Country	New Zealand	Canada	United Kingdom	Sweden	Finland	Australia	Spain
Date first instituted	March 1990	February 1991	October 1992	January 1993	February 1993	Approx April 1993	Summer 1994
Current Target	0-3%	1-3%	1-4%	2%	2%	2-3%	less than 3%
Time-frame	5 years (to 1998)	through end-1998	by spring 1997, 2.5% or less thereafter	1996 onwards	1996 onwards	On average over the cycle	by late 1997, less than 2% thereafter
Inflation measure	Underlying CPI	CPI	Retail Price Index excl. mortgage interest payments (RPIX)	CPI	Underlying CPI	Underlying CPI	CPI
Factors excluded from CPI	Interest cost component, indirect taxes, government charges and significant changes in terms of trade	None. Underlying inflation rate used operationally	Mortgage interest payments	None.	Mortgage interest payments, indirect taxes, govt. subsidies, house prices.	Mortgage interest payments, indirect taxes, other volatile items	None
Target announce-ment	Defined in policy target agreement (PTA) between the Minister of Finance and the Governor of the central bank	Joint agreement between the minister of Finance and the Governor of the central bank	Chancellor of the Exchequer	Bank of Sweden (Riksbank)	Bank of Finland	Reserve Bank of Australia	Bank of Spain
Inflation report	Quarterly since March 1990	Half-yearly since May 1995	Quarterly since February 1993	Quarterly since October 1993	No	No	Semi-annual
Inflation forecasts published?	Yes	No	Yes	No	No	No	No

Note: The New Zealand inflation target band width was widened from 0-2% in December 1996.

policy. Empirical studies have highlighted the costs of high (and variable) inflation.[3] Practical experience has also demonstrated that short term manipulation of monetary policy to achieve other goals is likely to be counter-productive. This does not necessarily imply that unemployment/output considerations are neglected by monetary policy. As will be discussed below, these considerations may often be consistent with the pursuit of the inflation target. Rather, the inflation targeting framework recognizes the theoretical consideration that monetary policy can affect only nominal variables in the longer term.

Secondly, inflation targets are supported by the theoretical literature that argues that a credible commitment to an inflation objective can remove the potential inflation bias of monetary policy.[4] This literature argues that discretionary monetary policy can lead to higher than optimal inflation outcomes, due for instance to an unemployment target below the natural rate. An inflation target removes the incentive for central banks to adopt such policies, essentially by appropriately defining the central bank's objective function. The inflation targeting framework, and the associated increased transparency and accountability, also may serve to increase the independence of the central bank to pursue the inflation goal without any constraints on its ability to set the instrument of monetary policy.

Nevertheless, the above arguments do not imply that the appropriate operational framework for monetary policy is to focus on the final objective of monetary policy (the inflation rate), rather than on some intermediate objective. To make this step, the linkage must be stronger between the instrument of monetary policy and the inflation rate than the linkage via any intermediate target which has a stable relationship with inflation. To be suitable as a target for monetary policy, the inflation target must be controllable by the instrument of monetary policy and be visible (see Cukierman 1995).

The instability of money demand functions (in part a result of financial sector liberalization) in the inflation targeting countries in recent years has raised the possibility that there is a more stable relation directly between inflation and short term interest rates compared to the relationship between short term interest rates and the money aggregates. Focusing on the final goal of an inflation target, avoids the potential loss of credibility from frequent changes to an intermediate target such as a monetary aggregate. Secondly, inflation targets are particularly visible and easily monitored, and serve as an anchor for inflation expectations, in addition to their role as a focus for policy decisions.

The focus on the inflation rate highlights one of the other defining features of inflation targeting, namely, the paramount role that inflation forecasts play in the policy process. In effect, the monetary policy reaction function is defined directly in terms of the inflation

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[3]See Fischer (1993), Barro (1995) and Sarel (1996).

[4]See Persson and Tabellini (1993), Walsh (1995), Svensson (1995) and Green (1996). Svensson and Green explicitly discuss inflation targets.

forecast. The reliance on inflation forecasts implies that the economic structure of the economy must be relatively stable and relatively easily modeled.

In theory, an inflation target is relatively straightforward: the central bank produces a forecast of the future path of inflation; the forecast is compared to the target inflation rate; the difference between the forecast and the target determines the necessary adjustment of the monetary policy instrument. However, the experience to date of the inflation targeting countries has identified a number of complex operational issues. These practical considerations are discussed in the next section and serve to highlight the prerequisites for an inflation targeting framework. The third section summarizes the economic performance of the seven inflation countries under the inflation targeting framework, while the final section concludes.

II. THE INFLATION TARGETING FRAMEWORK

This section will draw out the salient features of inflation targeting and will discuss the practical issues involved with the implementation of inflation targets.[5] The main issues that have been highlighted by the experience in the inflation targeting countries are: who assigns the target, how does the target interact with other policy goals, what is the appropriate definition of the target, what is the role of inflation forecasts, and how accountable should the central bank be for achieving the target.

A. Assignment of the target

The issue of who assigns the inflation target is closely linked to the independence of the central bank. Independence of the central bank need not be associated with the freedom for it to choose its own goals. Debelle and Fischer (1994) argue that it may be more appropriate for the central bank to be goal dependent (that is have its goals assigned in its charter or by the government) but have instrument independence, that is, be unconstrained in the operation of monetary policy in pursuing the assigned goal.

The announcement of the inflation target has varied across the seven countries. In some of the countries (Australia, Finland and Sweden), the inflation target was first announced by the central bank, initially without any explicit endorsement from the government. In others (Canada and New Zealand), the target was the result of a joint

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[5]A discussion of the actual monetary instruments used is beyond the scope of this paper. However, see Freedman (1995 and 1996) for a discussion of the choice of operating procedures and the use of a monetary conditions index in the conduct of Canadian monetary policy.

agreement between the Minister of Finance and the Governor of the central bank.[6] Where the inflation target was originally announced by the central bank, in most cases the inflation target has been subsequently endorsed by the government.[7] This is beneficial in that it promotes the agreement between the two policy making institutions. A unilateral announcement of the target by the central bank may decrease the effectiveness and dilute the credibility of the framework, if it is not endorsed by the government.

An inflation target is not mentioned explicitly in any of the charters of the central banks. Rather, the inflation-targeting central banks have justified the target as an operational interpretation of their ultimate goal of currency or price stability. Given the short run tradeoff embodied in the short-run Phillips curve, central banks whose goals include full employment in addition to inflation may be perceived as arbitrarily deciding to favor one goal over the other. To address this issue, central banks have stressed that there is no long trade-off between output and inflation and that the best way that the central bank can assist the achievement of higher growth in the long run is to maintain a low inflation rate.

The framework in New Zealand highlights the distinction between goal and instrument independence. In New Zealand, the Reserve Bank of New Zealand (RBNZ) Act approved in 1989 requires that a Policy Target Agreement be signed by the Governor and the Minister of Finance. This agreement defines the practical implementation of the Reserve Bank's primary goal of price stability. The actual terms of the agreement are negotiated between the government and the central bank. The agreement is generally signed at the commencement of each term of the Governor of the central bank and lasts for the length of his/her term (five years); the achievement of the inflation target is the principal performance criterion of the Governor's employment contract. The agreement may be overridden by the government for periods of six months but any override must be made public.[8]

B. Interaction with other policy goals

In an inflation targeting regime, the paramount goal for monetary policy is the achievement of the specified inflation target. Any other goal can only be pursued to the extent that it is consistent with the inflation target. For example, inflation targeting is not consistent

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[6]In the United Kingdom, where formal responsibility for monetary policy lies with the Chancellor rather than the Bank of England, the inflation target was announced by the Chancellor. The Bank of England advises the Chancellor on the monetary policy decision.

[7]For example, in Australia, in 1996 a joint statement was made by the incoming Governor and the Treasurer, formally endorsing the inflation targeting framework. The previous government had informally endorsed the framework on a number of occasions.

[8]This structure is similar to the incentive-compatible contracts described in the literature on central bank independence. See Walsh (1995).

with a fixed exchange rate regime. In fact, in a number of the countries that have adopted this framework, the inflation target directly replaced the fixed exchange rate regime. Given that monetary policy is endogenous under a fixed exchange rate, it is generally not possible to target an inflation rate in the medium term, much different from that of the country to which the domestic currency is pegged. A range for the exchange rate may underpin an inflation forecast on which the monetary policy decision is based, but this should not be interpreted in the standard sense of an exchange rate band.

A full employment goal is not necessarily inconsistent with an inflation target. In the long run, the achievement of the inflation target may be the best contribution that monetary policy can make to the full employment objective. In the short run, however, there may be a tradeoff between the two objectives. The response of monetary policy to a demand shock is generally the same under both a full employment goal and an inflation target. The adoption of "caveats" or the use of the underlying inflation rate in the monetary policy reaction function (discussed below) imply that the response to particular supply shocks dictated by the inflation target may also not be incompatible with a full employment goal.[9]

Another goal that central banks often pursue is that of financial stability. This goal should not necessarily be inconsistent with an inflation targeting framework, though a fragile banking system may decrease interest rate flexibility. In the long run, the deflationary pressure from a banking sector in crisis would result in an undershooting of the inflation target. In the short run, the central bank may face a conflict if the tightening in monetary policy necessary to achieve the inflation target imperils the survival of a particular financial institution. The Bank of Canada also noted that "its operations must sometimes give precedence to steadying nervous markets".[10] However, systemic risks may only develop if monetary policy is "excessively" tight so that the inflation target would be undershot.

In an inflation targeting regime, there is also an implicit interaction between the goals of monetary policy and fiscal policy. Operationally, monetary policy needs to take account of the effect of fiscal policy on the outlook for inflation. Fiscal policy in general also needs to be supportive of the inflation target. For example, an excessively large stock of public debt may create expectations of future inflation which may make it more difficult for the central bank to achieve the inflation target in the short run. The resultant higher interest rates may also increase the debt servicing burden for the government and add to the stock of debt resulting in a vicious circle of higher interest rates and higher debt.

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[9]An example is the effect of the decrease in the indirect tax rate in Canada in 1995, which caused the headline inflation rate to fall temporarily below the target band, while the underlying rate remained within the band. The Bank of Canada focused on the latter rate.

[10]Monetary Policy Report of the Bank of Canada, May 1995.

To some extent, this occurred in the initial phases of the inflation targeting regimes in Canada and New Zealand. Both countries introduced their inflation targets when public debt ratios were at high levels (over 60 percent and 50 percent in the late 1980s respectively). These debt levels may have increased the cost of the disinflationary process in both countries by undermining the credibility of the disinflationary effort, resulting in tighter monetary conditions than would otherwise have been the case.[11]

The more recent experience in New Zealand also demonstrates a more typical interaction between monetary and fiscal policy implied by an inflation target. The New Zealand government announced a large tax cut to take effect in 1996 prior to the election. The RBNZ estimated the effect of this tax cut on demand and concluded that monetary conditions would need to remain tight longer than if the tax cut had not occurred. Thus any changes in fiscal policy will also induce a change in monetary policy to the extent that the fiscal policy changes impact on the inflation target.

C. Definition of target

The definition of the inflation target varies across the inflation-targeting countries. The main differences are the horizon over which the inflation target is specified, the measure of the price index in terms of which the inflation target is specified, the central point of the target, and whether the target is specified in terms of a point or a band.

Horizon of the target

The horizon of the inflation target adopted in the various countries has depended in part on the inflation rate at the time of the initial inflation target. Those countries where the initial inflation rate differed from that of the desired inflation target, allowed an implementation period of around two years, given the lags in the effect of monetary policy on inflation. Those countries where inflation was already low, adopted targets that were to apply immediately and indefinitely. The horizon of the inflation target also reflects the ability of monetary policy to offset deviations from short-term shocks.

In Canada and New Zealand, the inflation targets were used to assist the disinflationary process. The timetable of the disinflations were pre-specified. Around 18 months was allowed for the achievement of the initial target to take account of the lags in the operation of monetary policy (see section III). Thereafter, targets for further step reductions in the inflation rate were set at 12 month intervals in New Zealand, and 18 month intervals in Canada. Once the disinflation had reduced inflation to the desired long run level, inflation targets in both countries were set for the next five years. Inflation was expected to remain within the target bands at all times over that horizon. In New Zealand, the five year horizon is determined by the length of the contract of the central bank Governor. In Canada, the horizon

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[11]See Debelle (1996).

was chosen to allow some understanding to be developed of how the economy operated at low levels of inflation and to allow some time to determine what exactly price stability corresponded to in practice.

In the United Kingdom, the horizon was set as the end of the parliamentary term (early-mid 1997). Inflation was to reach the lower half of the current band of 1 to 4 percent by that time. Thereafter, it was to remain below 2.5 percent indefinitely. Thus in part, the initial horizon was to allow inflation to be gradually brought down to the lower level. More recently, greater emphasis has been placed on a target of inflation less than 2.5 percent.

In both Sweden and Finland, the inflation target was adopted at the beginning of 1993, but was not expected to be achieved until 1995, in order to gain experience in the new floating exchange rate environment and to allow for the variable lags of monetary policy (Andersson and Berg (1995)).

In contrast to the other six countries, in Australia, the time horizon for the inflation target is the length of the cycle. To some extent, the specification of the horizon as an average over the business cycle offsets the absence of any inflation band in the definition of the inflation target. However, the vague horizon implied by the length of the cycle will make assessment of the central bank's success in achieving the target more difficult. This raises the question of whether there should be short run or long run accountability for the achievement of the inflation target (which is addressed further below).

Level of the target

The centre-point of the inflation target reflects, in most countries, their interpretation of the operational definition of price stability. In theory, zero inflation would appear to be equivalent to price stability, but in practice the concept of price stability is affected by issues such as the measurement and nominal rigidities.

The biases in the calculation of the consumer price index imply that in practice, price stability is likely to be associated with a small positive rate of inflation in the CPI rather than a zero rate. These biases include those due to the introduction of new goods, outlet substitution bias, quality bias and those caused by the adjustment of consumers to relative price changes between the periodic re-definitions of the basic consumption bundle. These issues are endemic to the calculation of price indices, and in general can not be remedied by the statistical bureau. Estimates of the bias in the CPI range from around 1 percent in the United States down to less than 0.5 percent in New Zealand.[12]

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[12]See Advisory Commission (1996) for the United States, Rae, Lloyd and Fung (1992) for New Zealand, and Crawford (1993) for Canada.

A number of other arguments have been advanced by central banks to justify a non-zero inflation target. Firstly, the possibility of downward rigidity in prices and wages implies that a small positive inflation rate allows for the necessary relative price adjustment.[13] Secondly, since nominal interest rates are bounded below by zero, a zero inflation target implies that the potential for negative real interest rates is ruled out (which may be necessary to stimulate economic recovery at the bottom of a recession).[14] Both of these arguments may be motivated by the high inflation period of the 1970s and 1980s. As the economy adapts to a low inflation regime, downward rigidity in wages and prices may decrease, and the need for negative real rates of interest to stimulate growth may diminish. Nevertheless, in the interim, downward nominal rigidity is likely to put a floor under the inflation rate, and may increase the cost of any disinflation.

Generally the inflation targets have centered on an inflation rate of around 2 percent per annum. At such low levels of inflation, there is little empirical evidence that the benefits of targeting a lower inflation rate (1 percent say) are much greater, but the costs of undertaking that reduction may be large. The greater benefit is likely to derive from a decrease in uncertainty and a more stable inflation rate, regardless of its particular level, once it is sufficiently low.[15]

Choice of price index

The choice of the price level that is used to calculate the targeted inflation rate in part reflects the differing methodologies in calculating the Consumer Price Index (CPI) across countries and the relative sensitivity of the CPI inflation rate to supply shocks. In general, the practice has been to specify the target in terms of the CPI, or some variant thereof, rather than the GDP deflator because it is the price index most familiar to the general public and also because it is timely and not subject to revision. The GDP deflator does however have a broader coverage.

A number of countries use an "underlying" measure of inflation based on the CPI, rather than the published or "headline" CPI inflation rate. The purpose of focussing on an underlying inflation rate is to exclude from the inflation rate, non-monetary determinants of

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[13]This argument was first made by Tobin (1972). One implication of nominal rigidities is that the distribution of price changes should be truncated at zero. However, there is mixed empirical evidence on the presence of such asymmetries in the distribution of wages or prices. See Lebow, Roberts and Stockton (1992) and Cabral, Hall and Yates (1995) for a rejection of asymmetries, and Akerlof, Dickens and Perry (1996) who find evidence of wage asymmetries.

[14]See Summers (1991).

[15]Sarel (1996) suggests that it is difficult to empirically determine the costs of inflation once it is below 8 percent.

inflation. In practice, measures of underlying (core) inflation exclude the first-round effects of particular shocks (which are therefore accommodated by monetary policy), but not the second round effects of those shocks on wages and prices (which are thus counter-acted by a tightening of monetary policy).[16]

The principal difference between the CPI and the underlying inflation rate in a number of countries is that the underlying rate excludes mortgage interest payments. This avoids the problem that if the central bank responds to a rise in the (expected) inflation rate above the target level by increasing short-term interest rates, the CPI inflation rate will rise further as the increased cost of funds flows through to higher mortgage lending rates. The component of the CPI which is affected by changes in mortgage costs is easy to identify, and the inflation rate excluding mortgage or credit charges is often published by the statistical bureau rather than the central bank itself. In a number of countries (including the United States), this problem is avoided by a different treatment of interest charges in the CPI.

Some countries have also excluded other components of the CPI from their underlying inflation target. For example, Canada and Finland both exclude indirect taxes so that changes in fiscal policy do not prompt undesired changes in monetary policy. In principle, this component is also relatively easy to identify. The Canadian and Australian underlying rates also exclude food and energy prices which tend to be highly volatile but are generally thought to be mean-reverting over a longer horizon (two to three years). One solution to this last problem is to define the inflation target over a longer time span than one year so that shorter term volatile movements in prices net out. Alternatively, one could take a moving average of the annual inflation rate. However, convention dictates that an annual horizon is used.

In New Zealand, the underlying inflation rate is calculated by adjusting the CPI inflation rate calculated by the statistics bureau by applying a number of "caveats" specified in the Policy Targets Agreement. The caveats specify the types of (supply) shocks that are allowed to be accommodated by the RBNZ. These shocks are changes in mortgage interest rates, price changes caused by natural disasters, changes in indirect taxes and other government-set prices, and the direct impact of "significant" changes in import or export prices, where "significant" is defined as any shock which has a cumulative impact on the price level of more than 0.25 of a percentage point over a 12 month period.

Such calculations are relatively judgmental and imply that the underlying rate and hence the target, are subject to revision. Judgement is required both in the identification of a shock and in the exclusion of the shock from the headline inflation rate. For example, in

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[16]An alternative to the underlying rate is the median inflation rate (see Bryant and Cecchetti (1993)). The median inflation rate focuses on the central tendency of inflation, down-weighting extreme values. Reserve Bank of Australia (1994) and Yates (1995) show that the movement between the headline, underlying, and median inflation rates have been very similar in Australia and the United Kingdom respectively.

excluding the effect of import and export price changes, models of pass-through must be utilized to determine the magnitude of the shock. To increase the transparency of the process, the RBNZ has requested that the statistics bureau calculate this underlying measure but has so far been unsuccessful.

Focussing on the underlying rate of inflation may be problematic if all the price and wage decisions in the economy are made on the basis of the "headline" (published) rate of inflation. However, wage and price responses to the movements in the headline inflation rate will be captured by the underlying rate. A further problem is that the underlying rate may not be as transparent, but if it is calculated by the statistical office, this is mitigated to some extent.

An underlying inflation rate may be a useful intermediate target toward the final goal of price stability. In Canada and New Zealand, the underlying inflation rate is used explicitly in this role. To function appropriately in this role, the underlying inflation rate should reflect the balance of demand and supply factors in the economy, hence the exclusion of indirect taxes and mortgage interest charges.

Width of the Target Band

A major difference between the definition of inflation targets across countries is the width of the band around the central target or whether a band is specified at all. In both Finland and Australia the framework focuses on a particular point target for the inflation rate, whereas Canada, the United Kingdom, Sweden and New Zealand have all specified a range for the inflation target.[17] In Spain, the target is specified in terms of a ceiling for the inflation rate.

The need to specify a bandwidth results from the imperfect control of monetary policy over the inflation rate. Given the long and variable lags of monetary policy, and given the imperfect ability to forecast future inflation, it is not possible to restrict the variability in inflation below a certain level. Bandwidth is also needed to maintain some flexibility in responding to short term shocks. The divergent bandwidths across the inflation targeting countries in part reflects different opinions of the feasible minimum variability in inflation.

The choice of bandwidth (or band versus point) reflects a tradeoff between announcing a tight hard-edged band and breaching it occasionally, and announcing a wide band (or no band at all) which may be regarded as softness on the part of the central bank. A narrower band may be interpreted as indicating a stronger commitment to the inflation target.

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[17]In Australia's case the target point is actually a "thick point" of 2 to 3 percent. However the authorities' intention is to signal a point rather than a range. See Debelle and Stevens (1995). More recently, the Governor of the Reserve Bank of Australia has shifted the focus to the mid-point of the range for reasons similar to those raised in Finland (below).

However, if it proves difficult to remain inside the band in practice, frequent breaches could undermine any credibility gain.

A hard-edged band also emphasizes the short-run accountability of the central bank for achieving the inflation target. Any breach of the band necessitates an explanation by the central bank for the reasons for that breach. With a soft-edged or wider band, the shorter term performance of the central bank is more difficult to assess, so the central bank is more accountable over the medium term. The soft-edged band may provide the central bank with necessary flexibility in the shorter term.

In Finland, the decision to specify the target in terms of a single point was motivated by the argument that a single figure provides a better focus for inflation expectations than a band. If a band were announced, there was concern that the focus of private expectations would be on the upper edge of the band (Akerholm and Brunila (1995)).

An important consideration in determining the bandwidth of the target is that adopting a narrow band may induce instability in the instrument of monetary policy. To achieve a given movement in the inflation rate, the shorter the time horizon, the larger the change in the instrument of monetary policy. If the band is too narrow, an increase in interest rates to prevent inflation rising above the band in one quarter may need to be more than offset the next quarter to prevent inflation from falling below the lower limit. Such movements in interest rates may destabilize financial markets even though the inflation target continues to be met. Furthermore, the necessary oscillations in interest rates to maintain inflation within the target band may be explosive rather than dampening over time.

Alternatively, the necessary change in the inflation rate can be induced by changes in the exchange rate. This may enable the inflation target to be met more easily in the shorter term, depending on the speed of exchange rate pass-through. However, systematically relying on the exchange rate can cause conflict between the achievement of the inflation target in the short and medium term. The change in interest rates necessary to induce the appropriate movement in the exchange rate in the short term, may cause an undesired movement in domestic demand and inflation in the medium term. A further problem is that there may be an undesirable distributional impact on the traded and non-traded goods sectors if too much reliance is placed on the exchange rate, particularly if the source of the inflation is in the non-traded goods sector. The appreciation in the exchange rate, while reducing the inflation rate of imported goods will reduce the competitiveness of the export and import-competing sectors.

Historically there have been few instances where countries have maintained inflation within narrow ranges. Lebow, Roberts and Stockton (1992) show that there have been only two periods in the post-War era where the standard deviation of inflation has been less than one percentage point for at least ten years among the G7 countries: in Germany from 1954-1971 and in the United States from 1952-1966. Even a standard deviation of this size still implies that a band width of two percentage points would be breached about 50 percent of the

time. In the gold standard era when the average inflation rate was close to zero, the standard deviation of inflation was greater than one percentage point in the United Kingdom and the United States.

In December 1996, the width of the inflation target band in New Zealand, defined under the Policy Targets Agreement, was widened from 2 percentage points to 3 percentage points. This change was in part induced by the difficulty in maintaining inflation within the narrower range (see section III). However, the Governor of the Reserve Bank of New Zealand was quick to emphasize that the RBNZ would still be targeting the middle point of this band, to counter any tendency for inflation expectations to drift upwards.

Some recent studies have tried to assess more systematically the question of the appropriate width of the inflation target band (Haldane and Salmon (1995) for the United Kingdom, Debelle and Stevens (1995) for Australia, and Turner(1996) for New Zealand). These studies have run stochastic simulations on small models of the macroeconomy typically consisting of an inflation equation, an output equation and a policy reaction function. The model is subjected to shocks that mimic the disturbances that have hit the economy in question over the model's estimation period. The central bank is assumed to know the structure of the economy and to target an objective that is a weighted average of inflation and the output gap. The resulting variation in the inflation rate is then calculated, and a 95 percent confidence interval for inflation is derived. For the United Kingdom, Haldane and Salmon calculate that the probability of hitting the current inflation target of 1 to 4 percent is only around 50 percent. Debelle and Stevens calculate that a 95 percent confidence interval for inflation in Australia would be over 5 percentage points wide. Even when the authorities' policy reaction function places all the weight on inflation, the standard deviation of quarterly inflation is still over 0.5 percentage points.[18] The main message from these exercises is that, on the basis of history, narrow inflation target bands would be frequently breached even when the authorities follow an optimal monetary policy.

Such empirical exercises are particularly subject to the Lucas critique. It is likely that the credibility induced by the announcement of an inflation target will gradually reduce the response of inflation expectations to shocks, thus reducing inflation variability. The degree to which this happens may be dependent on the ambitiousness of the target that is initially announced. That is, there may be some longer term gains from an initial investment in a tight band that offset the short term costs of maintaining inflation within that band. But conversely, if credibility is low and the effect of monetary policy is uncertain, it may be better to set less ambitious inflation objectives and a relatively wide band, to gain credibility. It is also likely to

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[18]The inflation rate used in these exercises has generally been the CPI. Adopting an underlying rate as the target should result in a less variable target rate.

be easier to decrease bandwidth than increase it, after more experience has been gained.[19] Nevertheless, these empirical results may provide a reasonable guide to the success of the inflation target regime in the shorter term.

D. Accountability

One role for inflation targets is to provide an anchor or coordinating device for inflation expectations. Another role is to provide a yardstick against which the actions of the central bank may be held accountable insofar as central banks can justify their monetary policy decisions in terms of the inflation target. In the context of the general move over the last decade to increase the accountability of policy makers, inflation targets have both advantages and disadvantages.

On the one hand, assigning an inflation target to the central bank defines a clear and easily measurable benchmark that serves to judge the bank's performance. Any breach of the inflation target band or significant departure from the desired target level will require a detailed explanation from the central bank. In the past, the objectives of central banks were relatively general, resulting in difficulty in assessing their performance. The central banks could not be held accountable for pursuing many (potentially conflicting) objectives.

On the other hand, because there is such a large gap between the instruments of monetary policy and the final inflation objective, it may be hard to determine whether any breach of the target was caused by policy errors or whether it was due to shocks outside the control of the central bank. A second problem with using inflation targets as a yardstick of accountability is the long and variable lags of monetary policy. The effect of any policy action will not be ascertained for at least one year and possibly longer. One avenue to circumvent this problem is to use the forecast of inflation as the yardstick (see Svensson (1996) and the discussion in the next section).

The issue of transparency is closely linked to the issue of accountability. To increase the effectiveness of monetary policy in the inflation target framework, it is necessary that policy changes are announced and that the reasons for the policy changes are made explicit. This should make it more apparent whether any breach of the inflation target was caused by an error of the central bank or whether the breach was foreseeable at the time of the policy decision. The inflation targeting framework itself should also be made as transparent as possible.

This increased transparency should help to increase the impact and reduce the lag length of monetary policy changes on price and wage decisions. The increased transparency and accountability can be regarded as providing an appropriate offset to the increased

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[19]In this regard, the recent experience in New Zealand suggests this is not necessarily the case (see below).

instrument independence of the central banks in pursuing the inflation target under this framework.

In general, the central banks with inflation targets are directly accountable to the government. Regular testimony to parliament and the publication of annual reports have been the main fora of accountability. Another vehicle aimed at increasing the accountability and transparency of the inflation targeting framework has been the publication of regular (generally quarterly) "Inflation Reports". The prototype for these inflation reports was the Monetary Policy Statement which the Governor of the RBNZ is required to publish on a six monthly basis since 1989. In this document, the Governor is required to discuss whether the inflation targets have been achieved during the previous six months and discuss the Bank's strategy for achieving the target over the next six month period.

Following the example of the RBNZ, the Bank of England and the Riksbank of Sweden have published inflation reports whose sole focus is on the recent history and outlook for inflation.[20] More recently, the Bank of Canada and the Bank of Spain have also begun publishing similar documents. The discussion of monetary policy is framed solely in terms of the inflation target. In this sense the target serves a useful purpose in that it provides a focal point for the discussion of the stance of monetary policy.

In addition, the transparency of the New Zealand framework is aided by the publication of the inflation forecasting and monetary policy framework in the semiannual Monetary Policy Statements and Economic Forecasts.[21] The Statement also specifies the risks over the policy horizon and the likely monetary policy response to those risks. The Bank of England increases the transparency of monetary policy by publishing (with a one month lag) the minutes of the meeting between the Chancellor and the Governor of the Bank of England.

Further enhancing the accountability of the central bank in New Zealand, the Policy Target Agreement defines the terms of employment for the central bank Governor. The Governor's performance is subject to review by the Reserve Bank Board whenever the inflation target is breached. The Board then recommends to the government whether the Governor's appointment should be continued or not. That is, the Governor is directly accountable for the inflation performance of the New Zealand economy. For example, after the breach of the inflation target in March 1996, the Finance Minister called upon the Reserve Bank Board to determine whether the Governor had performed his duties satisfactorily. The

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[20]In the United Kingdom, the final decision on interest rates rests with the Chancellor. However, the Chancellor has requested that the Bank of England "provide a regular report on the progress being made towards the Government's inflation objective."

[21]The Monetary Policy Statement is the main vehicle for the publishing of forecasts every June and December. The Economic Statement provides an interim account of how the forecasts are performing in the light of new data in the interim quarters.

Board concluded that the Governor's actions had been appropriate and that "this very small breach, on its own, should not call into question the Bank's absolute commitment to ongoing price stability for New Zealand."[22] It went on to add that "0 to 2 percent was always intended to be a target towards which the Bank would be *constantly aiming*, not necessarily a target which could, given the inevitable uncertainties in forecasting and lags in the effectiveness of monetary policy, always be certain of attainment."

None of the other countries have imposed such standards on the central bank or its Governor. The other countries rely more on the reputation of the Governor or the central bank as an institution, to discipline their behavior. Nevertheless, the publication of regular inflation reports and testimony to parliament are integral parts of enhancing the accountability of the central bank.

E. Inflation forecasts

Given the lags in the effect of monetary policy, an inflation target, of necessity, is forward-looking. Changes in the instrument of monetary policy must be made before the inflation rate begins to rise, that is "pre-emptive strikes" are necessary. Consequently, the central bank's forecasts of inflation must play an essential role in policy formation in such a regime. Svensson (1996) goes further and argues that the official inflation forecast effectively functions as an intermediate target. If the inflation forecast over the appropriate horizon (given by the average lag of monetary policy) differs from the target, then the monetary authority should respond by altering the stance of monetary policy. He argues that the inflation forecast is well suited for this role as an intermediate target because it is, by definition, correlated with inflation at the forecast date, controllable, easy to observe and transparent (assuming the forecast is published).

There are a number of criteria that underpin an inflation forecast as the cornerstone of the inflation targeting framework. A satisfactory forecasting framework must exist. There must be sufficient historical data to estimate reliable relationships. One must also be confident that these relationships will be sufficiently stable under the new regime. It may be difficult for the central bank to agree upon one model to base the forecast on. The fundamental principle is that the monetary policy decision should be based on a projection for the future path of inflation although this expectation need not be based on a particular model. Rather, it can summarize the information from a number of different sources of information.[23]

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[22]Letter from Sir Peter Elworthy to the Minister of Finance, 19 April 1996, reprinted in the Monetary Policy Statement, June 1996.

[23]Baumgartner and Ramaswamy (1996) discuss the role of information variables in the context of the United Kingdom inflation target.

However, in practice, the inflation forecast from a particular model could be one input into the monetary policy decision.[24] Other information from leading indicators should also be considered even if they cannot directly be incorporated into an inflation forecasting model.

The reliance on inflation forecasts raises the problem of forecast error, which is also relevant to the specification of the bandwidth. Cecchetti (1995) discusses various forecasts of the inflation process in the United States and concludes that the poor performance to date implies that reliance on such forecasts for the setting of monetary policy is problematic. He calculates that the one year ahead root mean square error of private sector forecasts in the United States implies a confidence interval of over 3 percentage points. The forecasts do, however, outperform a random walk model. Commenting on this paper, Kohn (1995) notes that the Federal Reserve Board's forecast implies a root mean square error of only 0.6 percent. Debelle and Stevens (1995) summarize the inflation forecasting experience of the OECD over the period 1987-1992 and calculate a root mean square error of between 0.5 and 1.5 percent for the G7 countries. Mayes and Riches (1996) cite evidence that the 95 percent confidence interval for a 12 month forecast of the underlying rate in New Zealand is 1.6 percentage points wide.

The inflation forecast equation assumes that the errors are distributed symmetrically around the central projection. The central bank however, may feel that the balance of risks are not symmetric and hence act to change policy even though the central estimate of inflation still lies within the target band. For example, in New Zealand, as a result of their recent breach of the band, their current strategy is to aim for the middle of the band, so that any small shock will not cause the inflation rate to breach the band.

The Bank of England explicitly provides an assessment of risks associated with the inflation outlook. It discusses different scenarios and their likely impact on inflation, and incorporates these scenarios in its published inflation forecasts. The confidence interval around the central inflation projection is not symmetric but is weighted to reflect the balance of the risks.

The need for accountability of the central bank suggests that its inflation forecasts should be published. Published inflation forecasts would allow the central bank to rationalize any breach of the inflation target in terms of forecast errors. Systematic errors in forecasting would also be transparent to the public and would force the central bank to improve its forecasting methodology.

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[24]For example, one could draw on a simple univariate forecast of inflation, a VAR model and a fully specified macro model to provide competing forecasts.

In practice, only the Reserve Bank of New Zealand and the Bank of England publish their inflation forecasts (or projections).[25] The other countries frame their discussion of the stance of monetary policy in terms of a vaguer outlook for inflation. The Reserve Bank of New Zealand publishes their complete inflation forecasting methodology. As mentioned above, the Bank of England also publishes forecasts that reflect the balance of risks in the economy.

In New Zealand, the inflation projection adopts particular assumptions on the exchange rate and interest rates. The exchange rate is assumed to move to maintain purchasing power parity with its trading partners. The interest rate is assumed to remain unchanged in nominal terms. In the June 1996 forecast of underlying inflation, at the end of the inflation horizon, inflation was forecast to fall below the target band given the current tightness of monetary policy, thus implying that monetary policy would be eased before the end of the horizon, although this was not directly acknowledged. The New Zealand experience highlights one problem with publishing forecasts, namely that the market reacts to their announcement, thus immediately changing the environment under which the forecasts were made. This effect is diluted if the forecasting methodology is made clear to the market.

III. Economic Performance under Inflation Targeting

Chart 1 and Table 2 show the recent path of inflation in the seven inflation targeting countries and their respective inflation targets. In general, inflation has remained within the targeted range in those countries where the target specifies a band (New Zealand, Canada, United Kingdom and Sweden) or close to the target rate (Australia, Finland and Spain). On this evidence, the inflation targeting framework appears to have been successful so far.

However, in most of these countries, it is probably too early to declare that the inflation targeting framework has been successful in delivering lower inflation, as there has also been a general decline in inflation in many industrial countries that do not operate in such a framework. Chart 2 compares the average inflation rate in the seven inflation targeting countries with the average inflation rate in the major industrial economies (the G7 countries excluding Canada and the United Kingdom). The chart shows that the inflation targeting countries have reduced their inflation rates further than the major industrial countries and have maintained comparable levels of inflation over the last four years.[26] This performance suggests that the inflation targeting framework is useful for those countries which may lack anti-inflation credibility.

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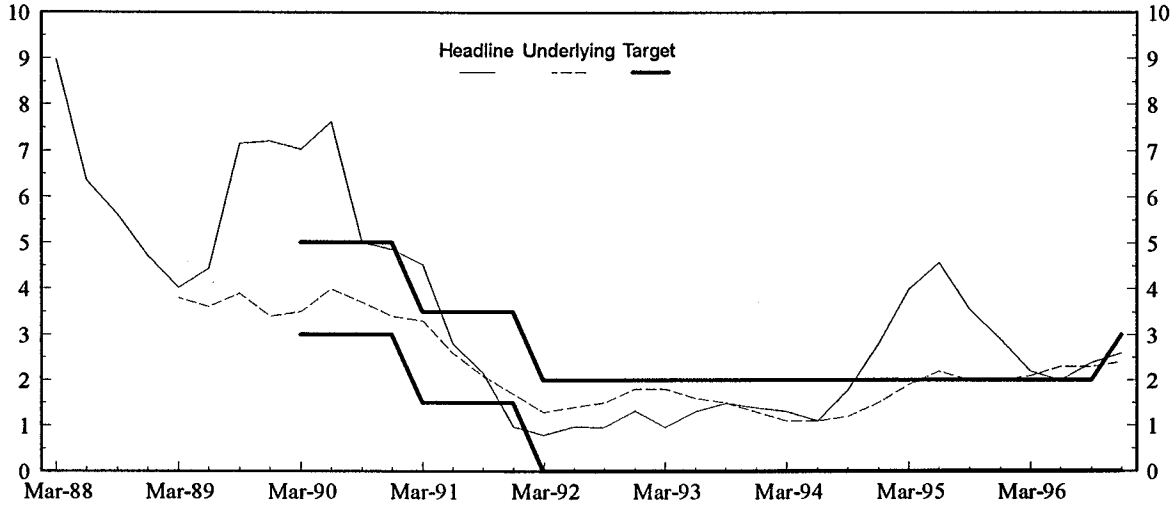
[25]The RBNZ refers to their forecast as an inflation projection to reflect that it is model-based.

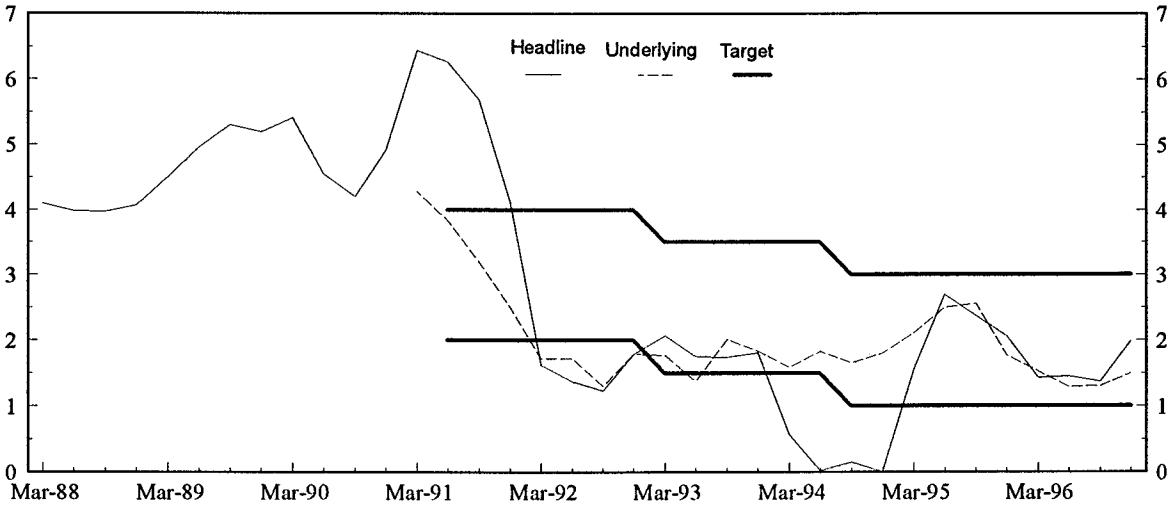
[26]Portugal has also reduced inflation significantly over the same time period without adopting an inflation targeting framework.

Chart 1: Inflation

New Zealand



Canada



United Kingdom

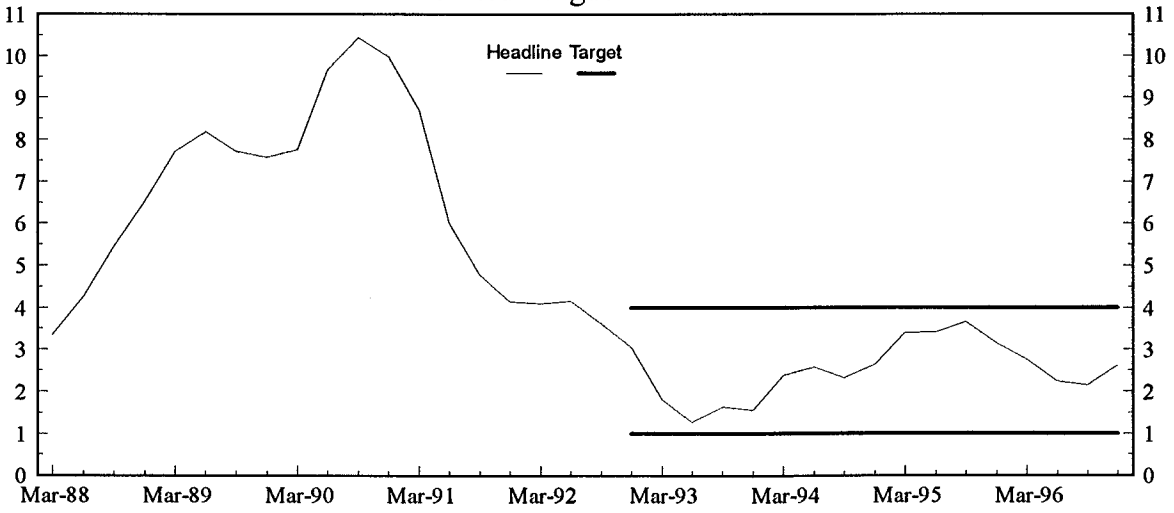
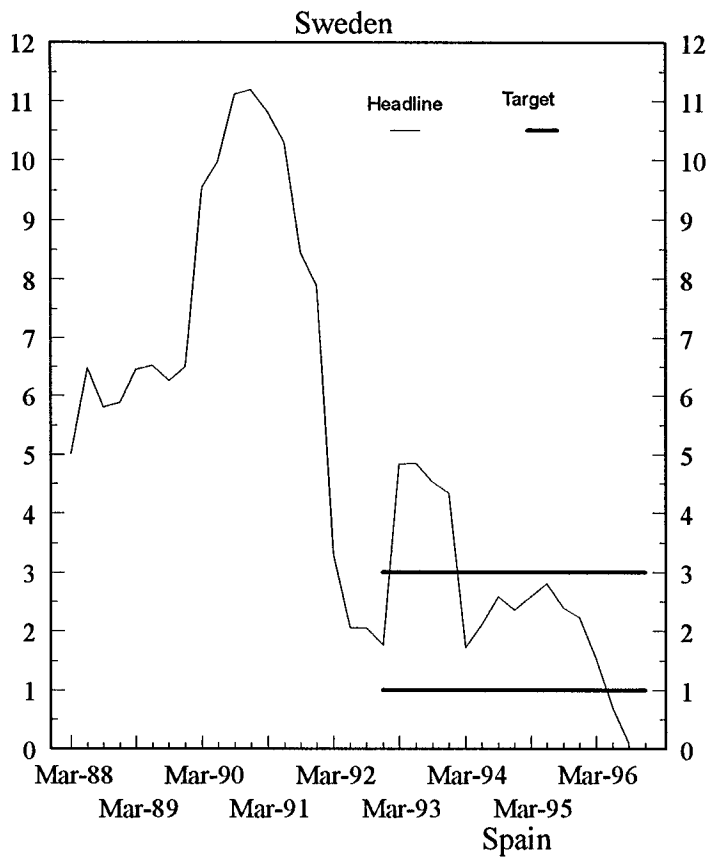
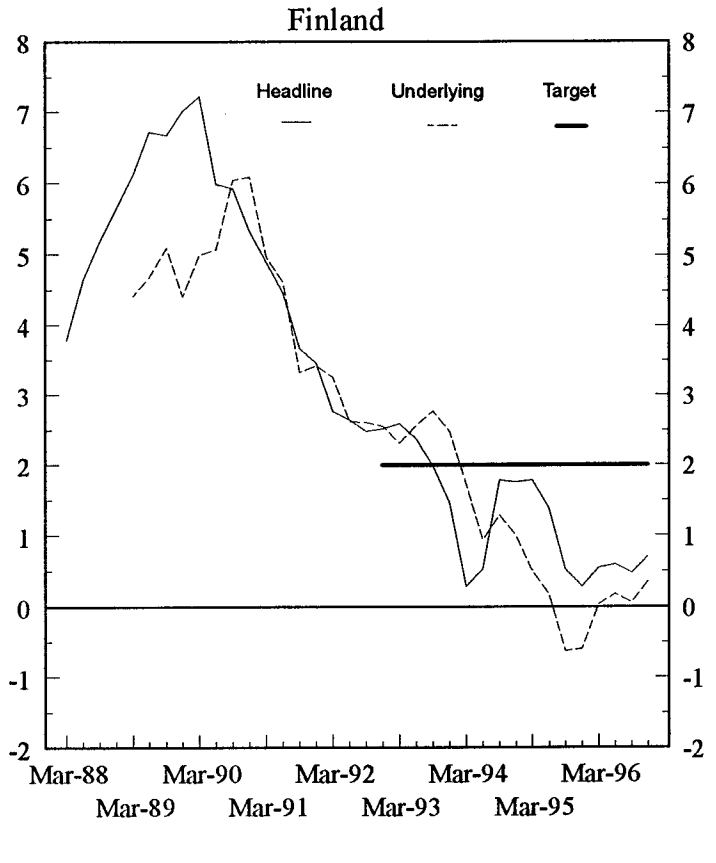
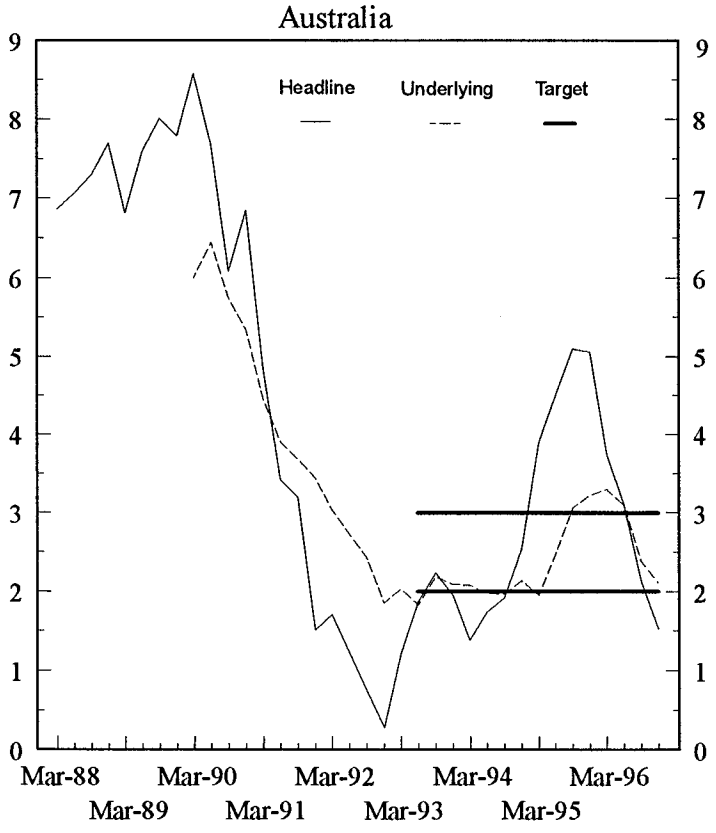


Chart 1: Inflation (continued)







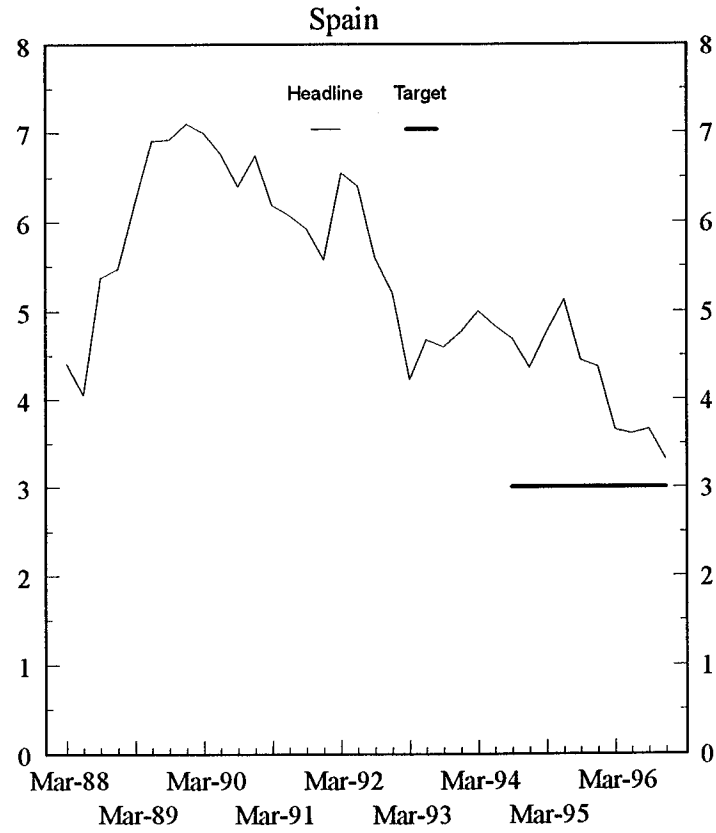


Table 2. Average inflation rates

	U.K.	Sweden	Canada	Finland	Spain	Aust.	N.Z.	G7
1985-89	5.3	5.6	4.3	4.9	6.9	7.8	11.3	3.4
1990-92	6.4	7.4	4.0	4.3	6.2	3.8	3.3	4.1
1993-96	2.5	2.7	1.4	1.2	4.4	2.7	2.3	2.4

Source: IMF, International Financial Statistics

Table 3. Average nominal long bond differentials with the United States

	U.K.	Sweden	Canada	Finland	Spain	Aust.	N.Z.
1985-89	0.97	0.65	1.32	2.69	3.79	4.56	6.56
1990-92	2.24	3.45	1.99	4.54	5.29	3.23	2.30
1993-96	1.58	2.69	1.58	1.92	3.28	1.93	1.05

Source: IMF, International Financial Statistics

Table 4. Average real long bond differentials with the United States

	U.K.	Sweden	Canada	Finland	Spain	Aust.	N.Z.
1985-89	-0.69	-1.35	0.63		0.49	0.35	-1.16
1990-92	0.09	0.31	2.24	4.49	3.31	3.61	3.27
1993-96	1.93	2.84	2.94	3.56	1.72	2.01	1.60

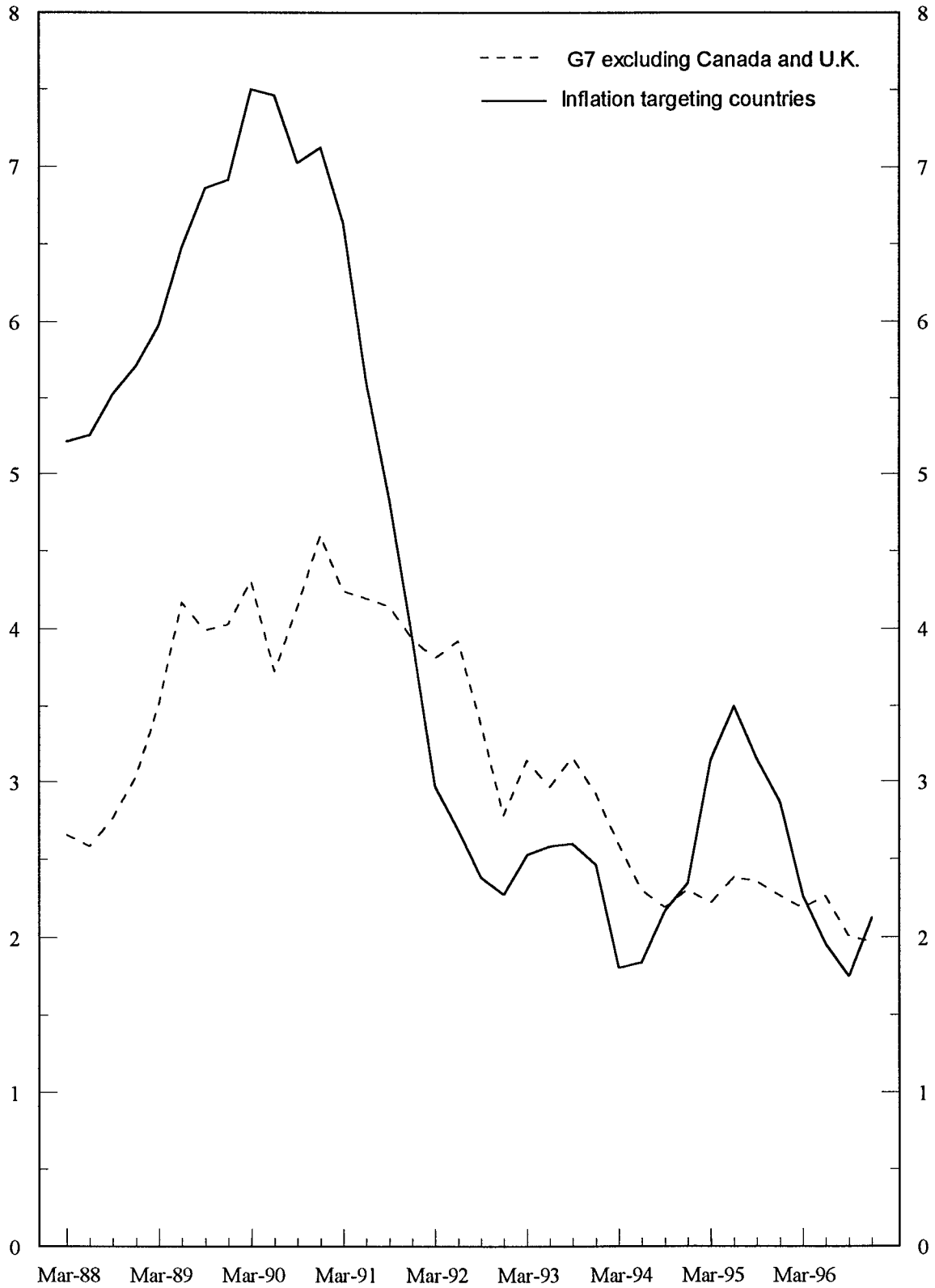
Source: IMF, International Financial Statistics

Table 5. Average unemployment rates

	U.K.	Sweden	Canada	Finland	Spain	Aust.	N.Z.
1985-89	9.1	1.9	8.9	4.7	20.0	7.5	4.9
1990-92	7.9	3.0	9.9	8.1	17.0	9.0	9.4
1993-95	9.3	8.0	10.4	17.8	23.4	9.7	8.1

Source: IMF, International Financial Statistics

Chart 2: Inflation Comparison



One potential measure of the credibility of the inflation targeting framework is the spread of long bond yields relative to a benchmark measure, such as United States long bond yields. While there are a number of other influences on long bond spreads such as expected exchange rate changes and relative fiscal positions, movements in the spread may be suggestive of changes in credibility. Table 3 shows that the average nominal spread against bond yields in the United States has declined in all seven countries in 1993-1996 (approximately the period associated with the advent of inflation targeting) compared to the spread in the early 1990s indicating a possible rise in credibility. However, in Canada, Sweden, and the United Kingdom, the spread is still larger than the average differential of the late 1980s. Only in New Zealand and Australia is there any clear evidence of a possible longer term gain in credibility.

It is possible that the decline in spreads is more simply a result of the improvement in inflation. A comparison of real interest rate differentials with U.S. long bonds[27] over the same time period (Table 4) shows that real interest differentials have widened in the United Kingdom, Sweden and Canada but have declined in Finland, New Zealand, Australia and Spain. Furthermore, the spread has widened in all seven countries since the late 1980s.

While there has been a decline in inflation, in most of the seven countries this has been accompanied by a rise in unemployment. Only in New Zealand has there been a systematic decline in unemployment in the 1990s but even there,[28] unemployment remains significantly above its level of the second half of the 1980s (Table 5). Comparing the unemployment experience in the inflation targeting countries to the other major industrial countries (again the G7 excluding the United Kingdom and Canada), shows that the average unemployment rate rose significantly in the early 1990s in the inflation targeting countries but since 1994 has tended back toward the level of the major industrial countries (Chart 3).

The individual experiences of the inflation targeting countries also highlights a number of the issues raised in the previous section, in particular, the role of target bands, underlying inflation and the policy horizon.

The experience to date in the countries that have announced target bands has been mixed. The United Kingdom and Sweden have both successfully maintained inflation within the target band. In New Zealand, underlying inflation remained inside the band from 1992 to early 1995. However, recently, the two percent wide band has been breached twice, although only by very small amounts. In the June quarter of 1995, the underlying inflation rose to 2.2 percent before falling back to the top of the band the next quarter, and in the March quarter of 1996, the underlying inflation rate again rose slightly above the 2 percent ceiling to 2.1

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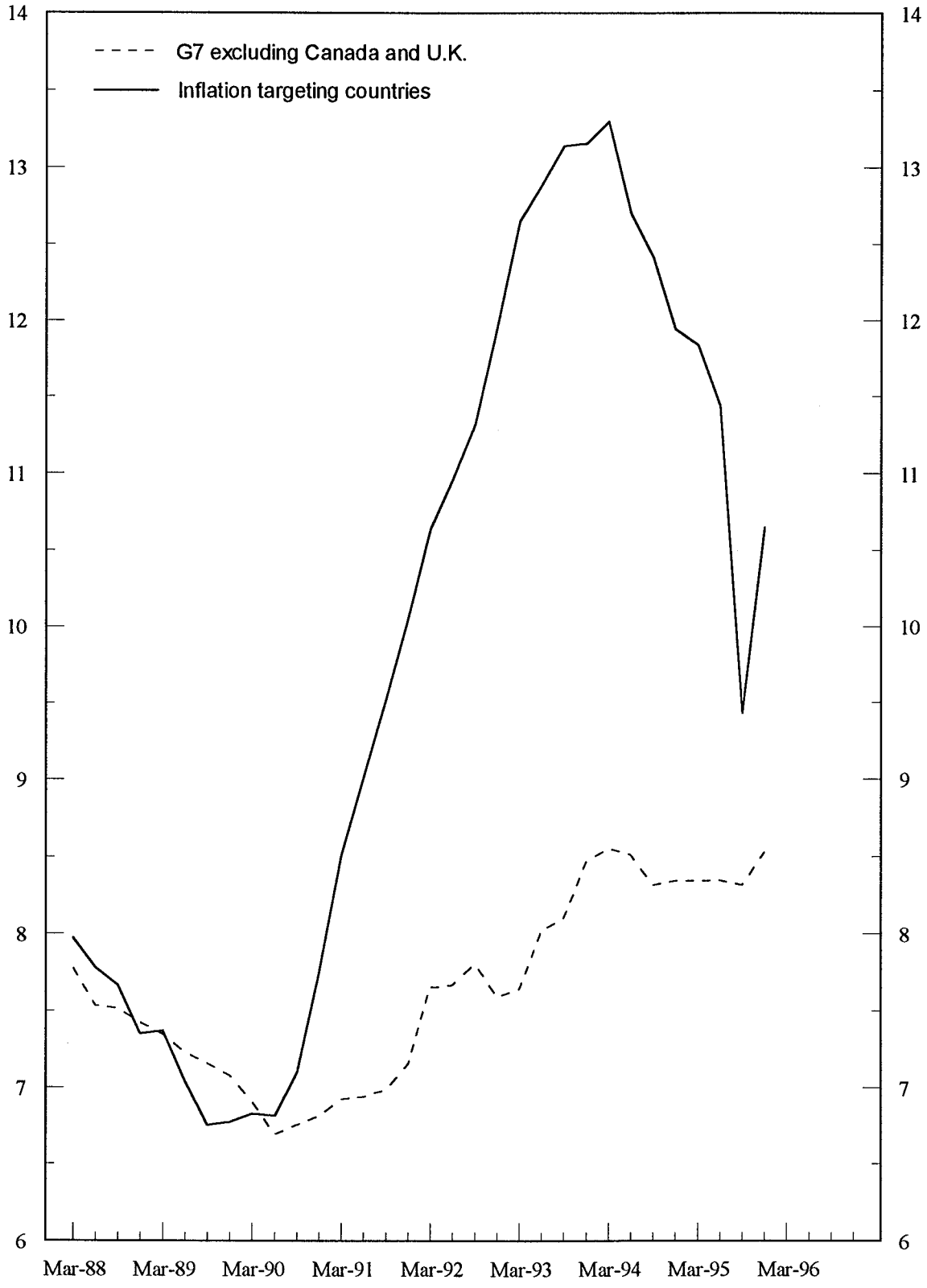
[27]The real rates are ex post, that is the long term bond yield less the annual inflation rate at that time.

[28]The fall in unemployment has also coincided with significant labor market reform.

Chart 3: Unemployment



percent and remained slightly above the ceiling during the following two quarters. The target band was then widened in the December quarter by raising the ceiling to 3 percent.

The initial indications from the New Zealand experience suggest that breaches of a narrow band may not be all that costly. Financial markets and inflation expectations seemed little perturbed by the small breaches that occurred, nor by the raising of the band ceiling.[29] However, it does raise the question as to what would be considered a significant breach and what would be the consequences of such a breach. The Governor of the Reserve Bank of New Zealand, Donald Brash, conceded that the breach of the band was a result of an underestimate by the Bank of the resiliency of domestic demand to previous tightenings in interest rates. However, given that the Bank's forecast for underlying inflation suggested that it would fall back inside the band within 12 months, he felt that no further tightening was warranted (Brash 1996).

The Australian and Canadian experience highlights the use of the underlying inflation measure. In Canada, the headline inflation rate fell below the target band due to a cut in indirect taxes. Focussing on the underlying rate which remained in the target band again resulted in a smoother path for monetary policy given that headline inflation rate subsequently rose back inside the band once the effect of the tax cut "dropped out" of the inflation rate.

In Australia, while headline inflation rose sharply in 1995, underlying inflation remained close to the target level. The rise in headline inflation was in large part caused by the impact on mortgage interest charges of the tightening in monetary policy in the second half of 1994. The subsequent path of underlying inflation, and the fall in headline inflation in early 1996 suggests that a further tightening of monetary policy in 1995 in response to the rise in the headline rate would have been inappropriate.

Both the central banks of New Zealand and Australia have also tolerated small rises in the inflation rate above the target in the short term without any response of monetary policy. This highlights the role of the policy horizon in the inflation targeting framework. Shocks to the inflation rate in the short term do not directly induce a change in the stance of monetary policy. They impact on monetary policy only to the extent that they change the outlook for inflation at the policy horizon of one to two years.

Role in disinflation

In New Zealand and Canada, inflation targets were used in the disinflationary process. In New Zealand the inflation targets were introduced when inflation was around 7 percent (having already fallen from around 16 percent), while in Canada the initial inflation rate was

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[29]Long bond rates rose in 1996, mainly reflecting uncertainty surrounding the 1996 elections when New Zealand moved to a multi-party system.

just over 5 percent. Thus inflation was only at a moderate level when the inflation targeting framework was implemented.

The target disinflationary trajectory was relatively gradual in both countries. In New Zealand the goal was a reduction in the inflation rate of 1.5 percentage points a year over a three year period, while in Canada the goal was a reduction of 2 percentage points in the first year (to 3 percent) and thereafter half a percentage point over the next two eighteen month periods. A two percentage point band was placed around the desired mid-point during the disinflationary process. The disinflationary path was thus relatively gradual in both countries.

As it turned out, the actual inflation rate was in the lower half of the desired band or at times even undershot the band in Canada. This undershooting may have resulted from the desire of both central banks to establish their inflation fighting credentials given their poor track record in the past. In assessing the balance of risks, the central banks were prepared to err on the size of tightness to generate confidence in the new framework. Of course, if they had significantly undershot the target and generated a large recession, this may have also undermined public support for the inflation targeting framework.

Inflation expectations generally lay above the upper edge of the target bands in the two countries, and lagged the fall in the actual inflation rate, suggesting that credibility in the new monetary framework was not quickly won. However, this may have been in part due to the large public debt positions in the two countries which raised questions as to the longer term sustainability of the inflation targeting framework. Fiscal consolidation was occurring simultaneously in New Zealand thus reducing these concerns, but was delayed in Canada.

There was little evidence of any significant credibility bonuses in the two countries from the new monetary policy frameworks. The sacrifice ratio[30] was relatively high in Canada by industrial country standards. That is, the Canadian economy underwent a relatively costly disinflation despite the presence of the framework. The decline in long bond yields in the two countries was comparable to other industrial countries that disinflated without the assistance of inflation targets, again not indicating the presence of any credibility bonus (see Debelle, 1996). Nevertheless, the disinflation may have been more costly in the two countries if the targeting frameworks had not been in place.

IV. Conclusion

The move to an inflation targeting framework in a number of countries appears to have been successful in reducing inflation. Inflation has been reduced to low levels and has remained there through the expansionary phase of the cycle. It is difficult to assign the credit for this solely to the adoption of inflation targeting framework, given that inflation also fell in a number of other countries that did not explicitly practice inflation targeting. Nevertheless,

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[30]The sacrifice ratio is the loss in output below trend divided by the reduction in inflation.

the inflation targeting framework is likely to have aided those countries that adopted it in overcoming their perceived lack of monetary policy credibility.

Although the frameworks vary across the inflation targeting countries, there are some common fundamental aspects. There is a clear need for accountability and transparency to enhance the effective operation of the inflation targeting framework. This may take the form of the regular publication of an "inflation report" that describes the central bank's outlook for inflation and the economy and explains it policy actions. Periodic testimony before the parliament also serves to increase accountability. Further benefit may be derived from having the government endorse the inflation targeting framework, signaling a unified policy framework. The inflation targeting framework places inflation at the forefront of the goals of monetary policy but this is not necessarily incompatible with the achievement of other policy goals.

The crucial role that inflation forecasts play in the targeting framework has been recognized, although whether it is appropriate to publish those forecasts is still a matter of debate. In the inflation targeting framework, the monetary policy reaction function is effectively defined in terms of the deviation between the inflation forecast (at an appropriate horizon) and the announced inflation target. The operational use of an underlying measure of inflation may prevent monetary policy from reacting inappropriately to developments in the headline rate of inflation.

The contrast between a "hard-edged" band and a "soft-edged" inflation target band has declined, as performance under the two approaches has been very similar. The hard-edged band may have the advantage of triggering a review of the central bank's actions when the band is broached but the soft-edged band provides the central bank with needed flexibility in responding to short-term shocks.

An inflation targeting framework for monetary policy is not necessarily appropriate for all countries. In a number of countries the credibility of monetary policy and the central bank is such that it may not need to be reinforced with an inflation targeting framework. Other countries may lack the necessary infrastructure to conduct inflation targeting effectively. The pre-requisites for effective inflation targeting include: a well developed financial system to allow for the effective operation of monetary policy; political institutions that facilitate agreement on policy goals; and a solid inflation forecasting framework, which in turn requires an adequately long and extensive historical database. While an inflation targeting framework can assist in maintaining low inflation, the overriding pre-requisite is the degree of commitment of the central bank to achieving low inflation.

References

Advisory Commission to Study the Consumer Price Index, 1996, "Towards a more accurate measure of the cost of living", Final report to the U.S. Senate Finance Committee.

Akerholm, Johnny and Anne Brunilla, 1995, "Inflation Targeting: the Finnish Experience," in Leonardo Leiderman and Lars Svensson (eds), *Inflation Targets* (London: CEPR).

Akerlof, George, William Dickens, and George Perry, 1996, "The Macroeconomics of Low Inflation", *Brookings Papers on Economic Activity*, 1 pp. 1-76.

Andersson, Krister and Claes Berg, 1995, "The inflation target in Sweden," in Andrew Haldane (ed), *Targeting Inflation* (London: Bank of England).

Barro, Robert, 1995, "Inflation and Economic Growth," *Bank of England Quarterly Bulletin*, Vol. 35, pp. 166-176.

Baumgartner, Josef and Ramana Ramaswamy, "Inflation Targeting in the United Kingdom: Information Content of Financial and Monetary Variables," IMF Working Paper 96/44 (Washington: International Monetary Fund).

Brash, Donald, 1996, *Monetary Policy Statement June 1996*, Reserve Bank of New Zealand.

Bryant, Michael and Stephen Cecchetti, 1993, "Measuring Core Inflation", NBER Working Paper no. 4303.

Cabral, D, S. Hall and Anthony Yates, 1995, "Are there downward rigidities in product markets?" (manuscript, London: Bank of England).

Cecchetti, Stephen, 1995, "Inflation Indicators and Inflation Policy", in Ben Bernanke and Julio Rotemberg (eds), *NBER Macroeconomics Annual*, (Cambridge Mass: MIT Press).

Crawford, A., 1993, "Measurement Biases in the Canadian CPI", Bank of Canada Technical Report no. 64.

Cukierman, Alex, 1995, "Towards a Systematic Comparison Between Inflation Targets and Monetary Targets," in Leonardo Leiderman and Lars Svensson (eds), *Inflation Targets*, (London: CEPR).

Debelle, Guy, 1996, "The Ends of Three Small Inflations: Australia, New Zealand and Canada," *Canadian Public Policy Analyse de Politiques*, Vol 22 no. 1 pp. 56-78.

———, and Glenn Stevens, 1995, "Monetary Policy Goals for Inflation in Australia," in Andrew Haldane (ed), *Targeting Inflation* (London: Bank of England).

———, and Stanley Fischer, 1994, "How Independent Should a Central Bank Be?" in Jeffrey Fuhrer (ed), *Goals, Guidelines and Constraints Facing Monetary Policymakers*, Federal Reserve Bank of Boston Conference Vol. 38.

Fischer, Andreas, 1993, "Inflation Targeting: The New Zealand and Canadian cases," *Cato Journal* Vol. 13 no.1 pp. 1-27.

Fischer, Stanley, 1996, "Why are Central Banks Pursuing Long-Term Price Stability?", paper presented at the Federal Reserve Bank of Kansas City Symposium, *Achieving Price Stability*, August 29-31.

———, 1993, "The Role of Macroeconomic Factors in Growth", *Journal of Monetary Economics*, Vol. 32 pp. 485-512.

Freedman, Charles, 1996, "What Operating Procedures should be adopted to Maintain Price Stability?--Practical Issues," paper presented at the Federal Reserve Bank of Kansas City Symposium, *Achieving Price Stability*, August 29-31.

———, 1995, "The Role of Monetary Conditions and the Monetary Conditions Index in the Conduct of Policy," *Bank of Canada Review* (Autumn).

Green, John H., 1996, "Inflation Targeting: Theory and Policy Implications," *IMF Staff Papers*, Vol. 43, pp. 779-795.

Haldane, Andrew (ed), 1995, *Targeting Inflation*, (London: Bank of England).

———, and Salmon, Christopher, 1995, "Three issues on inflation targets," in Andrew Haldane (ed), *Targeting Inflation* (London: Bank of England).

Kohn, Donald, 1995, "Comment", in Ben Bernanke and Julio Rotemberg (eds), *NBER Macroeconomics Annual* (Cambridge Mass: MIT Press).

Lane, Timothy, Mark Griffiths and Alessandro Prati, 1995, "An Inflation Targeting Framework for Italy," IMF Paper on Policy Analysis and Assessment 95/4 (Washington: International Monetary Fund).

Lebow, David, John Roberts and David Stockton, 1992, "Economic Performance Under Price Stability," Working Paper no. 125, Division of Research and Statistics (Washington: Board of Governors of the Federal Reserve System).

Leiderman, Leonardo and Lars Svensson (eds), 1995, *Inflation Targets*, (London: Centre for Economic Policy Research).

Mayes, David and Brendon Riches, 1996, "The Effectiveness of Monetary Policy in New Zealand," *Reserve Bank of New Zealand Bulletin* Vol 50, no. 1.

McCallum, Bennett, 1996, "Inflation Targeting in Canada, New Zealand, Sweden, the United Kingdom, and in General," NBER Working Paper no. 5579.

Persson, Torsten and Guido Tabellini, 1993, "Designing Institutions for Monetary Stability," *Carnegie-Rochestor Conference Series on Public Policy* Vol. 39, pp. 53-84.

Rae, D., M. Lloyd, and A. Fung, 1992, "Defining price stability: what should we aim for?" (manuscript, Reserve Bank of New Zealand).

Reserve Bank of Australia, 1994, "Measuring 'Underlying' Inflation," *Reserve Bank of Australia Bulletin* pp. 1-6.

Sarel, Michael, 1996, "Non-Linear Effects of Inflation on Economic Growth," *IMF Staff Papers*, Vol. 43, pp. 199-215.

Stiehler, Ulrich, 1995, "The New Monetary Policy Framework of the United Kingdom," IMF PPAA no. 95/1 (Washington: International Monetary Fund).

Summers, Lawrence, "How should long-term monetary policy be determined?" *Journal of Money, Credit and Banking,* Vol 23 (August 1991).

Svensson, Lars, 1996, "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets," NBER Working Paper no. 5797.

———, 1995, "Optimal Inflation Targets, 'Conservative' Central Banks, and Linear Inflation Contracts," NBER Working Paper no. 5251.

Tobin, James, 1972, "Inflation and Unemployment," *American Economic Review*, Vol. 62, pp. 1-18.

Turner, Dave, 1996, "Inflation Targeting in New Zealand: Is a two per cent band width feasible?" (manuscript, Paris: OECD).

Walsh, Carl, 1995, "Is New Zealand's Reserve Bank Act of 1989 an Optimal Central Bank Contract?", *Journal of Money, Credit and Banking*, Vol. 27, pp.1179-1191.

Yates, Anthony, 1995, "On Inflation Targets," in Andrew Haldane (ed), *Targeting Inflation*, (London: Bank of England).