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### **INFLATION TARGETING IN CANADA, NEW ZEALAND, SWEDEN, THE UNITED KINGDOM, AND IN GENERAL**

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**INFLATION TARGETING IN CANADA, NEW ZEALAND,  
SWEDEN, THE UNITED KINGDOM, AND IN GENERAL**

**Bennett T. McCallum\***

**ABSTRACT**

This paper begins with a description of the inflation targeting arrangements currently in place in the four above-mentioned countries and their performance records through mid-1995 are reviewed. It is argued, however, that too little time has passed for conclusions to be drawn, so that tentative evaluations of inflation targeting need to be based on theoretical analysis and more generalized historical experiences. Accordingly, two alternative rationalizations are considered, one stemming from the literature on dynamic inconsistency and the other based on more pragmatic considerations. In addition, it is asked whether some other nominal magnitude might be preferable as a target variable and the issue of growth-rate versus growing-level target paths is addressed.

**KEY WORDS:** Inflation; Price level targeting; Monetary policy; Central banks

**JEL CLASSIFICATION:** E52, E58

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## I. Introduction

One major objective of this paper is to discuss arrangements and experiences in four countries that have recently adopted explicit inflation targets as guides for the conduct of monetary policy. The countries in question are Canada, New Zealand, Sweden, and the United Kingdom, all of which adopted official inflation targets between 1990 and 1993.<sup>1</sup> As these countries instituted their inflation targets with substantially different legislative provisions and targeting procedures, their experiences should eventually provide useful information concerning the design of effective central bank arrangements. But too little time has passed to date for such conclusions to be drawn with any confidence, so in the meantime it will be necessary to base tentative evaluations of inflation targeting on theoretical analysis and more generalized historical experiences. The second major objective of this paper, accordingly, is to provide an analytical discussion of this type of the more important strengths and weaknesses of inflation targeting schemes.

The organization of the paper is as follows. Section II consists of a description of the inflation targeting procedures currently in place in the four countries, with Section III reviewing the limited record of experiences to date. Then Sections IV and V consider two alternative rationalizations for inflation-rate targets, one stemming from the technical literature on dynamic inconsistency in monetary policy and the other based on more pragmatic considerations. Then in Section VI it is asked whether some other nominal variable, rather than the inflation rate, might be preferable as a target. Section VII considers the issue of inflation versus price level (or growth rate versus growing-level) specifications of the target path, and Section VIII concludes.

## II. Inflation Targeting Arrangements

We begin in this section with a description of the inflation targeting arrangements now in place in Canada, New Zealand, Sweden, and the United Kingdom.<sup>2</sup> In this discussion and elsewhere in the paper the countries will be treated in alphabetical sequence. Somewhat more attention will be devoted to New Zealand than to the other countries, however, the reason being that the New Zealand setup is significantly more ambitious than elsewhere. This greater ambition has two distinct

dimensions. First, the chosen numerical target values for inflation rates are somewhat lower--closer to zero--in New Zealand than elsewhere. But more important is the second dimension: New Zealand has gone much farther than elsewhere in terms of legislation and formal governmental arrangements that are intended to enhance credibility and give a degree of permanence to the anti-inflationary undertaking.

### Canada

The ultimate achievement of price level stability became the centerpiece of Bank of Canada monetary policy in 1988 when then-Governor John Crow delivered that year's Eric J. Hanson Memorial Lecture at the University of Alberta. Canada's formal and explicit inflation target scheme began only in February 1991, however, when the Bank of Canada and the Minister of Finance jointly announced a series of targets. Participation by the latter was significant because it signalled "that the government was supportive of the price stability goal" (Freedman, 1995, p. 21). The Minister of Finance cannot dismiss the Governor, it should be noted, but can issue a "policy directive." Such an action has as yet never been taken, however.

The series of targets announced in 1991 called for target bands, with a width of 2 percentage points. The band's midpoint was specified to fall to 3 percent at the end of 1992, then to 2.5 percent as of mid-1994, and finally to 2.0 percent at the end of 1995. Subsequently, in December 1993, the government and the Bank agreed to maintain the latter target--a 1 to 3 percent band--intact to the end of 1998, with some possible further reduction in the midpoint value to be chosen in late 1995.

The specific price index utilized in the Bank of Canada's target scheme is the Consumer Price Index (CPI) excluding food, energy, and the contribution from changes in indirect taxes. The rationale for these exclusions is that the components in question are frequently subject to sharp temporary movements that, because of their transitory nature, should not be responded to by monetary policy.

An important component of any monetary policy targeting arrangement is the feedback procedure that is used in selecting instrument settings. Apparently the Bank of Canada's procedure is basically to use an econometric model to calculate, given experts' assessments regarding future

values of exogenous variables, the time path of a "monetary conditions" index that will be required to achieve an inflation path near the midpoint of the target range. The monetary conditions index is defined so that its changes reflect changes in exchange rates  $s_t$  and interest rates  $R_t$ , both nominal, with three times as much weight given to  $\Delta R_t$  as to  $\Delta s_t$ . When the monetary conditions index needs to be increased in value, the Bank of Canada "would act to adjust the level of liquidity in the system through adjustments to settlement balances of direct-clearing financial institutions thereby producing an appropriate rise in interest rates" (Duguay and Poloz, 1994, p. 196).<sup>3</sup>

The possibility of enhancing commitment to the inflation targeting arrangement was alive in early 1992, after the government proposed amendments to the Bank of Canada Act that would have changed the Bank's mandate so as to focus exclusively on price stability. But although the proposal was supported by the Governor of the Bank, it was rejected by a Parliamentary committee. Testimony to this committee by academic economists was, according to Laidler and Robson (1993), almost unanimously opposed to the proposed changes.

### New Zealand

As was mentioned above, by far the most ambitious of the four arrangements is that of New Zealand, which features a target range of only 0-2 percent and a degree of formal institutionalization that goes well beyond the extent found elsewhere. In this regard there are two notable features. The first is the Reserve Bank of New Zealand Act 1989, enacted by Parliament, which specifies that "stability of the general level of prices" shall be the overriding objective of monetary policy--indeed, it is the only objective mentioned. This Act requires the Bank's Governor and the Minister of Finance to make periodic Policy Targets Agreements (PTAs) regarding the price index to be targeted and its allowable range. A second notable feature is the provision whereby the Governor, who must report on inflation performance twice each year, may be dismissed prior to the end of his five-year term if the inflation rate falls outside its specified target band.<sup>4</sup>

As of October 1995, three PTAs had so far been in force. The first, dating from March 1990, mentioned the 0-2 percent inflation band as the eventual target but specified a less ambitious range

for a transition period, since the inflation rate at the time was above 6 percent. This transition range was also specified in the second PTA, which was put in place in December 1990 after an election which changed the governing party in Parliament. Then in December 1992, after inflation had reached the 0-2 percent range, the PTA was revised to reflect that fact, with the objective becoming that of maintaining (rather than achieving and maintaining) inflation within the target band.

The current PTA specifies that the Reserve Bank of New Zealand (RBNZ) will monitor a number of price indices but that "the formal price stability target will be defined in terms of the All Groups Consumers Price Index (CPI), [that] being the measure that is monitored most closely by the public." But whereas the basic requirement is to keep 12-month increases in the CPI in the 0-2 percent range, there are some important exceptions or "caveats." Specifically, the PTA recognizes that "there is a range of possible price shocks arising from external sources, certain government policy changes, or a natural crisis which are quite outside the direct influence of monetary policy." Consequently, "the CPI inflation rate can [occasionally] be expected to move outside the 0 to 2 percent range in response to particular shocks" without it being concluded that the RBNZ is failing to meet the requirements of the PTA. Specific types of listed shocks include changes in the terms of trade or indirect tax rates, natural disasters or livestock disease outbreaks, and changes in the interest-cost component of the CPI.<sup>5</sup>

Although such caveats are sensible, the way in which they are being handled in practice, as of July 1995, warrants some discussion. Specifically, the RBNZ's semi-annual Monetary Policy Statements are being written so as to focus attention on the "underlying inflation rate," which is measured by changes in a modified version of the CPI that excludes the interest-cost component and also "one-off effects on the CPI of aggregate price level shocks." The result, then, is that periods in which the basic CPI inflation rate exceeds 2 percent, but does so because of caveatable shocks, are described not in those words, but instead as being periods in which the underlying inflation rate lies within the 0 to 2 percent band.

There are evidently some problems with this practice, as the RBNZ has itself recognized. One of these is that accountability, which the Act emphasizes, is compromised by a process that in effect has the RBNZ constructing measures by which its own performance will be evaluated. This is the case for the underlying inflation rate since it is not directly obtainable from price index series or components developed and published by Statistics New Zealand. Instead, some of the adjustments involve estimated effects necessarily based on response coefficients obtained from econometric models or by other disputable methods. A second problem is that such adjustments to the basic CPI are adopted only when the effects of the shocks in question attain a "significant" magnitude. But smaller (and downward!) shocks of the same type are not recognized in the adjusted series, so it does not possess full definitional consistency or conceptual coherence over time. In addition, there is an element of ambiguity introduced to the RBNZ's review process by the use of the underlying inflation index with its incorporation of adjustments related to the PTA caveats. In particular, the question arises of whether other caveats are also permitted in addition to those built into the index.

For these reasons, a better method of managing the caveats, one might think, would be to adopt officially (as the PTA's formal price stability measure) some CPI index that is adjusted only in indisputable ways that are based entirely on numbers published by Statistics New Zealand. Such adjustments would exclude the interest cost component and perhaps indirect tax effects, but would not reflect all of the adjustments now used by RBNZ. Preferably the index would be calculated and given prominence by Statistics New Zealand. Then the effects of other caveatable shocks--which should not be frequent--would be handled by explicit discussion of the relevant circumstances.

In terms of its policy feedback procedure for achieving the inflation rate targets, the RBNZ adjusts monetary conditions in response to discrepancies between expected future inflation rates and the target midpoint. If the inflation rate forecast for a period 2 to 6 quarters in the future is above 2 percent, for example, the RBNZ will tighten monetary conditions. The main indicator variable used in gauging monetary conditions is the (trade-weighted) exchange rate, which is among quickly-responding variables the one that is believed to have the greatest predictive and explanatory power



for the inflation rate. When forecasted inflation exceeds the target range, then, monetary conditions are tightened until the exchange rate appreciates enough to drive the forecasted future inflation rate back into its target range. Short-term interest rates also serve in this indicator capacity, but to a substantially lesser extent. In terms of money-market operating procedures, the main instrument of direct control is the RBNZ's target level of commercial bank settlement balances at the RBNZ. Desired adjustments in conditions are usually achieved, however, without any actual change in this variable (or any other variable directly controlled by the RBNZ) by means of relatively clear communication to the financial markets of the RBNZ's desires and intentions.<sup>6</sup>

The volume of information provided to the public by the RBNZ is quite large. In addition to the semiannual Monetary Policy Statements, the RBNZ publishes semiannual forecasts and expository articles regarding monetary policy in its quarterly Bulletin. In addition, the Governor gives numerous talks regarding fundamental policy issues, and some of these are available from the RBNZ in printed form.

It should be mentioned that although the exchange rate plays a central role in the RBNZ's feedback procedure, it does not have the status of an intermediate target. Its chosen values are merely those that are needed, in the judgment of the RBNZ, to achieve the inflation targets.<sup>7</sup> A rather striking fact is that there have been no foreign exchange market interventions by the RBNZ since the dollar was floated in 1985--no purchases or sales of foreign exchange.

### Sweden

Sweden's adoption of inflation targets was announced by the Riksbank in January 1993, following the breakdown in November 1992 of the krona's exchange rate peg to the ECU. The target rate was set at 2 percent, with a tolerance band from 1 to 3 percent. This target was scheduled to apply to the 12-month inflation rate of the CPI excluding effects of indirect taxes and subsidies, but beginning only in 1995 because outcomes in 1993 and 1994 were viewed as already determined to a large extent. The inflation targeting scheme in Sweden is not highly institutionalized, in comparison with Canada and New Zealand. In particular, the Riksbank's 1993 announcement was made by its

governing board without any accompanying statement from the government. Consequently, there is little to prevent the board from altering or eliminating the inflation targets unilaterally (Svensson, 1995a). The board's composition is therefore of importance. In that regard seven of its eight members are appointed by the parliament, with terms that coincide with parliament's, and the eighth member--the governor--is appointed by these seven. The governor's term is five years but his position is not a dominating one. Indeed, one of the seven board members appointed by parliament is designated chairman, and his position is decisive in the event of a tie vote. Another relevant feature is that parliament's ruling party (or coalition) has control over four of the seven board appointments, including the chairman. There is, accordingly, room for concern that the Riksbank's policies could be sensitive to political forces.

The Riksbank now publishes an inflation report, Inflation and Inflation Expectations in Sweden, three times per year. Svensson argues that "there is some ambiguity to what extent the governor and the board stand behind the document. Furthermore, the document has been devoid of monetary policy conclusions and clear policy recommendations...an explicit inflation forecast is conspicuously absent" (1995a, p. 83). Nevertheless, the introduction of this document represents an "improvement in the quality of monetary policy discussion" (1995a, p. 83).<sup>8</sup> It should in this context be mentioned that the traditional channel of information in the form of speeches and lectures by the Governor and staff members "has been very actively used in the period since the krona began to float" (Andersson and Berg, 1995, p. 12) and that in 1994 the Riksbank Governor participated--for the first time ever--in a public hearing before parliament's Finance Committee.

#### United Kingdom

The United Kingdom, like Sweden, turned to inflation targets after its exchange rate peg to the ECU collapsed (the month in this case being September 1992). There was more governmental involvement, however, since the Bank of England has had very little independence vis-a-vis the Treasury. Thus the initial announcement in October 1992 of inflation targets was made by the Chancellor of the Exchequer, rather than the Governor of the Bank of England. The target band

specified for the retail price index excluding its mortgage interest component (RPIX) was 1 to 4 percent, with the rate to be below 2.5 percent by "the end of the present Parliament" (i.e., by spring 1997 at the latest). In addition, since September 1992 there have been four significant institutional changes, as follows.<sup>9</sup>

- (i) Monthly meetings between the Chancellor and Governor now provide the forum in which decisions on interest rates are made--but the Chancellor continues to make decisions after hearing the Governor's views.
- (ii) The Bank now publishes a quarterly Inflation Report that presents analysis and views of its staff and officers.
- (iii) In April 1994 the Chancellor agreed to publish minutes of his monthly meetings with the Governor, the publication date being two weeks after the subsequent meeting. Also, when interest rates are changed, a press notice outlining the rationale is issued.
- (iv) The Bank has been given control over the precise timing of interest rate changes, provided that any change chosen by the Chancellor will be effected before the next monthly meeting.

In the view of some analysts, item (iii) is of major importance, since decisions by the Chancellor that go against the recommendations of the Bank will quickly be identified as such. Also, the Inflation Report clearly gives the Bank an opportunity to put forth and explain its views.

The policy feedback procedure used by the Bank of England is quite similar to the ones prevailing in Canada and New Zealand. In particular, money market conditions are adjusted so as to keep the expected inflation rate--the Bank's forecast for 1-2 years in the future--within the target band, if possible. Money market conditions are measured, however, in terms of short-term interest rates alone (rather than in combination with exchange rates, as in Canada and especially New Zealand).

A striking feature of the four arrangements described is the similarity of the feedback procedures used by the central banks of the three English-speaking nations.<sup>10</sup> In all of these, money market conditions are tightened or loosened when inflation forecasts for (approximately) a year ahead

lie outside the target range, whose width is 2 percent. The manner in which the inflation targets are formally institutionalized is quite different across these nations, however, with New Zealand's arrangement featuring more legislation and more explicitness than those of Canada and Britain.

### III. Experiences to Date

Here the task at hand is to present a brief review of the relevant experiences of the four nations since adoption of their inflation targets. The most basic question to ask, of course, is whether actual inflation performance has been favorable--with rates close to the target-band midpoints and therefore reasonably close to zero. In that regard, figures reflecting annual observations on the basic CPI inflation rates are reported in Table 1. For comparison, values are also reported for the (unweighted) average of CPI inflation rates across 23 industrialized nations, as compiled and calculated by the International Monetary Fund (IMF).

In one regard, the figures reported in Table 1 are rather striking. Specifically, over the reported years prior to 1990, when the first of these inflation targets was introduced, the four countries all had inflation rates that were higher than the 23-country average. In contrast, during each of the recent years 1992, 1993, and 1994, three of the four inflation-targeting nations experienced less inflation than the 23-country average. Whether or not this outcome is a result of the inflation targeting schemes per se, as opposed to national desires for sharply reduced inflation, it would seem to be the case that behavior has in fact altered in these four countries.

The inflation rates reported in Table 1 pertain to basic CPI index numbers, not the adjusted series that are used as the actual target variables. Accordingly, relevant quarterly observations (of annual inflation rates) for the four nations' targeted variables are given in Table 2. These numbers are somewhat different, of course, but the basic message is much the same as with the raw CPI measures reflected in Table 1.

Table 3 reports real GDP growth rates on an annual basis for the four inflation-targeting nations and also, as above, the average value for 23 industrial countries. In these figures one can find some evidence suggesting that undesirable real effects were generated by the adoption of stern anti-

Table 1  
CPI Inflation Rates  
Percentage Change from Previous Year

	Average, 1977-86	1987	1988	1989	1990	1991	1992	1993	1994
Canada	7.5	4.4	4.0	5.0	4.8	5.6*	1.5	1.8	0.2
New Zealand	13.1	15.7	6.4	5.7	6.1*	2.6	1.0	1.3	1.7
Sweden	9.2	4.2	5.8	6.4	10.5	9.3	2.3*	4.6	2.2
United Kingdom	9.5	4.1	4.9	7.8	9.5	5.9	3.7*	1.6	2.5
Industrial Countries	7.3	3.1	3.4	4.4	5.0	4.5	3.3	3.0	2.4

\*Year during which inflation targets were introduced.

Source: IMF (International Financial Statistics and World Economic Outlook)

inflationary measures, especially when it is recognized that such measures were actually introduced a few years prior to the formal targeting arrangements.<sup>11</sup> But there has been an encouraging revival of growth recently: during 1993 and 1994, output growth rates above the 23-nation average were recorded in Canada, New Zealand, and the United Kingdom.

Also relevant is performance in terms of unemployment rates. Table 4 presents a picture that is less favorable than that of Table 3, in the sense that unemployment rates in New Zealand and Sweden were still, as of 1994, much higher than in the years prior to 1988 or 1991, respectively. In the case of New Zealand, there have been many other major structural reforms--e.g., involving government finance and labor market arrangements--that have taken place during the relevant period. Nevertheless, by March 1995, the rate had fallen to 6.6.<sup>12</sup>

A highly relevant consideration is whether the expectations of market participants concerning future inflation rates have fallen together with recent actual rates. Although there exist published

Table 2

**Target Variable Inflation Rates**  
**Percentage Change from One Year Earlier**

	Canada <sup>*</sup>	New Zealand <sup>†</sup>	Sweden <sup>‡</sup>	U.K. <sup>§</sup>
1989.1	4.8	3.8	6.6	
.2	4.9	3.6	6.6	
.3	5.0	3.9	6.4	
.4	4.7	3.4	6.6	
1990.1	4.3	3.5	9.6	
.2	3.8	4.0	10.0	
.3	3.7	3.7	11.1	
.4	3.8	3.4	11.2	
1991.1	4.4	3.5	11.5	8.4
.2	4.0	2.6	10.5	6.7
.3	3.4	2.1	8.7	6.2
.4	2.7	1.7	8.1	5.6
1992.1	1.6	1.3	3.6	5.7
.2	1.7	1.4	2.3	5.3
.3	1.4	1.5	2.4	4.2
.4	1.5	1.8	2.0	3.8
1993.1	1.9	1.8	4.9	3.4
.2	1.4	1.6	5.0	2.8
.3	1.8	1.5	4.6	3.0
.4	1.8	1.3	4.4	3.4
1994.1	1.6	1.1	1.9	2.6
.2	1.7	1.1	2.2	2.4
.3	1.7	1.2	2.8	2.2
.4	1.6	1.5	2.5	2.2
1995.1	2.0	1.9	2.9	2.9
.2	2.5	2.2	3.2	2.8

\* CPI excluding food, energy, and indirect taxes

† Underlying inflation rate as calculated by Reserve Bank

‡ CPI excluding indirect taxes and subsidies

§ RPI excluding mortgage interest charges, reported by NISER

Table 3  
Real GDP Growth Rates  
Percentage Change from Previous Year

	Average, 1977-86	1987	1988	1989	1990	1991	1992	1993	1994
Canada	3.1	4.2	5.0	2.4	-0.2	-1.8	0.6	2.2	4.5
New Zealand	1.6	-1.7	3.0	-0.5	-0.1	-2.1	-0.2	4.1	4.8
Sweden	1.7	3.1	2.3	2.4	1.4	-1.1	-1.9	-2.1	2.2
United Kingdom	2.1	4.8	5.0	2.2	0.4	-2.0	-0.5	2.2	3.8
Industrial Countries	2.7	3.2	4.4	3.3	2.4	0.8	1.5	1.2	3.0

Source: IMF

Table 4  
Unemployment Rates, Percentages

	Average, 1977-86	1987	1988	1989	1990	1991	1992	1993	1994
Canada	9.3	8.8	7.8	7.5	8.1	10.4	11.3	11.2	10.4
New Zealand	4.3	4.4	6.8	7.3	9.2	10.8	10.4	9.4	8.2
Sweden	2.6	1.9	1.6	1.4	1.5	2.9	5.3	8.2	7.9
United Kingdom	7.8	10.0	8.0	6.3	5.8	8.1	9.7	10.3	9.3
Industrial Countries	6.7	7.3	6.8	6.2	6.0	6.8	7.7	8.1	8.1

Source: IMF

Table 5  
Long Term Government Bond Yields  
Percentage Points Above Yield in Switzerland

	1987	1988	1989	1990	1991	1992	1993	1994
Canada	5.8	6.1	4.7	4.8	3.4	3.3	3.8	3.4
New Zealand	12.2	9.3	7.6	5.8	3.6	2.4	2.6	2.2
Sweden	7.6	7.2	6.0	6.4	4.3	4.5	4.5	4.1
United Kingdom	5.4	5.2	4.4	4.4	3.6	3.7	3.8	2.8

Source: IMF

figures pertaining to expectations as reflected in various surveys, these have various weaknesses including non-homogeneity across countries and over time as well as the inherently dubious nature of unofficial survey data. A better indicator, perhaps, is provided by interest rate differentials across countries. There may be different average values of long-term real rates of interest in different nations because of economy-specific risk characteristics, but if these are approximately constant over time then movements in nominal interest differentials should reflect movements in expected inflation rates reasonably well. Consequently, long-term bond rate differentials relative to Switzerland (a low-inflation nation) are reported in Table 5 for the years 1987-1994. For all four of our inflation-targeting nations the differentials have fallen significantly, with the most spectacular decrease occurring for New Zealand. As of 1994, the differential was smallest for New Zealand and largest (among the four nations) for Sweden.

There are various statistical investigations that could be conducted in an attempt to determine whether the inflation targets are credible and effective in the various nations. An interesting example of such a study is provided by Debelle (1995), for example, who has compared the anti-inflationary arrangements of Canada, New Zealand, and Australia by examining expected inflation series and sacrifice ratios (as well as interest rate differentials). There are, however, two major difficulties with such studies. One is the questionable nature of some of the comparisons themselves. The calculation of sacrifice ratios is in that regard especially plagued by conceptual weaknesses involving measurement of capacity output and the economics profession's poor understanding of Phillips-type relationships (short run wage-price-output dynamics).<sup>13</sup> Second is the limited observation period available at present.

With regard to this last consideration, I would argue that it is much too early yet to be attempting evaluations of the inflation-targeting arrangements in our four nations. New Zealand's has been in place about twice as long as those in Sweden and the United Kingdom, and even for New Zealand the time span is less than six years--less, arguably, than the duration of a single typical business cycle. But the issues at hand concern institutional arrangements that should be judged on the basis of their effects on the operating characteristics of economies over long spans of time--the



average performance, that is, over a number of cycles. Indeed, although the cost of a transition period is certainly relevant for any nation contemplating the introduction of a new monetary policy regime, the questions of greatest interest concern behavior after the transition period has been completed. And from that perspective it will be another decade or two before the potential advantages or disadvantages of the institutional arrangements will be clearly evident. Consequently, it is my contention that it is far too early for a predominantly empirical evaluation to be made of the inflation targeting arrangements in Canada, New Zealand, Sweden, and the United Kingdom.

Nevertheless, policy-oriented economists are rightly very interested in questions concerning the attractiveness of inflation-targeting schemes. So it is necessary to try to develop a tentative and preliminary evaluation--which will consequently have to be based primarily on theoretical reasoning together with empirical evidence of a more generalized sort. To attempt such an evaluation will be the object of the next four sections.

#### IV. The Pragmatic Case for an Inflation Target

In considering the desirability of an inflation target, there are two distinct ways of framing the question. One is whether adherence to an inflation targeting scheme is the best possible way of conducting monetary policy, whereas a second is whether inflation targeting is more desirable than the typical manner in which policy is currently conducted by actual central banks. We shall attempt to make some headway on both of these issues, but will initially limit our inquiry to the second of them, saving the first (and more ambitious) for Section VI.

Currently, there are two ways of conducting monetary policy that are quite common among actual central banks. One is to maintain a fixed value for some foreign exchange rate--an objective that requires monetary policy to be dedicated primarily to that task.<sup>14</sup> Whether such an objective is desirable is basically a question of whether the microeconomic (i.e., resource allocation) advantages of a fixed rate are greater than the macroeconomic (i.e., stabilization policy) disadvantages. For small economies in which a large fraction of market exchanges are conducted with foreigners, and which tend to experience the same macroeconomic shocks as their trading partners, it may well be advantageous to maintain a fixed exchange rate.<sup>15</sup> But for a substantial number of economies,

including those of some small nations, the macroeconomic disadvantages--i.e., the inability to use monetary policy for objectives other than maintaining a fixed exchange rate--outweigh the advantages. From this point onward, accordingly, it will be presumed that the discussion is concerned with economies of that type, that is, ones with floating exchange rates.

For this type of economy, the most common way of conducting monetary policy is to tighten or loosen monetary conditions each decision period so as to achieve an appropriate balance between the competing objectives of a low inflation rate and a low unemployment rate (or, almost equivalently, a high rate of output relative to capacity). A few central banks, such as those of Germany and Switzerland, utilize targets relating to monetary aggregates in this process, but most do not. Our objective, then, is to compare inflation targeting with this conventional way of conducting monetary policy--i.e., choosing instrument settings period by period so as to achieve a chosen degree of stimulus in light of inflation and unemployment objectives. In this context, there are basically two different lines of argument that have been used to justify adoption of inflation targeting. One of these builds on the academic literature concerning dynamic inconsistency in monetary policy while the second is a less formalized, more pragmatic argument. Let us concern ourselves initially, and for the remainder of this section, with the latter.

The pragmatic argument for inflation targeting begins with the proposition that, from a long-run (i.e., steady state) perspective, monetary policy has a dominating influence on an economy's (average) inflation rate and a negligible influence on its rate of unemployment or output relative to capacity. This proposition has wide support among central bankers and also within the academic community, where a version of it is often termed the "natural rate hypothesis." It should be noted that the proposition as here stated does not entirely rule out the possibility that monetary policy may affect the steady state path of capacity output--i.e., it does not require that there is no influence on capital intensity. The claim is rather that departures of output from "capacity" or its "normal" level cannot be permanently effected by any monetary means (Lucas, 1972). But there is also a presumption that non-superneutrality effects on capacity are not very large.

What about monetary effects on the (steady state) rate of growth of output? Until recently it was taken for granted by most analysts that monetary policy could not have any permanent effect on the average rate of output growth. In the past decade, however, the endogenous growth literature [see Romer (1986) or Rebelo (1991)] has suggested that level effects may be converted into rate-of-growth effects if the returns to human and non-human capital together are not diminishing--i.e., if all production functions have elasticities with respect to human and non-human capital that sum to 1.0 exactly. Also, there has been some cross section empirical work that purports to find a negative effect of inflation on long-term growth rates.<sup>16</sup> Now, if a causal relationship of this type actually existed, it would of course provide an extremely powerful stimulus to the position that inflation should be kept at negligible (or perhaps negative) levels, for even small changes in maintained growth rates will yield enormous income level effects when cumulated over time. It is my judgment, however, that there is at present not nearly enough persuasive analysis of either type--theoretical or empirical--to justify the position that inflation affects sustained growth rates. Accordingly, since such a position is not necessary to justify the conclusion that a near-zero inflation rate is desirable, it would seem prudent not to adopt it.

This last-mentioned presumption, that near-zero inflation is desirable, itself stems from various analytical and practical considerations. First, that even fully anticipated inflation is costly, due to the "shoeleather" effects of failing to satiate agents with the transaction-facilitating services of money balances (which require no resources to produce), is indisputable and has received a stimulating recent restatement by Lucas (1994).<sup>17</sup> Second, it is the case that all actual tax systems are specified (at least partially) in nominal terms. Thus inflation is apt to reduce the steady state level of capital intensity and also to induce a wasteful allocation of valuable human resources (e.g., accountants, lawyers, financial market participants) into activities that produce no utility-generating goods or services. Third, although there is no necessary theoretical connection between average rates of inflation and prevailing levels of inflation variability and uncertainty, in practice it is evidently true that more variability occurs at higher rates--and the resulting uncertainty is presumably both harmful

and unnecessary. Finally, it is probably true that a substantial fraction of actual individuals are confused by non-zero inflation, and so make suboptimal choices of various types.<sup>18</sup>

It is of course quite widely agreed that monetary policy also has important short-run effects, i.e., effects on fluctuations away from steady-state paths. When monetary conditions are tightened (or loosened), there is a tendency for output relative to capacity to fall (or rise). These effects are only temporary in duration but are long-lasting enough to have major consequences for human welfare. As a result, it is the case that central banks have a legitimate basis for their manifest concern with cyclical conditions. But while there is considerable professional agreement that such effects are important, their exact nature is very poorly understood. It is not just that the economics profession does not have a well-tested quantitative model of the quarter-to-quarter dynamics, the situation is much worse than that: we do not even have any basic agreement about the qualitative nature of the mechanism. This point can be made by mentioning some of the leading theoretical categories, which include: real business cycle models; monetary misperception models; semi-classical price adjustment models; models with overlapping nominal contracts of the Taylor variety or of the Fischer variety; models with nominal contracts set as in the recent work of Fuhrer and Moore; NAIRU models; Lucas supply function models; MPS-style markup pricing models; and so on.<sup>19</sup> Not only do we have all of these basic modelling approaches, but to be made operational each of them has to be combined with some measure of capacity output--a step that itself involves competing approaches--and with several critical assumptions regarding the nature of different types of unobservable shocks and the time series processes generating them.<sup>20</sup> Thus there are dozens or perhaps hundreds of competing specifications regarding the precise nature of the connection between monetary policy actions and their real short-term consequences. And there is little empirical basis for much narrowing of the range of contenders.

Accordingly, a rather natural conclusion would seem to be that central banks' monetary policy strategies should be designed in a manner that is primarily concerned with their long-run effects--those that result on average over time and about which we have considerable knowledge--rather than the short-run or temporary effects about which we know comparatively little. But the long-run effects are principally price level or inflation rate effects. Consequently, since we know that inflation is

socially undesirable (and also unpopular), it seems rather sensible to dedicate monetary policy to the goal of achieving an inflation rate close to zero--one that is of negligible importance from the perspective of most economic actors.<sup>21</sup> Making inflation prevention the sole objective might then be justified on the grounds that monetary policy can effectively be directed at only one target, since all a central bank can do, essentially, is to tighten or loosen monetary conditions.<sup>22</sup> But since a single weighted average of inflation and output growth components could be targeted, a better argument might be that it would be difficult to obtain public understanding of, and support for, such a target variable (or even an unweighted sum).

It is interesting to compare the foregoing argument, which is expressed in my own words,<sup>23</sup> with a rationale for the New Zealand framework as expressed by the RBNZ (1993, p. 21), as follows.

Experience both here and abroad has shown that the only beneficial economic outcome that monetary policy can deliver assuredly and sustainably is price stability. Monetary policy has a short-term impact on the real economy, but this impact is not sustained. Growth and employment gains or losses are mostly replaced by changes in prices and wages, while most initial competitiveness changes generated by movements in the nominal exchange rate are similarly eroded. Monetary policy cannot therefore be used to raise the trend in growth or employment, or sustainably influence the real exchange rate.

Nor does the short-term impact of monetary policy actions on growth and employment provide a reliable avenue for the use of monetary policy in smoothing out fluctuations in real economic activity. Successful counter-cyclical monetary policy would require that the nature and timing of the peaks and troughs of activity, and of monetary policy's impact, be well understood. Unfortunately, monetary policy is a relatively blunt instrument, and our state of knowledge is not precise enough for us to be confident of being right significantly more often than wrong.

Pursuing real economy fine-tuning objectives would thus risk diverting monetary policy down paths where it has no sustained beneficial impact, and often down paths that turn out to lead in directions opposite to those anticipated. At the same time as reducing the chances of achieving what monetary policy is best at--maintaining price stability--this approach would add a drag to economic performance by generating uncertainty and pushing up real interest rates.

Additionally, because it is typically easier to relax policy to stimulate activity than to tighten policy to offset overly rapid, inflationary, growth, monetary policy aimed at smoothing activity is likely to have a bias that leads to higher overall inflation. The costs of a more inflationary environment are thereby added to the costs resulting from higher risk and uncertainty.

Here the last paragraph relies upon an argument that one might interpret as essentially political in nature. Specifically, the phrase "it is...easier to relax...than to tighten policy" evidently refers to political pressures on central banks, since there is no greater technical difficulty in tightening. Furthermore, one might see the source of the problem as involving the tendency of

political processes in today's democratic nations to exhibit impatience and short-sightedness. This tendency would lead to an inflationary bias because the desirable effects of a policy loosening (i.e., its output stimulus) occur more quickly than the longer-lasting undesirable effects (i.e., its inflation stimulus), whereas the desirable effects are the slower to occur in the case of a tightening.

The foregoing line of argument suggests that it is sensible to strive for a negligible inflation rate, and also that short-run activist attempts to smooth out cyclical fluctuations are unlikely to be successful. Thus it suggests that inflation targeting is apt to be preferable to the usual way in which central banks conduct monetary policy. But nevertheless the argument does not literally imply that it is best to aim for some constant inflation rate each monthly (or quarterly) decision period.<sup>24</sup> Consequently, some other possibilities will be discussed in Section VI. But first it will be useful to discuss an alternative way of making the case for an inflation target.

#### V. The Dynamic-Inconsistency Case for an Inflation Target

There is a large amount of literature that uses a second-related but distinct--line of argument in developing the case for inflation targeting. Specifically, several academic writers<sup>25</sup> and a few from central banks<sup>26</sup> have for this purpose drawn upon results on dynamic inconsistency of monetary policy, results that were developed by Kydland and Prescott (1977) and Barro and Gordon (1983).<sup>a</sup> Since these results are well known, the present review can be very brief. The analysis presumes that aggregate output (relative to capacity) depends upon the unexpected component of monetary policy and that the central bank's objectives are to keep both inflation and output close to target values--values which accurately reflect society's preferences but with an externality-induced excess of target output over its capacity (or natural rate) value. At any point of time, so the argument goes, expectations regarding policy will be "given" (i.e., predetermined), so monetary conditions easier than previously expected would yield an output bonus whereas conditions tighter than expected would result in an output shortfall. Consequently, the optimal choice by the CB will be a policy setting that reflects a compromise between the value that would yield the inflation objective and some other (looser) setting that would be preferable because of its stimulating effect on output. But this same type of "discretionary" choice procedure will be repeated period after period, so rational agents will come to

expect it. Thus on average monetary conditions will be easy but not easier than expected and consequently there will be no output bonus realized--even though a greater-than-desired inflation rate is generated. The CB realizes that it is behaving suboptimally, according to this analysis, but can do nothing about it because the CB has no ability to precommit its future policy actions--there exists no "precommitment technology." In order to eliminate the inflationary bias and generate superior outcomes, it is necessary for external constraints to be placed on the central bank<sup>27</sup>--and inflation targets provide one convenient vehicle for imposing such constraints. Now, the foregoing line of argument certainly identifies one important pressure on central bank behavior, a pressure that in principle tends to induce an inflationary bias to policy choices. It is questionable, however, whether this was actually the main pressure that led many central banks to behave in an inflationary manner during the 1970s.<sup>28</sup> Since most central bank analysts and decision makers had not yet embraced the idea of rational expectations or perhaps even the expectations-augmented Phillips curve, it seems likely that a belief in the existence of a long-run tradeoff between inflation and unemployment may have been of greater actual importance.

In any event, it is the contention of McCallum (1995a) that an independent central bank is not inevitably destined to behave in the manner described above. While the pressure from dynamic inconsistency exists, there is no necessity for a central bank to succumb to it. Despite the absence of any precommitment technology, a central bank can nevertheless achieve better results in terms of its own preferences (which will tend to mirror society's) by abstaining from the temptation to exploit each period's expectations regarding monetary conditions, instead choosing policy settings that would be optimal if expected inflation were equal to the target rate. If the central bank consistently abstains in this way, the resulting monetary conditions will not be easier than required for the desired inflation rate, so the latter will be achieved on average. But as in the "discretionary" equilibrium, there will be no expectational errors on average, so the average rate of output (relative to capacity) and unemployment will be the same. Thus, since there will be no inflationary bias, the outcomes will on average be superior. And there is nothing tangible to prevent an actual central bank from behaving in this "committed" or "rule-like" fashion, so it is my contention that some forward-looking central

banks will in fact do so. Analytical results that presume non-committed or discretionary behavior may therefore be misleading.

Contributors to the literature understand, of course, that outcomes would be preferable from the central bank's own point of view if it were to behave in the committed fashion. Why, then, do they presume that such behavior will not be adopted by actual central banks? The usual argument is that despite the superiority on average of committed behavior (that abstains from exploitation of expectations), it remains true that within each period expectations are given, so a superior outcome for that period can be achieved by monetary conditions easier than the committed setting. Furthermore, the public is assumed to understand this and therefore to expect the discretionary inflation rate--which makes easy conditions necessary to avoid depressed output levels. Thus the public will expect the discretionary inflation rate, according to the usual argument, even if the central bank is behaving in a noninflationary (committed) manner. My contention, by contrast, is that if the central bank behaves in a committed manner, then the public will observe that behavior pattern and will soon come to expect such behavior.<sup>29</sup> That is what is usually implied by the assumption of rational expectations--that expectations conform (except for random errors) to actuality.

The foregoing argument is similar in some respects to that of Taylor (1983, p. 125), who concluded his discussion of Barro and Gordon (1983b) with the statement that it is "difficult to see why the [optimal] zero-inflation policy would not be adopted" by a central bank. The literature's main response to Taylor is provided by Canzoneri (1985), who first acknowledges "that Taylor would probably be right were it not for private information" (1985, p. 1060) but then goes on to say that if "the Fed's forecast of money demand is private information, a resolution of the precommitment problem is much more difficult to come by...[because]...direct verification of the Fed's adherence to the ideal policy rule is not possible" (1985, p. 1061). The alleged problem in this case still results, however, from the presumption that the central bank attempts to exploit existing expectations. The present argument is that a competent central bank may see that such a strategy is fruitless (on average) and therefore abandons it. If it does so it will be free to adopt the policy that Canzoneri finds "ideal" even in the private information setting.



There is also a second aspect of the standard literature on dynamic inconsistency and central bank behavior that seems misleading. This aspect concerns a result developed by Walsh (1995), and utilized by Persson and Tabellini (1993), concerning contracts between a nation's government and its central bank. Specifically, the result indicates that if a nation's government provides its central bank with an incentive arrangement (i.e., a "contract") that makes the latter's rewards negatively dependent upon the inflation rate, then it is possible to induce optimal monetary performance even though the central bank's decision calculus is of the discretionary type that would lead to an inflationary bias in the absence of this inducement.

The misleading feature of the Walsh and Persson-Tabellini result is that such an arrangement does not actually eliminate the motivation for dynamic inconsistency, it merely locates it in a different place. Thus, under the proposed arrangement the government would have to enforce the contract--say, by reducing the central bank's budget when inflation is high--but the government has exactly the same incentive not to do so as the central bank has to be too easy in its monetary stance in the first place. To put the point in other words, if the absence of a precommitment technology is actually a crucial problem, then it will still apply to a consolidated entity consisting of the government and central bank together, just as it would to an independent central bank. Furthermore, this weakness of the literature's position cannot be overcome by suggesting that the monetary authority's objective function can be specified at the "constitutional stage" of the political process--for constitutions must be enforced and the enforcing party will be subject to the same temptation as an independent central bank.

The foregoing argument does not imply, it should be said, that government-central bank contracts or explicit mandates are undesirable. But it suggests that the pragmatic line of analysis outlined in Section IV provides a more persuasive basis for such arrangements than does the literature on dynamic inconsistency. In addition, it suggests that the more important function of mandates or contracts may be in constraining the government, rather than the central bank.

The rationale for this last suggestion is as follows. The arguments of both this section and the one before suggest that a key requirement for good monetary policy is patience or far-sightedness. It

is desirable, that is, that policy decisions not be dominated by short-run considerations that would induce an inflationary bias. But governments (i.e., treasuries and other executive agencies) are typically more closely involved in political processes than central banks, and the political processes of today's democracies tend to be short-sighted and impatient in their emphasis. Consequently, governments are less likely than central banks to exercise the patience that is required to behave in a committed manner, as discussed above. But the existence of mandates or contracts that emphasize inflation prevention makes it more difficult for governments to bring pressure to bear on central banks to tilt their policies toward short-run payoffs. Such arrangements thereby provide central banks with enhanced opportunities to behave in a rule-like or committed fashion that avoids any inflationary bias. Doing so does not necessarily entail any failure to respond to current shocks, however, since such responses carry no necessary implications for the average rate of inflation; there is no inescapable tradeoff between "flexibility and commitment." Implicit recognition of this point is a strength of the Walsh and Persson-Tabellini analysis.<sup>30</sup>

## VI. Choice of Target Variable

It has been argued that inflation targeting can be useful because it helps to focus a central bank's attention toward the objective that is most relevant from a long-run perspective and because it helps to deflect political pressures that tend to be short-sighted and excessively inflationary. It is not entirely clear, however, that some other nominal variable would not function as well or better in this capacity. In my own studies, for example, I have usually worked under the presumption that it would be preferable to express quarterly targets in terms of a nominal spending variable--such as nominal GDP--rather than inflation itself, even if the principal (but not sole) objective of monetary policy is the prevention of inflation.

The rationale for a nominal spending target, formulated perhaps in growth rate form,<sup>31</sup> begins with the idea that it would entail little if any deterioration in terms of long-run average inflation performance. If, for example, nominal GDP growth rates were kept close to a target value equal to the expected long-term average growth rate of real GDP, then inflation (in terms of the GDP deflator) would be kept close to its desired value. This is so because long run output growth rates are

virtually independent of monetary conditions and are predictable with relatively high accuracy (say, within  $\pm 0.5$  percent per year) over long spans of time. The same would not be true for targets in terms of monetary aggregates, such as M1 or M2 growth rates, because of velocity changes that may be sizeable and are difficult to predict.

But the relevant issue here is nominal GDP growth versus inflation, not money growth rates. In that regard it seems obvious that an inflation target would, if successful, provide tighter short-run control over the inflation rate. But it is nevertheless arguable that nominal GDP targeting would be preferable, especially if inflation control is not the sole concern of monetary policy, for three reasons. First, because the prices of goods and services are widely believed to react more slowly than output in response to monetary actions,<sup>32</sup> cycling and dynamic instability are more likely to occur with a price level or inflation target. In other words, the problem of "instrument instability," which would render the targeting attempt entirely unsuccessful, is intensified. Second, the output-stabilizing properties of a smoothed path for nominal GDP are likely to be better than with a smoothed path for the price level. About this one cannot be certain, because--as emphasized above--the economics profession has a very poor understanding of the dynamic interaction between nominal and real variables, as well as the magnitude and serial correlation properties of various types of shocks. But, furthermore, this poor understanding leads to a third reason. It does so by suggesting that it is more difficult to devise a policy rule for hitting inflation targets than nominal GDP targets, because the former requires an understanding of the forces that determine the split of nominal GDP growth into its inflation and real growth components.<sup>33</sup> When a central bank takes stimulative policy actions, it can predict with more accuracy when (and by how much) nominal GDP will respond than it can for the price level.<sup>34</sup>

An often-expressed objection to GDP targeting is that national income statistics are not produced often enough or quickly enough, and are significantly revised after their first release. But the essence of the approach is to use some reasonably comprehensive measure of nominal spending; it does not need to be GDP or GNP per se. Other measures could readily be developed on the basis of price and quantity indices that are reported more often and more promptly.<sup>35</sup> It might even be

possible to devise a monthly measure that is conceptually more attractive than GDP, by making the price index more closely tailored to public perceptions of inflation and/or by using a quantity measure that treats government output more appropriately. In any event, if policy adjustments are based on expected future target discrepancies, rather than past misses, then this issue is not directly relevant.

The possibility of instrument instability, mentioned above, is related to the width of the target band employed, whatever the identity of the target variable. Thus if the target band is excessively narrow, then attempts to keep the targeted variable within its limits could generate ever-increasing cycles in the setting of the instrument variable, with the consequence being explosive oscillations in other variables as well as the one targeted. The point is that speedy responses to instrument changes are helpful in promoting stability. So if it is true, as suggested above, that nominal spending responds more quickly than the price level to altered monetary conditions, it may be possible to keep nominal spending growth but not inflation within a given percentage bandwidth.

In this regard, some relevant evidence for Canada and the United Kingdom has recently been developed in studies by Fillion and Tetlow (1993) and Haldane and Salmon (1995). In both cases, simulations with quantitative models were conducted to determine how tightly inflation rates could be controlled by policy feedback procedures of the general type used by the Bank of Canada and the Bank of England. Fillion and Tetlow estimate that a  $\pm$  two standard deviation bandwidth is about 7 percentage points in Canada whereas the Haldane and Salmon results for the United Kingdom imply a width of about 12 percentage points (i.e., the standard deviation of the inflation rate with feedback control is about 3 percentage points).<sup>36</sup> The Canadian study uses a calibrated model in which time periods are interpreted as years whereas the British results pertain to an estimated econometric model with quarterly time periods. Both studies suggest that a 0 to 2 percent band would be violated a large fraction of the time.

An analogous study for Australia conducted by Debelle and Stevens (1995) indicates, by contrast, the possibility of much tighter inflation control. Specifically, results based on simulations with an estimated quarterly model include inflation rate standard deviations as low as 0.64 percentage points, implying a  $\pm$  two standard deviation bandwidth of just 2.56 percentage points (see Debelle and

Stevens, p. 24). This value is so much smaller than in the Haldane and Salmon paper that one is led to wonder what aspects of these studies are responsible for the difference. In that regard it is true that the residual variances in the model's estimated relationships are somewhat smaller in the Debelle-Stevens study, but there is another difference that may also be of major importance. This difference involves the specification of the policy feedback rule postulated for the central bank. Whereas Haldane and Salmon used simple feedback rules with nominal interest rate settings in response to inflation and other realizations from previous periods, Debelle and Stevens use optimal feedback rules for real interest rates based on the minimization of a forward-looking loss function.<sup>37</sup> The latter would imply, I would guess, a much more complex feedback rule. But since simple rules often work (in simulations) nearly as well as complex ones, there may be another significant difference. Specifically, I am inclined to conjecture that the Debelle-Stevens analysis assumes that the central bank has knowledge of current-period values of real output and the price level when selecting its instrument setting. If so, then I would argue that the exercise is seriously unrealistic in its assumption about information available to the central bank. McCallum (1994) more fully develops this argument, which involves the contention that current-period values should be treated as elements of the central bank's information set only for asset prices. In the case of real income and inflation rates, only lagged values should be treated as known.

It might be noted that the UK study by Haldane and Salmon (1995) contains some rather striking results pertaining to the possible desirability of a nominal GDP target. In particular, their Table 5 indicates that the root-mean-square (RMS) targeting errors for annual inflation rates are smaller when nominal GDP growth is the target variable than when inflation itself plays that role. With a feedback rule coefficient of 0.25, for example, the RMS errors are 2.9 and 3.5 percent, respectively, with the GDP growth and inflation targets. These results are not fully applicable to actual arrangements in Canada, New Zealand, or the United Kingdom, even if we neglect econometric model issues, because the policy rules simulated involve responses to previous-quarter target misses, rather than discrepancies between expected future magnitudes and target values. But the results do illustrate in a general way one type of consideration that leads some analysts to believe that nominal

spending targets are worthy of serious consideration. On the other hand, such targets would be more difficult to explain and justify to the public, so their most useful role might be in terms of central bank decision-making rather than public pronouncements. Also, it must be recognized that, as mentioned in footnote 34, there may in practice be strong similarities between nominal income and inflation targeting. The references cited in footnote 23, as providing earlier statements of the case for inflation targeting, were actually put forth as proposals for nominal income targeting.

## VII. Growth Rates versus Levels

In this section we briefly consider the question of whether it is preferable to have a growth rate target or one of the growing levels type, i.e., one in which the (log of the) basic variable is difference stationary or is trend stationary. This topic is often discussed under the heading of "inflation versus price level targets," but the same considerations would apply if the target variable were nominal GDP or some other nominal aggregate.<sup>38</sup> In particular, the weakness of the growth rate choice is that it will--by treating past target misses as bygones--introduce a random walk or "unit root" component into the time-series processes for all nominal variables, including the price level (whatever index is chosen) or more precisely its logarithm. Thus there will be a possibility that the price level will drift arbitrarily far away from any given value (or path) as time passes, implying considerable uncertainty as to the value that will obtain in the distant future (e.g., 50 years from the present).

By contrast, the principal disadvantage with a levels-type target path is that the target variable will be forced back toward the preset path after any disturbance has driven it away, even if the effect of the disturbance itself is of a permanent nature. Since any such action entails general macroeconomic stimulus or restraint, this type of targeting procedure would apparently induce extra cyclical variation in demand conditions which will imply extra variability in real output if price level stickiness prevails. And variability in output and other real aggregative variables is probably more costly to society (in terms of human welfare) than variability in the price level about a constant or slowly-growing path. Now, it is not entirely clear that fully permanent shocks are predominant, but most time series analysis seems to suggest that the effects of shocks are typically quite long-lasting--

indeed, virtually indistinguishable from permanent. Consequently, it would seem preferable not to drive any nominal target variable back to a preset path--or at least not to do so quickly. In other words, it seems preferable to adopt a nominal target of the growth rate type, rather than the levels type.

One reason for reaching the foregoing conclusion is that very few economic transactions are based on 50-year planning horizons. A typical "long-lasting" arrangement might be more like 20 years in duration. But price level uncertainty 20 years into the future would not be terribly large even if the log of the price level were to behave as a pure random walk with zero drift. Assuming that the random, unpredictable component at the quarterly frequency has a standard deviation of 0.0045--roughly the value for the United States over 1954-1991--then a 95 percent confidence interval for the log price level 20 years ahead would be within 8 percent (plus or minus) of the current value.<sup>39</sup> This, I would suggest, represents a small degree of uncertainty in comparison with the magnitudes that have prevailed over the 1960s, 1970s, and 1980s, essentially because the drift or trend rate has been non-zero and uncertain.

Even so, it might be possible to do even better by adoption of a target that is a weighted average of the growth rate and growing levels type. In my study of targeting procedures for Japan, I found that a weighted average target that gives a weight of 80 percent to a growth rate path and 20 percent to a growing levels value, yields quite desirable results. Specifically, in the relevant simulations typical deviations from the growth-rate target path are almost as small as when growth rate targets are aimed for, and the deviations from a growing-levels path are also reasonably small. In particular, there is a distinct tendency for the simulated nominal values to return to the growing-levels path, rather than drifting away arbitrarily as when pure growth rate targeting is adopted.

### VIII. Conclusions

In this concluding section, I will attempt to summarize the foregoing arguments very briefly and in a manner designed to bring together various threads of the argument so as to yield some highly tentative judgments concerning the desirability of inflation targeting. In terms of general attractiveness, this paper suggests that inflation targeting is likely to yield results that are superior,

when averaged over long spans of time, to those provided by the typical discretionary mode of monetary policy-making that is prevalent today. The reason is that the discretionary mode possesses an inflationary bias, which results from the short-sighted nature of pressures that bear upon central banks. It is crucial to understand that elimination of this inflationary bias does not entail any necessary suboptimality in terms of policy responses to shocks of a cyclical nature. The bias stems from the tendency for the desirable effects of a monetary loosening to occur more promptly than the undesirable effects.

The dynamic inconsistency literature suggests that the discretionary mode of policymaking is inevitable, in the absence of external constraints on the central bank, but that suggestion is here disputed. Central banks can abstain from attempts to exploit inflationary expectations, and avoid the inflationary bias, if they are farsighted and resolute. It is nevertheless desirable to have an anti-inflationary target expressed in some formal, institutionalized agreement or mandate because such a target will help to ward off short-sighted, inflationary pressures from branches of government more closely involved in the political process.

It is arguable that some nominal variable other than inflation might be technically superior as a target for monetary policy, the growth rate of nominal spending being a leading contender. Use of such a target variable might yield superior cyclical behavior in terms of output and employment along with inflation performance that is not significantly worse, over long time spans, than with inflation targets. Current knowledge in macroeconomics does not permit any firm conclusion in this regard, however, and in terms of facilitating communication between a central bank and its nation's citizens, inflation would appear to be the preferable target. In any event, there are evidently some fairly strong operational similarities between nominal income growth targets and inflation targets with supply-shock caveats as implemented by, for example, the Reserve Bank of New Zealand. The discussion presented in Section VI probably overemphasizes the distinction.



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## Endnotes

1. There are also some other nations, including Finland, which have adopted official inflation targets. They have been excluded from my assignment in order to keep the study to a manageable size.
2. More extensive descriptions have recently been published in Leiderman and Svensson (1995).
3. The specification of the monetary conditions index is theoretically rather unappealing, as it combines a variable expressed in monetary units with one whose units involve only time. A related point is that, from a long-run perspective, the level of  $R_t$  is negatively related to monetary stringency.
4. Note that dismissal is not automatic. The Act's provision is that "The Governor-General may..., on the advice of the [Finance] Minister, remove the Governor from office...if the Minister is satisfied...That the performance of the Governor in ensuring that the Bank achieves the policy targets fixed under...this Act has been inadequate...."
5. This paragraph and the next three are adapted from McCallum (1995b), as are portions of Sections IV, V, and VI.
6. On this topic, see Archer (1995) and Hansen and Margaritis (1994).
7. The same is true, of course, of short-term interest rates.
8. Furthermore, in June 1995, the Inflation Report featured a summary by the Governor with policy conclusions that had been cleared with the Board.
9. This account is adapted from King (1995).
10. I think it best not to classify Sweden as an English-speaking nation, despite the great proficiency of many of its citizens.
11. In the Swedish and U.K. cases, the previous anti-inflationary measures involved exchange rate pegs to the ECU.
12. It has been pointed out to me by David Gruen that the fraction of the New Zealand population that is recorded as participating in the workforce has also fallen since the beginning of reforms. This seems at first glance to be an undesirable outcome. But if some of the jobs in the pre-reform era were actually non-productive, the long-run consequences may be positive even in this respect.

13. On the latter topic, see Section IV below. Mayes and Chapple (1995) also expresses skepticism regarding the reliability of calculated sacrifice ratios.
14. That the maintenance of a fixed (nominal) exchange rate requires the dedication of monetary policy--i.e., that fiscal policy cannot be used for this purpose on a long-run basis--is argued by McCallum (1996, pp. 135-6 and 144-5).
15. In this case, it will also be advantageous to go one step farther and have a common currency with the other nation or nations, so as to eliminate currency exchanges that use up valuable resources.
16. Some of these findings are discussed by Fischer (1994) and Okina (1995).
17. Incidentally, it is incorrect to claim [as in Laidler (1995)] that the societal nature of money is not reflected in the shoeleather cost calculus. To the contrary, it is precisely that nature that justifies the analytical modelling features that lead to shoeleather costs; without the societal, transaction-facilitating, medium-of-exchange features of money, models would properly be specified in such a way that no shoeleather cost would result from anticipated inflation.
18. There is no inconsistency in believing this and also believing that it is best to assume rational expectations for most analytical purposes. One does not want to design policy in a way that attempts to exploit systematic expectational errors of any particular type.
19. In this list I have not included "menu cost" models, which have attracted much attention, because they have not been developed fully enough to be operational, i.e., estimated with quarterly data.
20. Which could be white noise or autoregressive or moving average or some combination.
21. "Negligible" inflation is one way of expressing succinctly Alan Greenspan's concept of price level stability, namely, as a condition in which "...price levels [are] sufficiently stable so that expectations of change do not become major factors in key economic decisions."
22. I am inclined to say that all a CB can do is to create base money at a slow or rapid rate. But many analysts would prefer alternative indicators.
23. Earlier versions appear in McCallum (1988, 1993).
24. The New Zealand framework calls, of course, for departures from a constant inflation rate in periods with sizeable supply shocks.

25. A few leading references are listed in McCallum (1995a). Also see Debelle and Fischer (1995).
26. Examples include King (1995) and (to some extent) Archer (1995, pp. 4–5).
27. See, e.g., Blanchard and Fischer (1989, pp. 596–614), Debelle and Fischer (1995), and Persson and Tabellini (1994)
28. In the case of the United States, the late 1960s was a crucial inflationary period but other nations' central banks were constrained by the Bretton Woods arrangement until 1971.
29. This sentence says "will soon come to" because it is very unlikely that expectations would adjust immediately following a change in policy behavior.
30. The same statement applies to Svensson (1995b). All of these authors presume, however, that central banks will behave in a discretionary manner, attempting to exploit expectations—which I dispute.
31. The issue of whether it is preferable to formulate nominal targets in growth rate (difference stationary) or growing–level (trend stationary) form will be taken up below in Section VII.
32. This is suggested by a very large number of empirical studies. A notable recent contribution is Christiano, Eichenbaum, and Evans (1994).
33. The policy rule proposed by Meltzer (1987), to set base money growth at the average (over the previous three years) value of output growth minus base velocity growth, does not require knowledge of the period by period effect of money on real variables. But Meltzer's rule, like mine (McCallum, 1988), is designed to achieve a desired inflation rate on average, not on a period-by-period basis. It should therefore be regarded as a nominal income growth rule in which the target value changes as the (implicitly) forecasted rate of average real growth changes.
34. David Archer has argued that this third suggestion of mine fails to recognize that actual inflation targeting schemes, such as New Zealand's, respond to discrepancies between target values and inflation rates expected to prevail a year or so in the future, not past discrepancies. In practice, such discrepancies may be highly correlated with recent GDP target misses.
35. In the United States, for instance, one could in principle use the product of the CPI and the Fed's

Industrial Production Index, both of which are published monthly. Monthly availability is also a feature of the Bureau of Economic Analysis nominal series entitled "Personal Income."

36. It should be noted that these standard deviations pertain not to forecast errors, but to control errors in simulations that assume rational expectations.

37. These rules are optimal, of course, only for the particular model used. My own work presumes that, in light of our ignorance regarding nominal-to-real dynamics, that it is more sensible to look for a simple rule that performs reasonably well in a variety of models.

38. Alternative analyses have been presented by Fischer (1995) and Fillion and Tetlow (1994), among others.

39. Note that there is not contradiction between this figure and the Haldane-Salmon and Fillion-Tetlow results reported in Section VI, even abstracting from any possible difference between the United States and the other countries. Specifically, the present figures pertain to a one-period ahead forecast error whereas the Section VI values pertain to variability around a constant target value.