

Board of Governors of the Federal Reserve System

International Finance Discussion Papers

Number 473

June 1994

INFLATION TARGETING IN THE 1990S:  
THE EXPERIENCES OF NEW ZEALAND, CANADA, AND THE UNITED KINGDOM

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## **Abstract**

We survey the recent experiences of three industrial countries -- New Zealand, Canada, and the United Kingdom -- that have announced specific targets for inflation. Despite success on the part of the targeting central banks in attaining their inflation goals thus far, bond yields suggest that long-term inflation expectations for these countries persistently tended to exceed long-term targets throughout the first several years of targeting. For New Zealand and Canada, survey data generally implied that inflation also was expected to exceed its targeted level in the near term.

# **Inflation Targeting in the 1990s: The Experiences of New Zealand, Canada, and the United Kingdom**

John Ammer and Richard T. Freeman<sup>1</sup>

## **1. Introduction**

In the past five years, a number of monetary authorities have made strong policy declarations that give increased emphasis to inflation control. Among the industrial countries, New Zealand, Canada, and the United Kingdom reinforced these statements by implementing specific inflation targets, beginning between 1990 and 1992. Sweden and Finland have announced targets more recently. A few other countries have pursued less formal inflation goals, typically closer to projections (see Table 1). Germany, for example, does not have an explicit official inflation target, but the Bundesbank has long emphasized its primary focus on low inflation, and it makes public an informal inflation objective that is used in formulating its official targets for money growth. By 1994, France, Italy, and Switzerland had all begun to announce similarly quantified inflation objectives.

In this paper, we concentrate on the question of whether and how a government (that is pursuing a monetary policy that emphasizes inflation control) should announce an inflation target, and review the experience of three monetary authorities that have done so. A crucial

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<sup>1</sup> An earlier version of this paper (with a different title) was presented at a joint meeting of the Federal Reserve System Committees on Business and Financial Analysis in September 1993. The authors are Economist and Chief, respectively, in the International Finance Division at the Board of Governors of the Federal Reserve System. We would like to thank David Bowman, Deb Lindner, Patrice Robitaille, and conference participants for helpful comments; Douglas Laxton and Craig Beaumont for sharing data; and Jon Willis for research assistance. Opinions expressed herein should not be construed to represent those of the Board of Governors or any other Federal Reserve System employees. We made all of the errors.

targeting issue is the likely effect of policy announcements on private expectations. Knowing the stance of policy might help consumers and firms make the choices that will lead to the most efficient macroeconomic outcomes; otherwise, policy uncertainty might be a needless source of risk. However, a policy announcement may not reduce uncertainty for private agents who do not know whether or not to believe it.

Accordingly, in the next section of the paper, we examine the theoretical determinants of policy credibility, drawing on the published literature on this subject. In the third section, we undertake an informal discussion of several practical details of inflation targeting. In the remainder of the paper, we detail the experiences of the three OECD member countries that had implemented formal inflation targets by the end of 1992: New Zealand, Canada, and the United Kingdom. We describe the steps that were taken to specify and implement the targets, with particular focus on measures that were intended to enhance the credibility of the announced policies. Although the targets have been attained in each of the three countries, persistently high long-term interest rates suggest that full credibility was not achieved for these low-inflation policies, at least within the first few years of implementation.

## **2. When is a Low-Inflation Monetary Policy Credible?**

One of the most important insights that arose from incorporation of the rational expectations hypothesis into mainstream macroeconomics in the 1970s was that expectations are an important determinant of the aggregate price level, and that they can even be self-fulfilling in some instances. In many models, the labor supply function drives this

phenomenon -- workers accept smaller nominal wage increases if they are expecting a slower rate of consumer-price inflation. The consequent wage concessions decelerate prices. As a result, at least in the short run, an anti-inflation monetary policy may be more effective if it is anticipated. Successful private anticipation of a low-inflation policy could also imply a lower cost of inflation reduction, by eliminating the potential welfare cost of suboptimal decisions that may be induced by policy misperceptions. Thus both the effectiveness and the desirability of a low-inflation policy may depend crucially upon its credibility.

Taylor (1982) has argued that the converse of this is also true -- the credibility of a monetary policy logically should depend on its desirability and effectiveness. In order for a monetary policy to be credible among private agents, it must be possible for them to view it as a feasible, desirable, and effective policy in terms of their perception of the central bank's objectives. Clearly, if there are any costs to reducing inflation, then, in order for a low-inflation policy to be credible, one must be able to make a case that there are benefits to be reaped, as well.

Rodrik (1989) notes that a sincere monetary policy announcement made by a competent central banker can lack credibility if it fundamentally conflicts with other likely government policies. For example, if it is expected that there will be large budget deficits, and the fiscal authority will compel the central bank to monetize them, a low-inflation monetary policy may not be feasible. In this scenario, either a commitment to fiscal restraint or an increase in the political autonomy of the central bank might enhance the credibility of

monetary policy.<sup>2</sup>

Credibility can also be undermined if agents are either uncertain or misinformed about the central bank's true intentions. Such an informational problem could arise if the government's preferences cannot be observed (Backus and Driffill (1985)), if private agents do not know the central bank's model of the economy (Canzoneri (1985)), or if there is uncertainty about how long the current policy maker will remain in charge (Ball (1992)). The uncertainty in these models is generally detrimental to social welfare.

Barro and Gordon (1983a, 1983b) and others have shown that, even when the preferences of competent policy makers are known and coincide with those of society, the optimal social welfare outcome can be difficult or impossible to obtain. In the Barro and Gordon (1983b) model, the socially optimal inflation rate is zero. However, if workers negotiate their wages according to an expectation of zero inflation, the central bank has an incentive to pursue subsequently an inflationary policy in order to reduce unemployment below the "natural rate" that obtains when inflation expectations are realized. Knowing that the central bank would have an incentive to "cheat" on any implicit or explicit agreement to aim for a lower inflation rate, rational agents expect the (positive) inflation rate that is consistent with the monetary authority's reaction to their labor supply decision. This is an example of the problem of policy time-inconsistency, or incentive-incompatibility, that was first recognized by Kydland and Prescott (1977). The existence of this problem raises the possibility that some form of pre-commitment on the part of the central bank may increase

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<sup>2</sup> This notion is supported by some indirect empirical evidence -- Alesina and Summers (1990) and others have found a negative correlation between a country's average inflation rate and indices that measure the degree of central bank independence.

social welfare.

### **3. Inflation Target Specification Issues**

In order actually to implement inflation targets, a number of specification choices must be made, including (i) the specific price index to be targeted, (ii) whether to announce levels or ranges as the targets, (iii) the optimal pace of inflation reduction, and (iv) whether or not a target commitment may be temporarily suspended after an extraordinary economic shock.

The remainder of this section of the paper constitutes an informal discussion of these practical issues.

#### *Which Measure of Inflation?*

National statistical agencies typically produce more than one measure of the general price level -- which should be the target? That the government is the source of the official data is in itself a potential threat to credibility. There may be more public confidence in "cleaner" measures, such as the all-items CPI, than smoother indices designed to more accurately reflect underlying inflationary pressures by excluding volatile items such as energy, food, and housing. Similarly, target specifications that rely on seasonally adjusted data might best be avoided. Also, a price measure that is promptly released and seldom revised is clearly preferable.

*Target Levels or Target Ranges?*

Canzoneri (1985) examines the imperfect monitoring problem using an extension of the Barro and Gordon (1983a) model that includes an informational asymmetry. Specifically, workers cannot observe the central bank's forecast of the innovation in money demand. With this hindrance, the best equilibrium outcome for the economy occurs when agents follow a specific rule in forming their inflation expectations. In particular, if money growth is within a particular range around a rate consistent with a low inflation policy, workers give full credence to the central bank's following a low inflation policy. If not, they expect a higher rate of inflation in future periods, associated with a non-cooperative equilibrium. If the target band is appropriately chosen, the central bank will be induced to pursue honestly the lower inflation outcome. Although, ex ante, policy is directed to produce a particular *level* of inflation, it is judged to have been successful, ex post, if inflation was within a specific range.

There are other reasons to choose a target range rather than a single level. First, because of random shocks and feedback delays, it is impossible to hit a target exactly and repeatedly. Second, there may be problems in measuring inflation. Even if there is no measurement error in the conventional sense, price index data may not reflect the most appropriate concept of inflationary pressures. For example, in several countries, mortgage interest rates enter directly into the consumer price index. In some cases, governments maintain measures of "underlying inflation" that do not always have an official status.

*What Should be the Pace of the Initial Inflation Reduction?*

Given a target level of inflation that is below its current rate, it is not clear what is the optimal path to the target. If excessive inflation is an impediment to economic performance, ceteris paribus, it would appear best to reduce it as swiftly as possible. However, if the economy exhibits a tendency for inflation persistence, a rapid inflation reduction could lead to a substantial disruption in economic activity, even if the policy was credibly announced. Rigidities in inflation could derive from long-term nominal contracts, such as wage agreements, or from inertia in inflation expectations, if a significant proportion of agents use a backward-looking rule for forming expectations.<sup>3</sup> Chadha, Masson, and Meredith (1990) explore the effect of the speed of inflation reduction on its cost with a log inflation specification derived from a staggered wage contract model that mixes forward-looking and backward-looking agents:

$$\pi_t = \delta \pi_{t+1}^e + (1 - \delta) \pi_{t-1} + \beta y_t$$

Embedding this equation in a simple macroeconomic model, they find that the cumulative output loss associated with a given decrease in inflation is decreasing in the length

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<sup>3</sup> Laxton, Rose, and Tetlow (1993) estimate that the relative importance of a backward-looking forecast component in a survey of professional forecasts of Canadian inflation is 30 percent. One might expect this weight to be even higher for firms or workers.

of time over which the policy is implemented, and the cost can be further reduced by (credibly) announcing the policy change in advance. If there are both advantages and disadvantages to reducing inflation more rapidly, then ultimately the optimal pace of inflation reduction is an empirical question.

### *Temporary Exemptions from the Target*

Regardless of the degree of commitment on the part of the central bank to its low-inflation policy, because of lags in the effects of policy instruments and delays in feedback, random shocks are likely occasionally to drive inflation away from its target. Generally an adverse supply shock, (or, for a small undiversified open economy, also an adverse external demand shock) will be particularly problematic because it would tend simultaneously to raise inflation and lower output. The central bank then faces a tradeoff between counteracting the inflationary effect of the shock, with possible adverse implications for real activity, and accommodating the shock by allowing inflation to rise. It must also decide how quickly inflation should be brought back to the target path (a problem similar to that of specifying the initial inflation reduction path).

When a monetary authority announces an inflation target policy, it may be prudent for it to specify the circumstances under which it is anticipated that targets will be missed. One possibility is to permit temporary exemptions from the inflation target after shocks of a particular type and magnitude, thus striking a balance between commitment and flexibility. However, if there is an informational asymmetry, exemptions can pose a dilemma in evaluating the central bank's performance -- even ex post, agents may not be able to tell

whether or not it was "cheating" by aiming for an inflation rate above the announced target.

#### **4. Country Experiences**

##### *New Zealand*

The experience of New Zealand, the first country to implement specific inflation targets in the recent period, reflects many of the issues discussed above. In particular, the credibility of New Zealand's "price stability" program clearly has been a central concern of the government.<sup>4</sup> Accordingly, elements have been introduced into the country's inflation-control framework -- including measures related to establishment of central bank independence and accountability -- that are designed specifically to reinforce the program's credibility.

Until the mid-1980s, monetary policy in New Zealand was designed to meet varying objectives that rarely were fully specified. For many years previously, the country had experienced persistent slow growth and one of the highest average inflation rates among OECD members (more than a seven-fold increase in consumer prices between 1970 and 1985). To help revitalize the sagging domestic economy, when the new Labor government was elected in 1984, it introduced a number of structural reforms aimed at enhancing the role

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<sup>4</sup> In recent parlance, "price stability" has come to refer to a policy goal of very low inflation rates, typically between 0 and 2 percent per annum. In this context, a positive inflation objective is typically justified by an assertion that there is upward bias in measured inflation rates. Given that implementation of these policies typically involves a target for inflation rather than for the level of prices, "price stability" is, perhaps, a slight misnomer.

of market forces and redressing macroeconomic imbalances -- including a broad liberalization of New Zealand financial markets and a floating of the exchange rate. In monetary policy, a greater emphasis was placed on controlling inflation.

In the late 1980s, efforts were begun to institutionalize the anti-inflation focus of monetary policy and to create conditions to ensure its effectiveness. These included establishing greater independence for the New Zealand Reserve Bank, which previously had operated with only a limited degree of autonomy in matters of monetary policy. This process culminated with passage in 1989 of the New Zealand Reserve Bank Act. With regard to the objectives of monetary policy, the Act stipulated the "primary function of the Bank is to formulate and implement monetary policy directed to the economic objective of achieving and maintaining stability in the general level of prices." According to the Act, the objective of price stability is to be spelled out in a Policy Targets Agreement (PTA) that is entered into periodically by the Bank's governor and the Minister of Finance. Targets agreed to under PTAs up to now have taken the form of requiring the Bank to contain CPI inflation (defined as the four-quarter rate of change) within particular numerical ranges (2 percentage points in width, so far) that may be specified for several years in advance.<sup>5</sup>

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<sup>5</sup> Because a large proportion of home mortgages in New Zealand have variable rates, the targeted CPI (which includes mortgage costs as part of the housing component) can be sensitive to the stance of monetary policy. Interestingly, when the monetary authority is near the upper boundary of its target range, the Bank may have a perverse incentive to drastically ease policy in order to obtain a short-term decrease in measured inflation through reduced mortgage interest rates. The Reserve Bank had requested that the targets be specified in terms of the Bank's "housing-adjusted" price index (HAPI), which differs from the CPI in using a "rental-equivalent" measure of the housing component. However, the government has insisted on using the CPI measure because it has a more "official" statistical status than the HAPI. The government may have recognized that the credibility of a monetary policy target based on a price index compiled by the central bank may be suspect.

To strengthen the price-control framework and specifically to enhance the credibility of inflation targeting, the New Zealand program has emphasized transparency and accountability. The Bank is required to publish every six months an official statement that reviews monetary policy in the preceding six-month period and details how monetary policy will be directed at price stability in periods ahead. The Bank's governor regularly is cross examined in parliament on the contents of the statement. It also is clear from public statements by the Bank's governor and other officials that the PTA and the targets in particular should be regarded as a "clear yardstick" against which the governor's performance should be assessed and held accountable (at the potential cost of dismissal).

In conjunction with its inflation targets, the New Zealand government also committed itself to an austere fiscal policy with specific targets for deficit reduction, reducing the risk that deficit financing requirements might increase pressure on the central bank to ease its monetary stance. After two decades of persistent deficits that ran as high as 5 percent of GDP, the central government returned to approximate fiscal balance in 1993-1994. The government also shifted in 1991 to a system of accrual-based budget accounting that increased the transparency of the government's fiscal position.<sup>6</sup> To reinforce the Reserve Bank's independence and accountability, the government and the Bank revised the Bank's financing arrangements, replacing the previous system with a medium-term (5-year) funding

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<sup>6</sup> Under this method, pension liabilities, for example, are treated as expenditures when they are incurred, not when they are paid.

agreement.<sup>7</sup>

The New Zealand program has placed high priority on establishing autonomy for the Bank in its monetary operations. Under the Reserve Bank Act, the government is barred from instructing the Bank on operation of monetary policy, giving the Bank a high degree of independence in its day-to-day operations. Largely because of this provision, the Bank has garnered a reputation as the world's most independent central bank, but its autonomy is not absolute. An important qualification is that, according to the Reserve Bank Act, it is the government that defines the inflation target, not the Bank -- although in practice there is considerable collaboration and consultation between the government and the Bank in the process of target setting.

The New Zealand system also allows for a certain amount of flexibility in the event of unforeseen developments. Even after a target is in place, the government can initiate a revision by invoking an override provision. However, procedures for such an override require formal, public review (including tabling a new PTA in parliament) -- steps that presumably mitigate the adverse effect that the existence of such opt-out provisions might exert on policy credibility. The current PTA also includes several "caveats" that allow for temporary exemption from the targets in the event of specific shocks not under control of the Bank. For example, a sharp increase in indirect taxes or local levies may permit temporary deviation from the inflation target. Other shocks to which a caveat may be applied according to the current PTA include natural disasters and other crises, effects from changes in government,

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<sup>7</sup> Because the funding agreement fixes the Bank's operating budget in nominal terms fairly far in advance, it creates an additional incentive to maintain the value of the currency.

large changes in mortgage interest rates (to the extent that they impact directly on measured inflation), and (in some circumstances) terms-of-trade changes. The PTA's list of such shocks is not intended to be exhaustive or prescriptive, but only indicative. In any event, if the Bank invokes a caveat, it must provide an estimate of the effect of the shock on the CPI and an explanation of its intended response.

The upper panel of Chart 1 provides some basic information on New Zealand's inflation targets and inflation performance through early 1994. In April 1990, the Reserve Bank announced its first official ranges for headline CPI inflation (a "guidepost" of 3-5 percent for end-1990; and official targets of 1.5-3.5 percent to be achieved by end-1991 and 0-2 percent by end-1992).<sup>8</sup> Following an election and change in government in December 1990, the original targets were revised upward and extended through 1993.<sup>9</sup> The new inflation targets were set at 2.5-4.5 percent for end-1991, 1.5-3.5 percent for end-1992, and 0-2 percent for end-1993. In late 1993, the authorities extended the 0-2 percent range for a period of indefinite duration. The current range has been interpreted as applying continuously (as opposed to at specific end-of-year reference dates), leaving the Reserve Bank, in principle, with somewhat less intra-period scope for maneuver in the event that four-quarter inflation moves outside the range.

As the chart shows, starting in 1990, the inflation rate began a downward trend that continued until early 1992. During 1991, the inflation rate entered its target range, and it

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<sup>8</sup> Of these, only the guidepost is shown in Chart 1, because the 1991 and 1992 targets were revised a few months later. (The revised targets are shown instead.)

<sup>9</sup> This softening of the targets had been part of the opposition platform throughout the campaign.

remained well below the upper bound for the duration of the interval shown. Inflation fell sufficiently rapidly, in fact, that for part of this period the inflation rate was below the lower end of its target range.

The upper panel of Chart 1 also shows 12-quarter changes in GDP that are intended to provide information on the cyclical context of New Zealand's inflation performance. The implicit assumption is that several years of weak or negative growth would tend to leave an economy with excess capacity. Conversely, after a period of rapid growth, productive resources would be relatively scarce. By this reasoning, the near-zero output growth between 1987 and 1990 suggests that New Zealand's low-inflation program was undertaken in a context of economic slack that likely facilitated the establishment of short-term credibility for the program. (The rising unemployment rate over this period also suggested that factor cost pressures were waning.)

New Zealand's real economic performance under inflation targeting is difficult to evaluate. Following a sharp drop in the first year of the new regime, output grew at about a 5 percent annual rate in the following two years. Unemployment rose initially and remained high by historical standards through early 1994. We cannot determine the extent to which activity was initially depressed by the inflation reduction program or by other factors, such as the recessions experienced by most of New Zealand's major trading partners.

The lower panel of Chart 1 shows that New Zealand authorities have been able to reduce inflation without large increases in nominal short-term interest rates. From the end of 1990, when the present targets were announced and implemented, through the end of the period shown, both short-term and medium-term interest rates have been on a generally

declining trend.

Application of the Fisher equation (which states that the nominal interest rate equals the sum of the real interest rate and inflation expectations) to the 5-year interest rate casts some doubt on the notion that New Zealand's inflation targets won instant credibility. This relation implies that, during the targeting period shown, either inflation expectations have exceeded the targets or that the real 5-year interest rate generally exceeded 5 percent and was initially nearly 10 percent. However, the real interest rate may have been elevated because of concerns over external financing requirements for the national debt, which, despite an improving outlook, still exceeded 40 percent of annual GDP in 1994.<sup>10</sup>

Chart 2 provides some additional information on inflation expectations from a business survey conducted by New Zealand's largest commercial bank.<sup>11</sup> There is no indication of any effect on inflation expectations from the announcement of the inflation targets in early 1990. Short-term inflation expectations tracked contemporaneous inflation down during the targeting regime, but do not appear to have been more forward-looking than previously.<sup>12</sup> Expectations remained above the 0-2 percent long-term target range through 1994, despite the Bank's success in lowering inflation. Accordingly, the implicit forecast errors (shown in the

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<sup>10</sup> About 40 percent of New Zealand's government debt is held by foreigners, who may have a limited appetite for assets denominated in Kiwi dollars. The government undertakes some of its borrowing in more popular currencies, but in doing so, it faces the dual disadvantage of paying a default risk premium and being exposed to exchange rate risk.

<sup>11</sup> The expectations measure is dated according to the time it was recorded.

<sup>12</sup> Household surveys have apparently shown that consumers' inflation expectations have been slower to adjust. In response to one of these surveys in 1990, Reserve Bank governor Donald Brash delivered a speech warning the public that if wages were raised much in excess of productivity increases, employment would be jeopardized.

lower panel) have been negative throughout the targeting period, although with some evidence of a narrowing.

### *Canada*

In the late 1980s, Canadian monetary policy became increasingly preoccupied with a struggle to control inflation in an overheated economy. After Bank of Canada Governor John Crow declared in early 1988 that price stability should be the objective of Canadian monetary policy, the Bank of Canada began to explore the possibility of targeting inflation, and by 1990 the issue had become an active part of public policy debate. At that time Canada clearly did not have as extreme an inflation problem as did New Zealand: over the previous three decades, consumer prices had risen at an annual rate of about 5-1/2 percent, only slightly faster than in the United States. In addition, real GDP growth had averaged more than 4 percent per year over the same period, better than any G-7 country except Japan.

In February 1991, Governor Crow and Finance Minister Michael Wilson jointly announced the setting of a target path for inflation (measured by 12-month changes in the CPI, excluding food and energy): 3 percent by the end of 1992, 2-1/2 percent by the middle of 1994, and 2 percent by the end of 1995.<sup>13</sup> Although in each case a band of plus or minus one percentage point was associated with the targets to allow for unavoidable variability in inflation, it was emphasized that the mid-point (not the upper bound) would be the objective.

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<sup>13</sup> The press release noted that the Bank would focus on the ex food and energy series for technical reasons (it has been less volatile) but that its movements in the long run would mirror those of the all-items index. The ultimate goal is stability in the general level of prices.

In addition, the official press release announcing the program referred to a goal of "price stability" after 1995, which was left to be defined more precisely later but was broadly characterized as an inflation rate "clearly below two percent".

The initial press release soon was followed by a longer document that provided additional explanation and detail. It included several caveats and other conditions, not unlike those in the New Zealand program, that were intended to deal with possible eventualities.<sup>14</sup> In particular, authorities indicated that if "unexpected developments" push inflation outside of the target range, the Bank is expected to bring inflation back toward the middle of the band (but not beyond).<sup>15</sup> Large changes in "indirect" taxes are regarded similarly. If the direct effect of a tax change on the price level is 1/2 percent or more, then the inflation target may be altered temporarily by a corresponding amount. Longer-term adjustments to the targets are to be undertaken only "in very unusual circumstances" (none of which have occurred in Canada in recent years), such as "a very large increase in oil prices that could not be prevented from spilling over into a broad range of other prices or a widespread natural disaster."

The Bank of Canada clearly has given high priority to raising the credibility of its inflation-reduction program, both by asserting its own commitment to the targets and by striving to convince the public of the benefits of low inflation. The Bank's press releases have included considerable rhetoric designed to bolster the standing of price stability as a

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<sup>14</sup> See Bank of Canada (1991).

<sup>15</sup> Thus, the direct effects of such shocks on the long-run price level are to be accommodated.

policy goal, including a characterization of inflation as "socially unjust."

In the autumn of 1991, the ruling Progressive Conservative government attempted to enhance the legal standing of the inflation targets by proposing amendments to the Bank of Canada Act. Their key proposal was to change the Bank's mandate from pursuit of a multitude of potentially conflicting goals, including the mitigation of fluctuations in employment, to the single goal of price stability. Governor Crow endorsed these reforms, but they were rejected by a Parliamentary committee in early 1992. Accordingly, inflation targets have been only a discretionary policy of the government, a fact which periodically has engendered some doubts about their permanence -- for example, when Jean Chrétien became Prime Minister as a result of the Liberal Party's electoral victory in 1993. These particular doubts turned out to be misplaced -- in early 1994, the new Liberal government and the Bank jointly reconfirmed support for the program and announced specifically an extension of the 2 percent target through 1998.<sup>16</sup>

Like New Zealand, Canada also adopted official targets for budget deficit reduction. Concurrent with the introduction of the inflation targets, the government announced that it would initiate legislation that was designed to enhance its medium-term fiscal credibility. The Spending Control Act, passed in 1992, required nominal "program spending" (defined as expenditures net of interest payments on the national debt) to remain within predetermined limits through 1996.

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<sup>16</sup> As in the New Zealand case, the extended targets have been interpreted as applying continuously -- not only at specific widely-spaced reference dates -- with the result that Bank of Canada will have somewhat less time, in the event of a shock, to bring inflation back toward its target.

The upper panel of Chart 3 depicts all-items CPI inflation in Canada; the ex food and energy series followed a similar pattern after its introduction in 1987. The official inflation objectives are also shown, with "I-bars" representing the implicit target bands around them. The 12-month change in the CPI temporarily shot up to nearly 7 percent in January 1991 because of the introduction of a national sales tax (the Goods and Service Tax, or GST) that impacted directly on measured consumer prices.<sup>17</sup>

The general consensus when the targets were introduced in early 1991 was that the underlying rate of inflation was 4 or 5 percent and due to decline, because of substantial slack in the economy (as suggested by the tepid rate of GDP growth from 1988 to 1991 shown on the chart). The unemployment rate had risen to about 10 percent. As it turned out, the first quarter of 1991 was the trough of a year-long decline in real output. In that context, the initial target level of 3 percent inflation seems to not to have been very ambitious. Measured inflation fell dramatically during 1991 and remained near or below the bottom end of the target band through early 1994, despite significant Canadian dollar depreciation.

Real output growth was fairly weak in Canada during the first few years of inflation targeting. Despite substantial excess capacity, the Canadian economy expanded at an average annual pace of only about 2 percent in the first three years after the government announced the targets -- an unusually sluggish rate of recovery from what was regarded as a deep recession. However, there were other factors that depressed growth. External demand was relatively weak at this time, largely because of the contemporary U.S. slump. In addition,

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<sup>17</sup> Analogously, the passing of this effect took about 2 percentage points out of measured inflation at the beginning of 1992.

Canadian fiscal policy was fairly tight, as the federal government remained intent on reducing its budget deficit despite the soft economy.

Interest rates at maturities of three months and ten years are shown in the lower panel through early 1994. Although monetary conditions were tightened sharply in the late 1980s, announcement of the inflation targets came after nominal short-term interest rates had been declining for about 9 months. Both short-term and long-term interest rates trended down during the targeting period shown. Nevertheless, application of the Fisher equation implies either that inflation expectations have exceeded the targets or that real long-term interest rates were generally 5 percent per annum or higher during the targeting period shown. As was the case with New Zealand, real interest rates may have been elevated by the government's fiscal condition -- by 1993, Canadian public sector debt had grown to more than 80 percent of annual output.

An additional piece of information on the credibility attached to the Canadian inflation-control program can be garnered from the difference in the yields on nominal and indexed bonds. This spread represents a "break-even" value for a (weighted) average inflation rate at which an investor would be indifferent, ex post, between holding either of the two securities to maturity. (Note, however, that this yield spread may reflect inflation risk, interest rate risk, and liquidity premiums, as well as the bond market's long-term inflation expectations.) Between the end of 1991 (when the Canadian indexed bond was issued) and mid-1994, this spread ranged from about 3-1/2 percent to 5 percent (for bonds maturing in 2021), suggesting that price stability may not have achieved full long-term credibility (assuming that the excess of this spread over the long-term inflation target is not entirely the

result of risk premiums).

However, Chart 4 implies that the inflation targets have attained some short-term credibility. The upper panel shows the consensus expectation for year-ahead inflation (specifically, the year-over-year change in the GDP deflator) of a group of professional forecasters.<sup>18</sup> In 1993, this expectation (applying to 1994) had fallen below 2 percent. Nevertheless, the group's collective forecast errors, shown in the lower panel were consistently negative between 1990 and 1993.

### *United Kingdom*

When the United Kingdom joined the exchange rate mechanism (ERM) of the European Monetary System in October 1990, British consumer-price inflation was nearly 10 percent, its highest level since the early 1980s. A recession, combined with the tight monetary stance associated with ERM membership, led to significant inflation reduction -- shown in the upper panel of Chart 5 -- eventually to a 12-month rate of less than 4 percent by autumn 1992. (The price measure shown, which is the British government's official measure of underlying inflation, excludes the distorting effect of mortgage interest payments.)

In September 1992, following a period of severe selling pressure on sterling and several other European currencies, the United Kingdom elected to suspend its membership in the ERM and allowed the pound to float. Shortly after the United Kingdom withdrew from the ERM, it became evident to authorities that a new nominal anchor was needed. Accordingly, Chancellor of the Exchequer Lamont announced in October 1992 a

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<sup>18</sup> These data are from a survey conducted by the Conference Board of Canada.

"medium-term" inflation target of 1-4 percent for underlying inflation (as defined above) and a "long-run" objective of 2 percent.<sup>19</sup> (Lamont did not define "medium-term" or "long-run"). Given that inflation was already below 4 percent and there was substantial slack in the economy (the unemployment rate was about 10 percent), the medium-term objective does not appear to have been an especially ambitious target. In contrast to the Canadian and New Zealand cases, the U.K. targeting regime clearly represents an easier monetary policy stance than what immediately preceded it (i.e., during ERM membership).

The Bank of England's scope for independent monetary policy action had always been limited, and it was not granted any significant increase in political autonomy upon announcement of the inflation targets.<sup>20</sup> Nor did the British government make any statutory commitment to fiscal restraint in conjunction with the inflation targets. However, in the hope of enhancing the credibility of the government's inflation-oriented policy, several steps were taken to inform the public more fully and generally increase the openness of monetary policy. Since April this year, the minutes of the monthly meetings between the Chancellor and Governor have been made available to the public. Another important related innovation is that the Bank has committed to publishing quarterly a detailed record of its performance in

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<sup>19</sup> Prior to departure from the ERM, both Prime Minister Major and Chancellor of the Exchequer Lamont occasionally made statements that implied that the government's implicit inflation target was zero. It appears, however, that pursuit of this goal was suspended.

<sup>20</sup> However, somewhat later, a minor change was introduced that allows the Bank to now set the timing of changes in official rates during the period between monthly meetings of the Chancellor of the Exchequer and the Governor of the Bank of England at which monetary policy is set. The U.K. Treasury retained decision-making power over the size of rate cuts, however.

controlling inflation, a discussion of its forecasting procedures, and its intended approach to meeting the inflation targets.

Inflation remained within the medium-term target range throughout the targeting period shown in Chart 5, despite substantial sterling depreciation. Short-term interest rates (in the lower panel) decreased throughout this interval, and long-term rates declined, on balance, by about as much as measured inflation. Nevertheless, the Fisher equation implies that, if agents used the long-term target as their expectation of inflation, real long-term rates ranged from 4 percent to 7 percent over this period, substantially more than their (ex post) historical average.

Survey results recorded in issues of the Bank of England's quarterly Inflation Report imply that the medium-term target enjoyed short-term credibility between late 1992 and early 1994, with a consensus of respondents typically reporting an inflation expectation below 4 percent. However, the Inflation Report's long-term (e.g., 20-year) estimates of inflation expectations derived from the term structures of nominal and indexed gilt yields over the same period were typically between 4 and 6 percent, substantially more than the long-term target of a 2 percent inflation rate.<sup>21</sup> (As in the Canadian case, this measure may reflect inflation risk, interest rate risk, and liquidity premiums, as well as the bond market's long-term inflation expectations. In addition, asymmetric tax treatment of nominal and indexed bonds in the U.K. is an additional complication that would tend to cause inflation expectations to be overstated.)

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<sup>21</sup> Deacon and Derry (1994) describe a method for undertaking such a computation.

## 5. Conclusions

To date, the targeted low-inflation programs of New Zealand, Canada, and the United Kingdom have been successful -- in the sense that inflation has been kept within the target zones. Furthermore, this was accomplished in each case without drastic increases in short-term interest rates. However, longer-term interest rates suggest that none of these countries rapidly achieved complete long-term credibility for their announced long-run inflation intentions. Nor is there any real evidence that announcement of these low-inflation policies (with specific targets) has significantly reduced inflation expectations. This is a somewhat surprising outcome for New Zealand, which took extraordinary steps to enhance its credibility, including fiscal restraint, increased central bank autonomy, and a contractual targeting arrangement. In both New Zealand and Canada, it is possible that the public has underestimated the sincerity of the low-inflation policy announcements and that, *ceteris paribus*, these misperceptions have hampered macroeconomic performance.

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Table 1

TARGETED INFLATION RATES  
(as of 1994)

	<u>Targeted Series</u>	<u>Target Period</u>	<u>Target Rate</u> 0/
<u>Countries with officially announced targets</u>			
Canada	CPI 1/	Through 1998	1 - 3
United Kingdom	RPI 2	Medium term	1 - 4
New Zealand	CPI 3/	Starting 1994	0 - 2
Sweden	CPI 4/	Starting 1995	1 - 3
Finland	CPI 5/	Starting 1995	2
<u>Countries with quantified inflation objectives</u>			
France	GDP deflator 6/	Medium term	2 max.
Germany	GDP deflator 6/	Medium term	2 max.
Italy	PCE deflator 7/	By 1996	2
Switzerland	GDP deflator 6/	Medium term	2

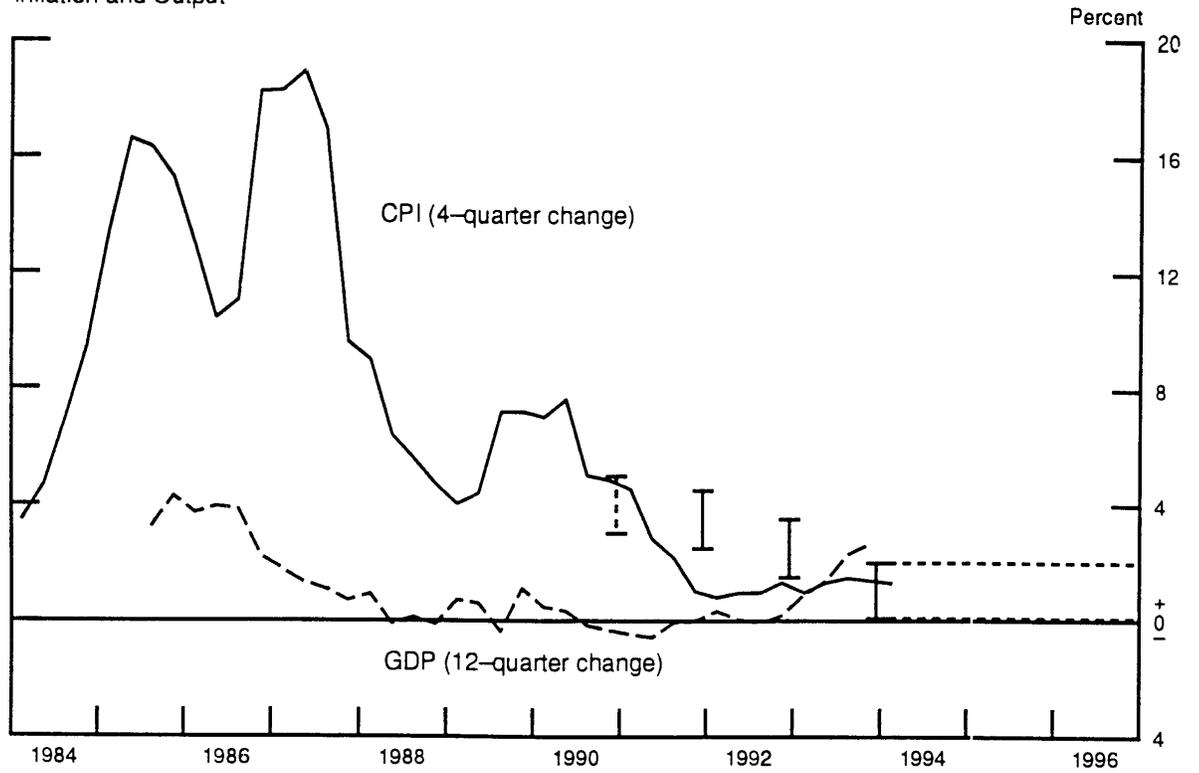
Notes:

- 0/ expressed in annual percent units
- 1/ Canada: all-items CPI is the official target, but a measure that excludes food, energy, and temporary effects of indirect taxes is used as an operational objective.
- 2/ United Kingdom: retail price index excluding mortgage interest payments. Longer-run goal is to achieve inflation in the lower half of the range by 1997.
- 3/ New Zealand: CPI excluding taxes.
- 4/ Sweden: CPI excluding indirect taxes, subsidies, and direct import price effects.
- 5/ Finland: CPI excluding indirect taxes, subsidies, and housing capital costs.
- 6/ France, Germany and Switzerland: because the objective is set in conjunction with assumptions for money growth, velocity, and real output, it refers implicitly to the GDP deflator.
- 7/ Italy: the inflation objective is in terms of the deflator for private consumption expenditure (NIA basis).

(information reported in this table is based in part on OECD sources)

Chart 1  
New Zealand

Inflation and Output



Interest Rates

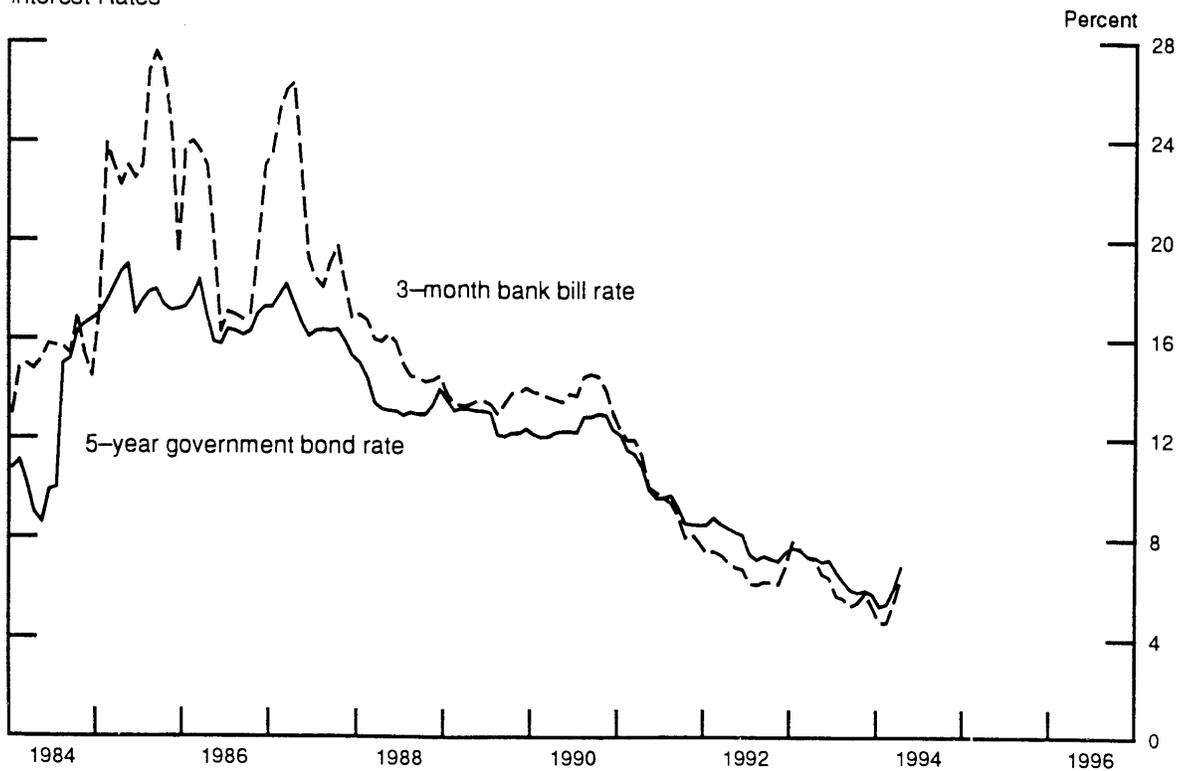
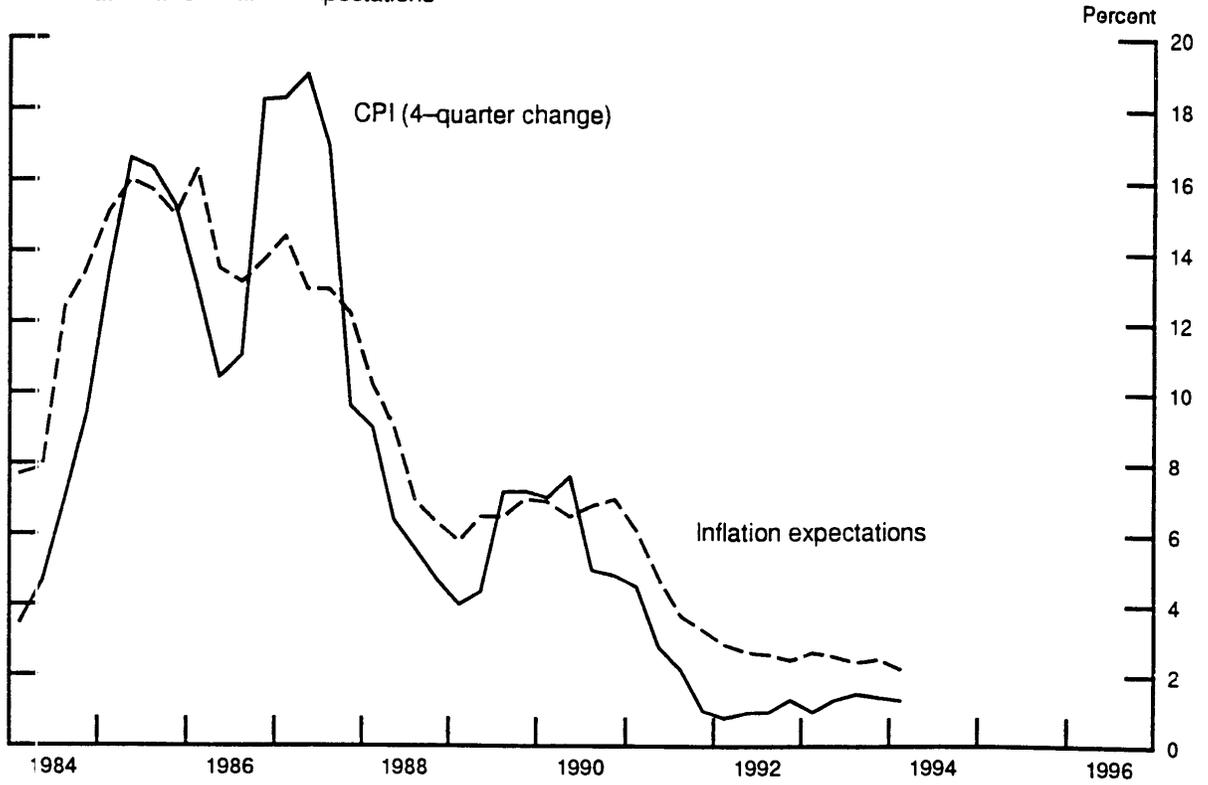


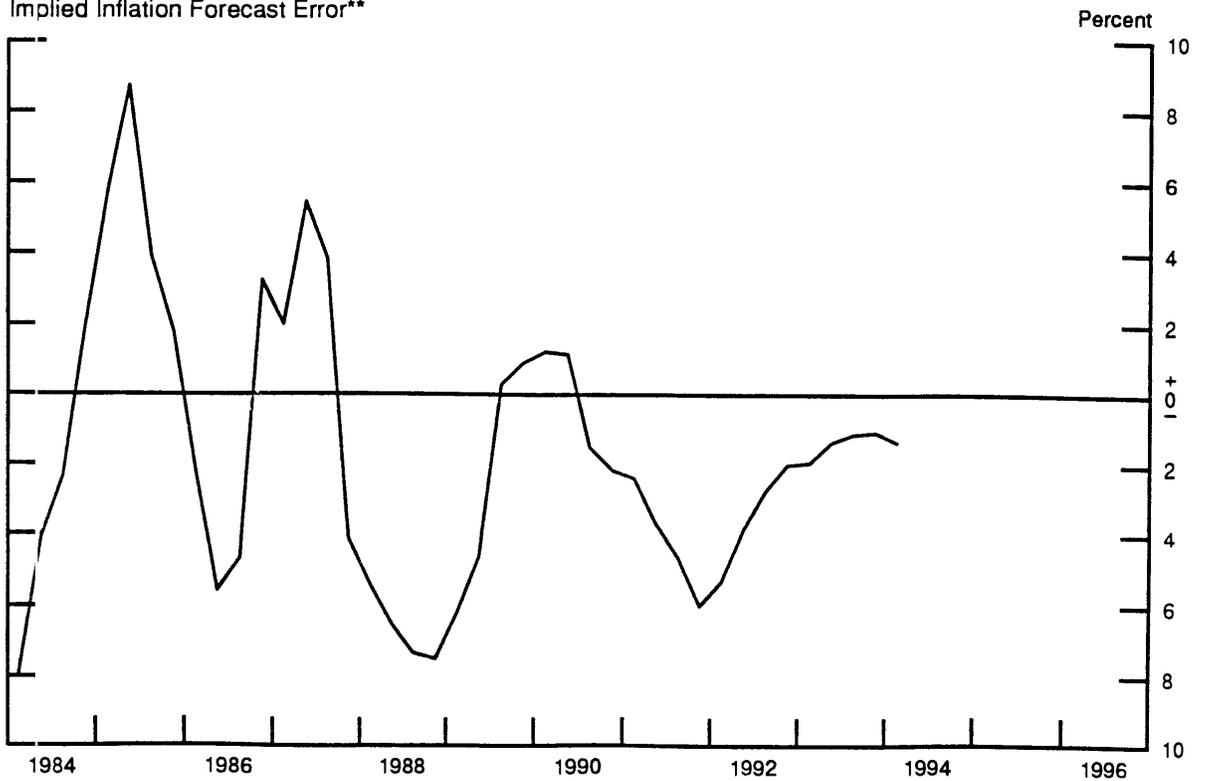
Chart 2  
New Zealand

CPI Inflation and Inflation Expectations\*



\*Expectations for CPI inflation over coming year, from business people.

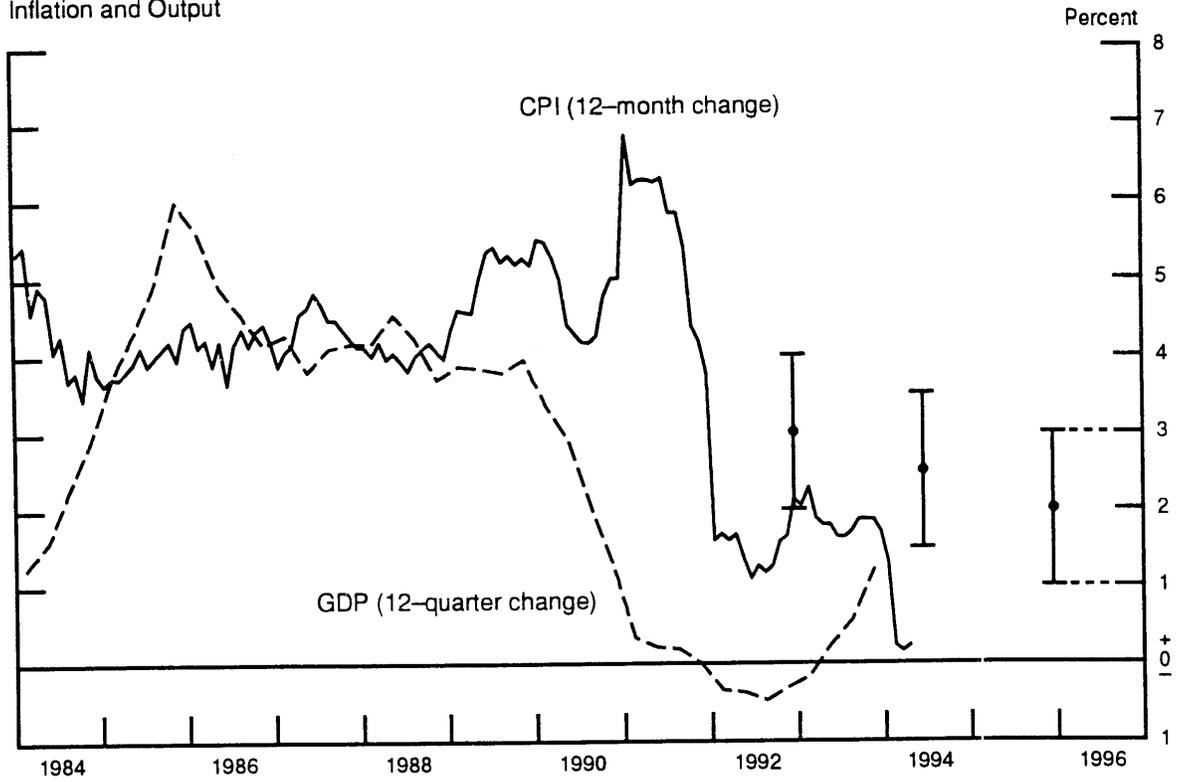
Implied Inflation Forecast Error\*\*



\*\*Inflation outcome less (lagged) expectations for that outcome.

Chart 3  
Canada

Inflation and Output



Interest Rates

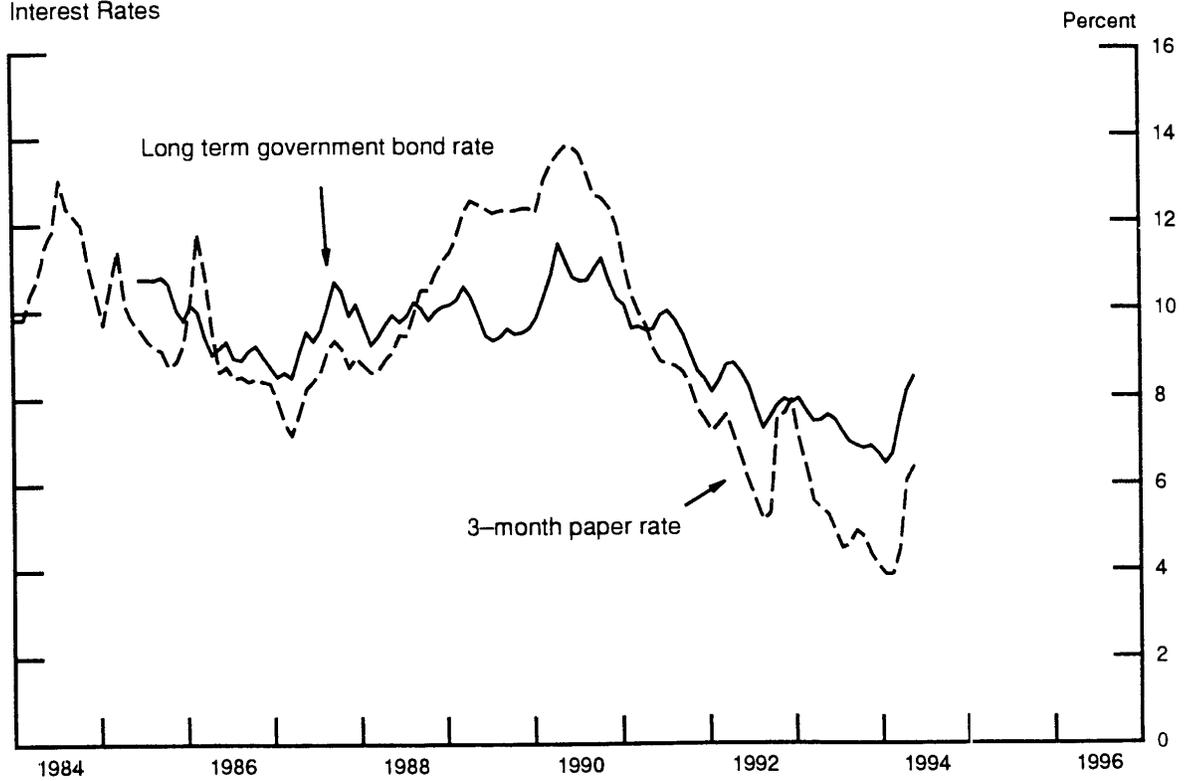
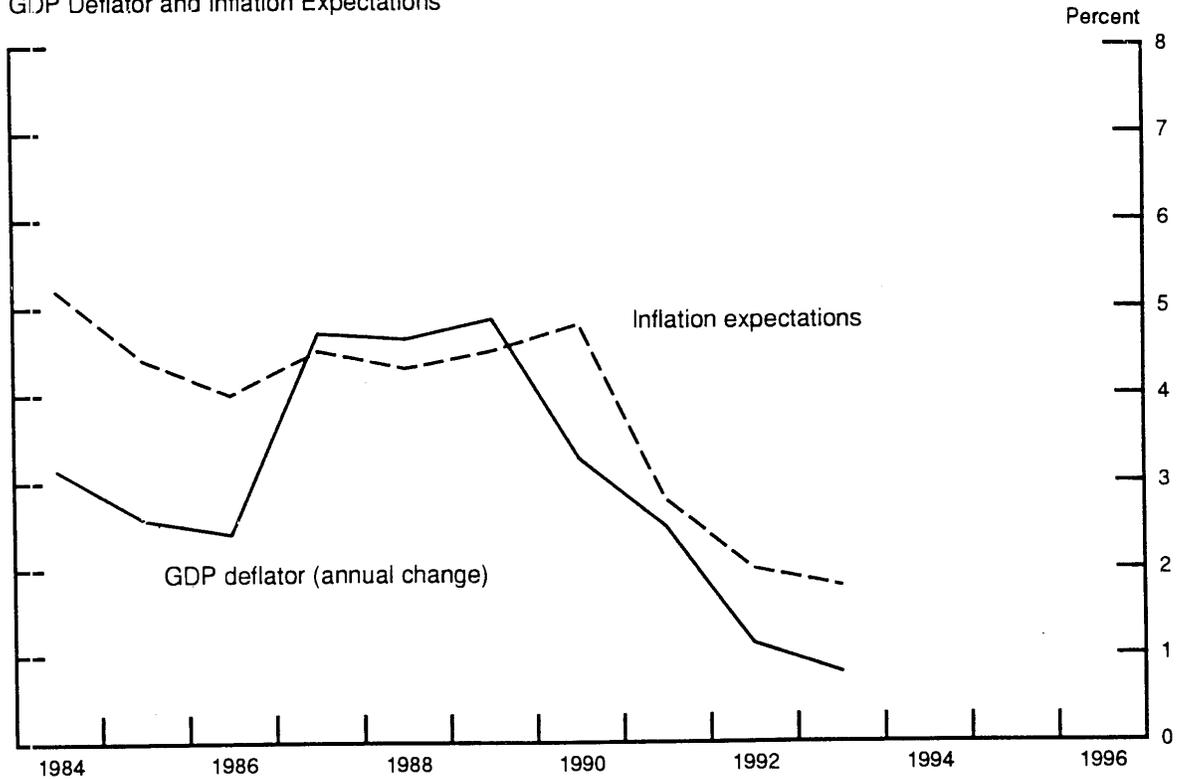


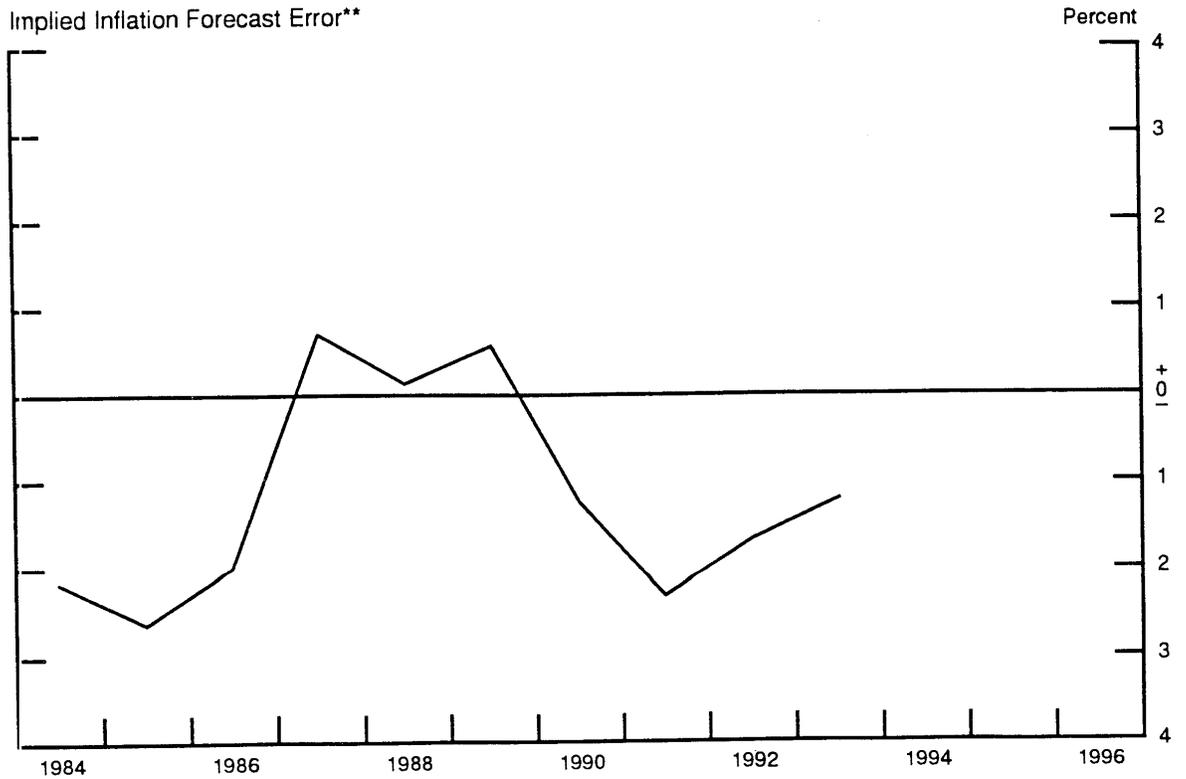
Chart 4  
Canada

GDP Deflator and Inflation Expectations\*



\*Professional forecasters' expectations for GDP deflator over coming year.

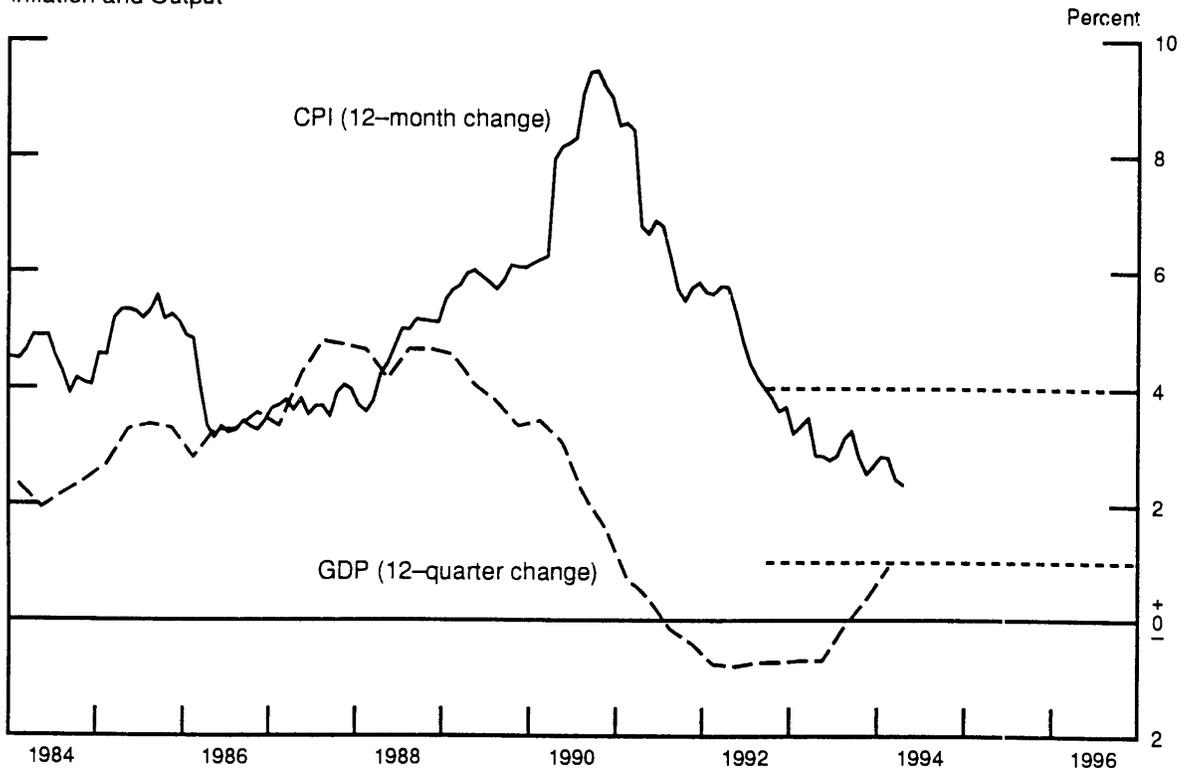
Implied Inflation Forecast Error\*\*



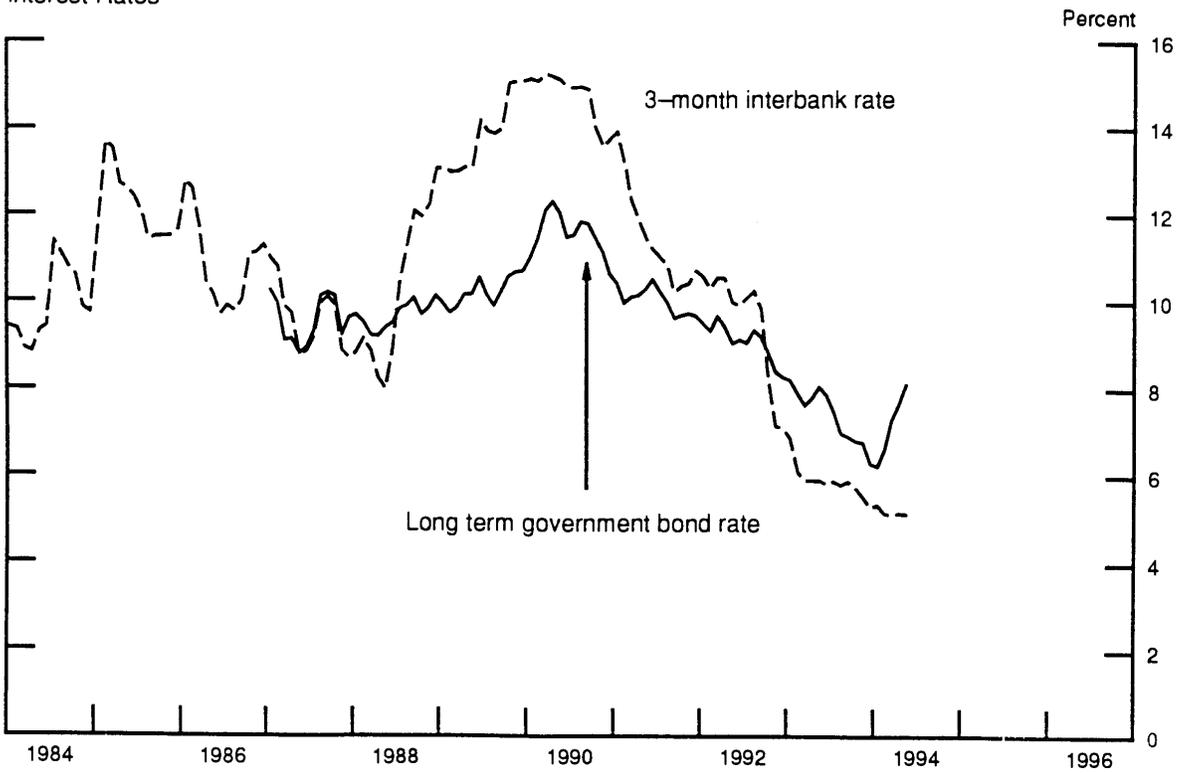
\*\*Inflation outcome less (lagged) expectations for that outcome.

Chart 5  
United Kingdom

Inflation and Output



Interest Rates



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