III. Inflation Targeting: Considerations in Reducing Inflation Further[1]

1. In February 1991, the Government and the Bank of Canada announced targets for inflation, aiming at reducing CPI inflation to a range of 1–3 percent by the end of 1995, and since then, monetary policy has been conducted to achieve this target. After inflation was brought within the target range earlier than expected, it was announced in December 1993 that the 1–3 percent target range would be extended through the end of 1998, at which time a decision would be made regarding the target range that would be consistent with price stability. In making a decision in a low-inflation environment to move toward price stability, the benefits from a further reduction in inflation have to be weighed against potential costs. This paper briefly reviews the possible benefits and costs that need to be considered.

2. There is a large literature that describes the growth and efficiency gains from moving to a low-inflation environment, but these gains largely appear to accrue as inflation is reduced from high to moderate rates, or from moderate to low rates. The benefits to be derived by moving closer to price stability from already low rates of inflation are difficult to gauge in view of the lack of sufficient recent experience with sustained very low inflation or long-term price stability. Recent empirical work provides evidence that a reduction in the rate of inflation does increase the rate of economic growth; however, the panel data used in these studies do not include sufficient examples of very low inflation to offer much assurance that the results apply when moving from low to lower inflation rates.[2]

3. Although the relationship between economic growth and moving to very low inflation may be weak, it may still be advantageous to reduce inflation to lower levels in order to capture benefits that would accrue from reducing inflation uncertainty and the variability in output and relative prices.[3] Moreover, moving to very low inflation would eliminate losses to the economy associated with tax distortions arising when the tax system is not indexed for inflation.[4] On the other hand, lower inflation may reduce tax revenue in the absence of full

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[1]Prepared by Michael Leidy and Stephen Tokarick.

[2]See, for example, Fischer (1993) and Barro (1996). Barro (1996) estimates that if inflation falls from 5 percent a year to zero, the growth rate will increase by between 0.1 and 0.15 percentage point a year. These relatively modest gains would likely be more than proportionately smaller if the economy were to move from 3 percent inflation to zero. In any case, Barro's estimated effects of reducing inflation from low rates to zero are not statistically significant.

[3]See Hess and Morris (1996).

[4]Feldstein (1996) acknowledges that the deadweight loss attributable to inflation in a non-indexed tax environment could, in principle, be eliminated by fully indexing the tax system or by shifting to a tax system based only on consumption or labor income. However, he notes

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indexation, requiring an increase in other taxes, which may offset some of the gains from lower inflation. Feldstein (1996) concludes that moving from a stable 2 percent inflation rate to price stability would result in a net gain for the economy and that the benefits of price stability could exceed the transition costs within six to nine years.[5] Central to Feldstein's analysis is an assumption that the nominal rigidities responsible for the employment/output costs associated with disinflation do not persist for an extended period.

4. The existence (and persistence) of downward nominal wage rigidities is a major factor to be considered in deciding to try to reduce inflation further. During periods of disinflation, there is a tendency for nominal wage increases to lag behind the decline in the inflation rate, thereby raising real wages and leading to a rise in unemployment. Once inflation expectations adjust to a new lower level in line with the decline in inflation, real wages should return to a level consistent with the natural rate of unemployment. This process is slowed down at low rates of inflation by the presumed reluctance of workers to accept actual declines in nominal wages.

5. In a recent paper, Akerlof, Dickens, and Perry (ADP, 1996) suggest that there could be a *permanent* trade-off between inflation and unemployment at low rates of inflation, based on the existence of some downward wage rigidity in the economy. Since there is little recent experience with low inflation, ADP use a model calibrated to U.S.-based stylized facts to run a large number of simulations to arrive at estimates of the implied long-run employment/inflation trade-off.[6] They estimate that the sustainable unemployment rate at a 3 percent

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that no industrial country "has fully (or even substantially) indexed its tax laws" and he argues that, beyond questions of political feasibility, full indexation of the tax system is fraught with technical "legal" and administrative problems. Thus, indexation might not be a workable alternative to achieving price stability.

[5]These results are based on the assumption that there is no indexation in the tax system. To the extent that partial indexation exists, the net benefit would be reduced and the period required to recover transition costs would be lengthened.

[6]In their model, ADP assume the existence of downward rigidities, but they provide for workers to adjust their wage demand behavior to reflect a new lower inflationary environment and the profit performance of individual firms. They assume, however, that firms are monopolistically competitive and that individual firms are subject to demand and supply shocks that affect them differently. It is principally the influence of these independent shocks to firms in the face of downward nominal wage rigidities that produces the possibility of a permanent trade-off between unemployment and inflation, as adjustments in real wages across individual firms is affected. In critiques of the ADP model, it has been pointed out that the magnitude of ADP's permanent trade-off between inflation and unemployment would be diminished con-
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inflation rate is 5.9 percent, and that it rises to 6.1 percent at a 2 percent inflation rate, to 6.5 percent at a 1 percent inflation rate, and to 7.6 percent at zero inflation (price stability). Hence, the ADP model implies that a small amount of yearly inflation provides considerable "grease" to the workings of the labor market, facilitating adjustments in relative real wages in the face of downward nominal wage rigidities.

6. A number of studies have attempted to establish the existence of nominal wage rigidities, but the results are not conclusive. Survey data from interviews with U.S. employers indicate that firms tend to cut wages only reluctantly and under extreme circumstances.[7] Wage settlement data from the U.S. Bureau of Labor Statistics demonstrate a clear asymmetry in the distribution of yearly wage changes, with the distribution being almost completely truncated below zero.[8] Similarly for Canada, Fortin (1996) found that in over 1,000 large non-COLA wage settlements over the period 1992–94, there were wage increases in 47 percent of the cases, wage freezes in 47 percent of the cases, and wage cuts in only 6 percent of the cases. Crawford and Harrison (1997) also found that for Canada nominal wage cuts are relatively infrequent even in years with low inflation. Wage rollbacks occurred in just 2.8 percent of private sector wage contracts over the period from 1992–96. The authors of these various studies concluded that the relative infrequency of observed wage cuts and the significant number of wage freezes point to the existence of effective nominal wage floors.

7. Other studies cast some doubts on the existence of strong downward nominal wage rigidities. Parkin (1997) notes that Fortin's evidence is strongly influenced by the presence of public sector wage settlements in the data; when only private-sector settlements are examined, the strength of the evidence supporting downward rigidities diminishes. Parkin also notes that conclusions regarding the degree of rigidity are dependent on how wage changes are classified. For example, he observes that Fortin classified multi-year wage settlements that contained a one-year freeze, but future increases, as a zero wage change. If such cases were treated as wage increases, the percentage of wage freezes falls to about 12 percent in Fortin's data, and the suggestion that the relative frequency of wage freezes indicates resistance to

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siderably if firms are allowed to enter and exit, allowing new firms not constrained by the previous history of nominal wage agreements to absorb labor shed by firms going out of business (see Howitt (1997)). The trade-off would also be reduced if firms and workers were treated as forward-looking wage bargainers, instead of just focusing on current profitability as in the ADP model (see Hogan (1996) and Lavoie (1997).

[7]See Bewley and Brainard (1993).

[8]See ADP (1996). These data indicate, however, that under conditions of "extreme duress," such as during deep recessions, there tended to be less resistance to downward wage adjustments.

wage cuts looks less convincing.[9] Moreover, conclusions about the extent of downward rigidity depend on whether consideration is limited to wage changes or to changes in total compensation. Using a data set that includes information on nonwage compensation (such as bonuses), Crawford and Harrison (1997) find for Canada that the wage-settlements data overstate downward rigidity. In adjusting to external shocks, firms may find it easier to reduce or modify nonwage compensation as a means of reducing total labor costs. In a study using panel data for U.S. firms, McLaughlin (1994) also finds evidence of a relatively high degree of downward flexibility in total labor compensation. In contrast to the results of McLaughlin, Kahn (1997) finds strong evidence for downward wage rigidity in the United States.

8. Overall, the empirical studies of the U.S. and Canadian labor markets suggest that there is some degree of downward nominal wage rigidity. A question arises as to what extent this might be a function of the inflationary environment of the late 1970s and 1980s. As noted by Laidler (1997), the evidence for downward nominal wage rigidity is drawn either from a period of moderate-to-high inflation or from a period when high inflation was still a recent memory. Laidler (1997) and Howitt (1997), among others, have argued that resistance to nominal wage cuts might diminish or disappear once expectations adjust to a low-inflation environment. This is an important consideration. If the economic benefits of moving from a low to a lower inflation rate (or price stability) may be more than proportionally less than those resulting from a move from moderate to low inflation, then the net gain from reducing inflation further is likely to depend critically on how long it might take for nominal rigidities to become less prevalent or even disappear. In Canada, the rate of inflation has been reduced sharply over the last five years with little evidence that nominal wages have become noticeably more flexible downward..

9. Moving from low to lower inflation also has implications for the effectiveness of monetary policy. Conducting policy in a very low-inflation environment implies that it becomes more difficult for the central bank to engineer significantly negative real interest rates in order to stimulate aggregate demand during periods of less than full employment.[10] Summers (1991) observes that real interest rates in the United States have been negative in about a third of the years since World War II, and that the real after-tax rate of interest has been negative in about three-quarters of the years during this period. In Canada, real short-term interest rates have remained positive in the past decade even during periods of slow and negative economic growth, especially since 1992 as the inflation rate has declined sharply. Fortin (1996) argues that these high real interest rates, induced by monetary contraction in

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[9]Hogan (1996), pp.8–9.

[10]See Summers (1991) and Fischer (1996). It should be noted, however, that the prevalence of negative real interest rates in Summers' data should not be taken necessarily as evidence of the relevance of his observation. The effect on aggregate demand of an expansionary monetary policy depends on whether there are induced changes in *expected* real rates, and such interest rates are more difficult to measure.

pursuit of essentially a zero inflation target, caused the Canadian economy to perform poorly in the early 1990s.[11]

10. While the ability of monetary policy to generate negative real interest rates may be applicable to a large economy (like the United States), the scope for a small, open economy with open capital markets (like Canada) to engage in similar monetary policy actions would be substantially more limited. If the uncovered interest parity condition tends to hold,[12] and if expectations of changes in bilateral exchange rates are largely determined by relative purchasing-power parity (PPP),[13] real interest rates in Canada will tend to equal (in an *ex ante* sense) those in the United States. Moreover, in a Mundell-Flemming model of a small, open economy with flexible exchange rates and a high degree of capital mobility,[14] monetary policy influences aggregate demand principally through its effect on the exchange rate (and expectations regarding the change in exchange rates). In such circumstances, an inability to produce negative real interest rates need not undermine the effectiveness of expansionary monetary policy, as policy can still induce a real exchange rate depreciation (at least in the short term).

11. Another factor to consider in moving to a lower-inflation environment is that the real cost of servicing outstanding government debt will tend to increase. As a consequence, a windfall transfer of wealth to public creditors (holders of government bonds) occurs because they will be repaid in money that has greater purchasing power than was anticipated at the time the debt was incurred. This shift in wealth from debtors (government) to creditors (the public) in a disinflationary environment is something that will have implications for the fiscal outlook.[15]

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[11]In Fortin's opinion, Canada's average inflation rate since 1991 of around 1½ percent effectively translates into zero inflation, given a potential upward bias in the change in the consumer price index of as much as 2 percentage points. The Bank of Canada estimates the upward bias in the CPI measure of inflation to be only about ½ percentage point.

[12]The *uncovered interest-parity condition* says that if capital is perfectly mobile between any two countries and economic agents are risk neutral, a nominal interest rate at home must equal the equivalent nominal interest rate abroad plus the expected rate of appreciation of the foreign currency. This is an *ex ante* relationship.

[13]*Relative PPP* says that changes in nominal bilateral exchange rates will tend to reflect inflation differentials. There is little, if any, empirical evidence that exchange rates are determined by relative PPP in the short to medium run.

[14]Empirical evidence suggests that capital is relatively immobile internationally.

[15]This shift in wealth would be a zero-sum transfer from the perspective of the economy as a whole if all debt were held domestically, however, a substantial amount of Canadian-dollar

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12. While the essential factors to be considered in reaching a judgement on adopting a lower inflation target (or moving to price stability) have been reviewed here, it is not possible from the available economic literature to draw firm conclusions on the desirability of such a policy choice. Both empirical evidence and theoretical considerations indicate that substantial benefits will accrue when moving from high or moderate to low levels of inflation. It is difficult, however, to find statistically significant evidence of a positive growth effect when inflation is reduced from low to lower rates, although this may in part reflect the lack of experience with very low rates of inflation. Nevertheless, reducing the rate of inflation further to a very low level would help to mitigate distortions caused by the lack of full indexation in the tax system. It may also help to reduce relative price uncertainty, thereby further improving resource allocation. How these benefits might stack up against the potential costs of further inflation reduction appear to depend principally on the extent and duration of nominal rigidities in the economy. Output and employment losses stemming from further disinflation could fall some-where along a spectrum from being permanent (as argued by Akerlof, Dickens, and Perry) to being short-lived, vanishing once economic agents become assimilated to a new lower inflation environment. If the output and employment losses are relatively long-lived, the present value of the costs arising from the move from a low to a lower inflation rate could exceed the present value of the benefits that would accrue from further inflation reduction. From a political economy perspective, the time that it might take the benefits to offset the initial losses from a policy of further disinflation may also be a determining factor in deciding on such a policy action; the longer the expected "payback period", the less likely the decision would be made to further disinflate.

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denominated fixed income debt is held by foreigners.

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