Monetary Targets and Inflation: The Canadian Experience

By Gordon H. Sellon, Jr.

In response to the worldwide inflation problem of the 1970s, central banks in a number of countries have altered their techniques for conducting monetary policy. The common theme of these new approaches has been an increased emphasis on monetary control through the use of formal targets for monetary growth and the adoption of procedures designed to make monetary control more efficient. Thus, in the United States, the Federal Reserve began publishing monetary targets in the mid-1970s and made changes in its operating procedures in an attempt to improve monetary control. Behind these changes was a belief that a systematic reduction in money growth was necessary to moderate inflation and inflationary expectations.

While much has been written on the Federal Reserve and its monetary control procedures, less attention has been paid to the experience of other countries. The purpose of this article is to provide additional perspective to discussions of inflation and monetary control by examining the Canadian experience. The Bank of Canada began publishing monetary targets in 1975. Since that time, it has had considerable success in achieving these targets using an interest rate operating procedure and has been able to systematically lower the trend rate of monetary growth. At the same time, however, lower money growth has not been translated into a lower trend rate of inflation.

The Canadian experience raises two interesting questions. First, what factors might account for Canada's success in monetary control? To what extent, for example, is this achievement due to monetary control procedures and to what extent is it a result of behavioral and institutional factors influencing the demand for money? Second, what explains the apparent insensitivity of inflation to lower monetary growth? Does the Canadian experience strengthen or weaken the case for a direct relationship between monetary control and inflation?

The initial sections of this article provide background information on the recent performance of the Canadian economy, the definitions of the Canadian monetary aggregates, and the principal policy instruments used by the Bank of Canada. This information is followed by an examination of the Bank of Canada's monetary policy targets. The concluding sections of the article discuss possible reasons for

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the success of monetary control procedures in Canada and the relationship between monetary control and inflation.

AN OVERVIEW OF THE CANADIAN ECONOMY

Before beginning a detailed discussion of monetary policy in Canada, it is useful to provide a brief description of the performance of the Canadian economy in recent years. The record of the Canadian economy from 1970 to 1981 as measured by key economic indicators is shown in Table 1. From the somewhat uneven year-to-year patterns, several important trends emerge. As did the United States and other countries during this time period, Canada experienced a marked slowdown in real growth. Associated with this slower growth in real output is a rise in the unemployment rate from 5.7 percent in 1970 to 7.6 percent in 1981. At the same time, the rise in the inflation rate that occurred at the time of the oil and agricultural price increases in 1973-74 and 1979-80 has not been permanently offset despite an anti-inflationary monetary policy and the use of direct controls on wages, prices, and incomes from 1975 to 1978.

In Canada, as in the United States, higher inflation rates have been accompanied by higher nominal interest rates. The record levels of nominal interest rates reached in 1980 and 1981 have had detrimental effects on specific sectors of the economy such as the housing industry. Furthermore, with a high underlying rate of inflation, high U.S. interest rates, and capital outflows in the energy sector, even record interest rates have not been sufficient to avoid a decline in the value of the Canadian dollar.

The budgetary situation in Canada has paralleled that of other countries—from a mixed pattern of small deficits and surpluses in the early 1970s, deficits have risen dramatically

Table 1
CANADIAN ECONOMIC INDICATORS

Year	Real GNP Growth Rate	GNP Price Deflator	Unemployment Rate	Long-Term Canada Bonds	U.S. $ in Canadian $	Federal Budget Surplus or Deficit (In millions of dollars)
1970	2.5	4.7	5.7	7.97	1.0440	266
1971	6.9	3.1	6.2	6.95	1.0098	−145
1972	6.1	5.0	6.2	7.23	0.9905	−556
1973	7.5	9.1	5.5	7.55	1.0001	387
1974	3.6	15.3	5.3	8.87	0.9780	1,109
1975	1.2	10.8	6.9	9.00	1.0173	−3,805
1976	5.5	9.5	7.1	9.22	0.9861	−3,391
1977	2.1	7.1	8.1	8.69	1.0635	−7,303
1978	3.7	6.3	8.4	9.24	1.1402	−10,654
1979	3.0	10.4	7.5	10.17	1.1715	−9,213
1980	0.0	10.6	7.5	12.33	1.1690	−10,697
1981	3.0	10.0	7.6	15.03	1.1990	−7,500

SOURCE: *Bank of Canada Review.*

Table 2
CANADIAN M1 TARGETS AND OUTCOMES

Period	Target (In percent)	Actual Money Growth (In percent)
1975:Q2 to March* 1976	10-15	11.0
March* 1976 to 1977:Q2	8-12	7.8
June 1977 to June 1978	7-11	9.2
June 1978 to 1979:Q2	6-10	8.0
1979:Q2 to Sept. 1980	5-9	6.2
Sept.† 1980 to Dec. 1981‡	4-8	1.3

*Three-month average centered on March.
†Three-month average centered on September.
‡Most recent month.
SOURCE: *Bank of Canada Review.*

Table 3
GROWTH RATES OF THE CANADIAN MONETARY AGGREGATES

Year	M1	M1B	M2	M3
1971	12.7	9.2	12.3	10.3
1972	14.2	12.6	10.5	14.0
1973	14.6	11.9	14.2	14.9
1974	9.4	5.7	20.1	24.8
1975	13.8	9.6	15.0	14.8
1976	8.0	6.2	12.6	18.4
1977	8.4	7.2	14.0	15.8
1978	10.2	8.8	10.7	13.7
1979	7.0	4.8	15.8	19.3
1980	6.4	4.4	18.1	14.4
1981	3.3	2.8	14.3	12.1

SOURCE: *Bank of Canada Review.*

since 1975. To the extent that these deficits represent an expansion in government activity or a reduction in taxes rather than a response to slower economic growth, they may contribute to the behavior of prices and interest rates.

In response to the higher inflation rate in the mid-1970s, the Bank of Canada implemented a monetary policy program designed to achieve a gradual reduction in monetary growth and a lower rate of inflation.[1] The centerpiece of this program is a series of long-run target ranges for a monetary aggregate, M1, which consists of currency and demand deposits. These ranges and the associated outcomes for monetary growth are shown in Table 2. Clearly, the Bank of Canada has had considerable success in meeting its monetary growth objectives. At the same time, as shown in Table 1, little progress has apparently been made in controlling inflation.

THE CANADIAN MONETARY AGGREGATES

Generally speaking, individuals and institutions in Canada can hold a range of deposits including demand deposits, checkable and noncheckable savings deposits, and various term deposits and certificates. The Bank of Canada defines four monetary aggregates based on these types of deposits. The narrow aggregates, M1 and M1B, emphasize a transactions definition of money, while the broader aggregates, M2 and M3, incorporate time or notice deposits as well. Table 3 shows the pattern of growth of the four aggregates from 1971 to 1981.[2]

The structure of the Canadian aggregates has important similarities to and differences from the definitions used in the United States. A detailed comparison is contained in Table 4.

[1] Bank of Canada, *Annual Report of the Governor to the Minister of Finance,* 1975-81. See also G. E. Freeman, "Recent Developments in Canadian Monetary Policy," *Kredit Und Kapital,* February 1978, pp. 145-58.

[2] The growth rates for M1 in Tables 2 and 3 are calculated on a different basis. In Table 2, the growth rates are calculated for the period in which the relevant target ranges are in effect. These periods are irregular in length and do not correspond to a calendar year. In Table 3, the growth rates are calculated for a calendar year.

Table 4
DEFINITIONS OF THE MONETARY AGGREGATES

	Canada		United States
M1	= currency plus Canadian dollar demand deposits at chartered banks.	M1	= currency, nonbank travelers' checks, demand deposits at commercial banks plus other checkable deposits at depository institutions.
M1B	= M1 plus Canadian dollar personal and nonpersonal checkable notice deposits at chartered banks.	M2	= M1 plus overnight repurchase agreements and Eurodollars, general purpose and broker/dealer money market mutual fund balances, plus savings and small time deposits at depository institutions.
M2	= M1B plus Canadian dollar personal noncheckable and fixed term deposits, and nonpersonal noncheckable notice deposits at chartered banks.	M3	= M2 plus large time deposits at depository institutions, term repurchase agreements, and institution-only money market mutual fund balances.
M3	= M2 plus Canadian dollar nonpersonal fixed-term deposits and bearer-term notes at chartered banks plus all foreign currency deposits of Canadian residents booked at chartered bank branches in Canada.	L	= M3 plus other liquid assets.

The Canadian M1 definition which includes currency and demand deposits corresponds closely to the old M1-A definition used in the United States; and the Canadian M1B definition which incorporates currency, demand deposits, and other checkable deposits is similar to the M1 definition presently used in the United States. In contrast, there is less correspondence between the broader definitions of money in the two countries.[3]

One important factor which differentiates the monetary aggregates in Canada from those in the United States is the scope of institutional coverage. Primarily because of data availability the Canadian aggregates include deposits only at chartered banks (commercial banks), despite the fact that thrift and other types of financial institutions issue both transactions and notice accounts. In the United States the aggregates include transactions, time, and savings deposits at all depository institutions as well as nondeposit items such as money market mutual fund shares and repurchase agreements.

The Canadian institutional environment is also distinguished by the absence of legal interest rate ceilings on deposits. Demand deposits have traditionally paid a zero explicit interest rate as a result of chartered bank decisions rather than legal restrictions.[4] Similarly, checkable savings accounts pay a fixed rate of

[3] For a more detailed discussion of the Canadian aggregates, see G. F. Boreham, *Money and Banking: Analysis and Policy in a Canadian Context*, 2nd ed., Canada: Holt, Rinehart, and Winston, Inc., 1979, especially pp. 31-38 and pp. 113-23.

[4] The Canadian banking system is characterized by branch banking and by a relatively small number of banks. Prior to the 1980 Bank Act, there were 11 chartered banks with 5 large banks operating nationwide. Under the 1980 Bank Act, a number of foreign banks have received charters.

Corporate demand deposits (current accounts) have generally paid an implicit and negotiable interest rate in the form of the level of activity fees and compensating balance requirements.

interest (3 percent presently), although chartered banks are free to adjust this rate.[5] In contrast, noncheckable savings accounts and other term and notice accounts pay market-related interest rates.

The absence of interest rate ceilings in Canada has important implications for the nature and importance of financial innovation and hence for the reliability of the monetary aggregates. First, because chartered banks and other financial institutions pay similar rates for similar types of deposits, there is less substitution between deposits in chartered banks and deposits in other institutions as a result of interest rate differentials. Second, because financial institutions may pay market interest rates on savings deposits, there is less incentive for deposit disintermediation. The net result of these factors is a reduction in the abrupt and unpredictable type of interest-induced deposit substitution that has made the definition and control of the monetary aggregates so difficult in the United States.[6]

POLICY INSTRUMENTS OF THE BANK OF CANADA

In a broad sense, the policy instruments used by the Bank of Canada are similar to those used by the Federal Reserve. The three principal instruments are cash reserve management, reserve requirements, and discount policy.[7]

Cash Reserve Management

In Canada, chartered banks are required by law to maintain cash reserves as a percentage of their deposit liabilities in the form of vault cash or deposits at the Bank of Canada. Generally speaking, the Bank of Canada can influence the growth of money and credit by controlling the amount of cash reserves through open market operations and other means.[8] By increasing the amount of cash reserves it can bring about faster money growth and lower interest rates. Alternatively, the Bank can lower money growth and raise interest rates by reducing reserve availability.

Reserve Requirements

The second element in the Bank of Canada's monetary control mechanism is the structure of reserve requirements.[9] Chartered banks are required to hold cash reserves behind Canadian dollar demand deposits, Canadian dollar notice deposits, and certain reservable foreign currency deposits. Reserve requirements are higher

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5 Banks view checkable deposits as involving high service and maintenance costs and price these deposits accordingly.

6 Financial innovation has occurred to a limited degree in Canada in response to inflation and high interest rates. The most significant type of innovation has been the adoption of more sophisticated cash management techniques by corporations. This process reached significant proportions in 1976-77 as corporations attempted to minimize the amount of funds held in noninterest-bearing demand deposits by shifting into special savings accounts and short-term certificates. These shifts tended to reduce the demands for the narrow aggregates. A second type of innovation which began in 1979 was the payment of daily interest on savings accounts. To the extent that funds were attracted to these accounts from demand deposits, the demand for M1 would be reduced. For a more detailed discussion of recent financial innovation, see L. Landy, "Financial Innovation in Canada," *Quarterly Review,* Federal Reserve Bank of New York, Autumn 1980, pp. 1-11.

7 For a more detailed discussion of the policy instruments used by the Bank of Canada, see Boreham, pp. 260-332.

8 In addition to open market operations, the principal methods of reserve management employed by the Bank of Canada are changes in balances of government accounts at the Bank of Canada and swap transactions with the Exchange Fund Account. For a discussion of these methods, see Bank of Canada, "Cash Reserve Management," *Bank of Canada Review,* June 1975, pp. 3-12.

9 For the purposes of this article, only cash reserve requirements are relevant. The Bank of Canada can establish secondary reserve requirements on banks' holdings of secondary reserves consisting of Treasury bills, day-to-day loans to investment dealers, plus excess cash reserves. This ratio is 4 percent as of December 1981.

on demand deposits than on notice deposits and foreign currency deposits.[10] The structure of reserve requirements is mandated by the current Bank Act.[11] Thus, while cash reserve requirements serve as a fulcrum for monetary control, they cannot be varied in a discretionary manner.

An important feature of the Canadian system of reserve requirements is the use of lagged reserve accounting. Under this procedure, cash reserve requirements are based on an average of deposits from the previous month.[12] As a result, under lagged reserve accounting, required reserves and interest rates do not respond immediately to changes in the amount of deposits in the banking system. In the very short run, a lagged reserve accounting system makes monetary control more difficult.[13]

10 It should be noted that the differential structure of reserve requirements makes it difficult to control a broad aggregate such as M2 which includes both demand and notice deposits. The reason is that shifts between demand and notice deposits will result in a change in the amount of required reserves behind a broad aggregate such as M2, weakening the linkage between reserves and money.

11 Following the 1980 revision of the Bank Act, as of February 1981, the required reserve ratios are 12 percent for reservable Canadian dollar demand deposits, 2 percent for reservable Canadian dollar notice deposits plus 2 percent for the amount by which reservable notice deposits exceed $500 million, and 3 percent for reservable foreign currency deposits. Beginning March 1981, these ratios are to be phased down over a four-year period until demand deposits have a 10 percent reserve requirement and a 1 percent ratio is applied to notice deposits exceeding $500 million per institution.

12 Required cash reserves are computed on the basis of deposits averaged over four consecutive Wednesdays ending with the second Wednesday of the previous month. For Schedule A banks, the 11 domestic chartered banks, two reserve maintenance periods occur each month. The first includes business days up to and including the 15th day of the month, and the second period includes the remainder of the month. For Schedule B banks, principally the newly chartered foreign banks, reserves have to be maintained only on a monthly basis.

13 For a discussion of the relationship between lagged reserve accounting and monetary control in the United States, see D. S. Jones, "Contemporaneous Versus Lagged Reserve Accounting: Implications for Monetary Control," *Economic Review,* Federal Reserve Bank of Kansas City, November 1981, pp. 3-19.

Discount Policy

The third policy instrument available to the Bank of Canada is the regulation of the quantity and price of reserves borrowed from the Bank. Borrowing as a function of interest rate differentials is severely limited by administrative rules. In general, banks are discouraged from borrowing except to adjust their reserve position at the end of a reserve maintenance period as a result of an unexpected loss of reserves.[14]

The Bank of Canada generally reinforces administrative pressures on borrowing by its setting of the Bank Rate. While the Bank Rate is an administered rate, the Bank of Canada has at times tied it to market rates. Since March 1980, for example, the Bank Rate has been set at 1/4 percent above the weekly tender rate on 91-day Treasury bills. As shown in the following section, the limited scope for discount borrowing in conjunction with lagged reserve accounting has important implications for the Bank of Canada's monetary control procedures.

THE CHOICE OF MONETARY POLICY TARGETS

The Bank of Canada conducts monetary policy with the ultimate purpose of achieving desired values for long-run goals such as prices and real output. Because it is difficult to focus directly on these variables, the Bank uses a set of short-run targets that are designed to con-

14 Banks can borrow once each reserve period at the current Bank Rate. Additional borrowing may occur, but at rates that may be higher than the current Bank Rate. See Boreham, pp. 308-10.

In addition to chartered bank borrowing from the Bank of Canada, temporary provision of reserves can also occur through Purchase and Resale Agreements between the Bank of Canada and money market dealers.

nect its policy instruments to these goal variables. During the first stage of this procedure the Bank selects an intermediate target which is closely linked to output and prices but which is not controlled precisely over a short period of time. At the second stage, the Bank chooses an operating target which is related to the intermediate target and over which policymakers can exercise close control.[15]

Since 1975, the Bank of Canada has used a monetary aggregate, M1, as an intermediate target and a representative short-term interest rate (typically the 90-day commercial paper rate) as an operating target. In broad outline, this set of targets parallels that used by the Federal Reserve from 1970 to 1979.[16] The key element in the success of these procedures is the existence of a well-defined money demand function relating money, interest rates, and income. Through this function, desired growth in income is translated into targets for the monetary aggregate. Then, policymakers use their management of reserves to establish interest rates that will keep money growth within its targeted range. Thus, by controlling money through interest rates it is hoped that the desired income growth will be achieved.

Rationale for an M1 Intermediate Target

The choice of short-run targets depends to a great extent on the relative weights that policymakers attach to goal variables such as inflation and real output as well as on the types of disturbances causing the goal variables to deviate from their desired values.[17] The Bank of Canada's choice of a monetary aggregate intermediate target was motivated by the high rates of inflation in 1974 and 1975 and reflected a decision to attempt to reduce inflation by lowering the trend rate of monetary growth.

In selecting M1 rather than a broader aggregate as an intermediate target, the Bank of Canada emphasized both the relationship of the aggregate to the goal variables and the Bank's ability to control the aggregate. Empirical studies of money demand in Canada have generally found that the demand for M1 is more stable than the demand for a broader aggregate such as M2.[18] One explanation for this finding is that in Canada the broader aggregates are particularly affected by changes in the chartered banks' share of intermediated funds. As a result, the growth rate of the broader aggregates over a short period of time may be more indicative of the relative share of credit being extended through chartered banks than of underlying trends in economic activity.[19]

The Bank of Canada has also argued that M1 is easier to control than the broader aggregates because M1 has a relatively large interest elasticity. An increase in market rates, for example, tends to bring about a relatively large movement from demand deposits to other interest-bearing deposits. In contrast, the broader aggregates which include both interest-

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15 Discussion of a general form of this two-stage procedure can be found in B. Friedman, "Targets, Instruments, and Indicators of Monetary Policy," *Journal of Monetary Economics,* October 1975, pp. 443-73; and G. Sellon and R. Teigen, "The Choice of Short-Run Targets for Monetary Policy: Part I," *Economic Review,* Federal Reserve Bank of Kansas City, April 1981, pp. 3-16.

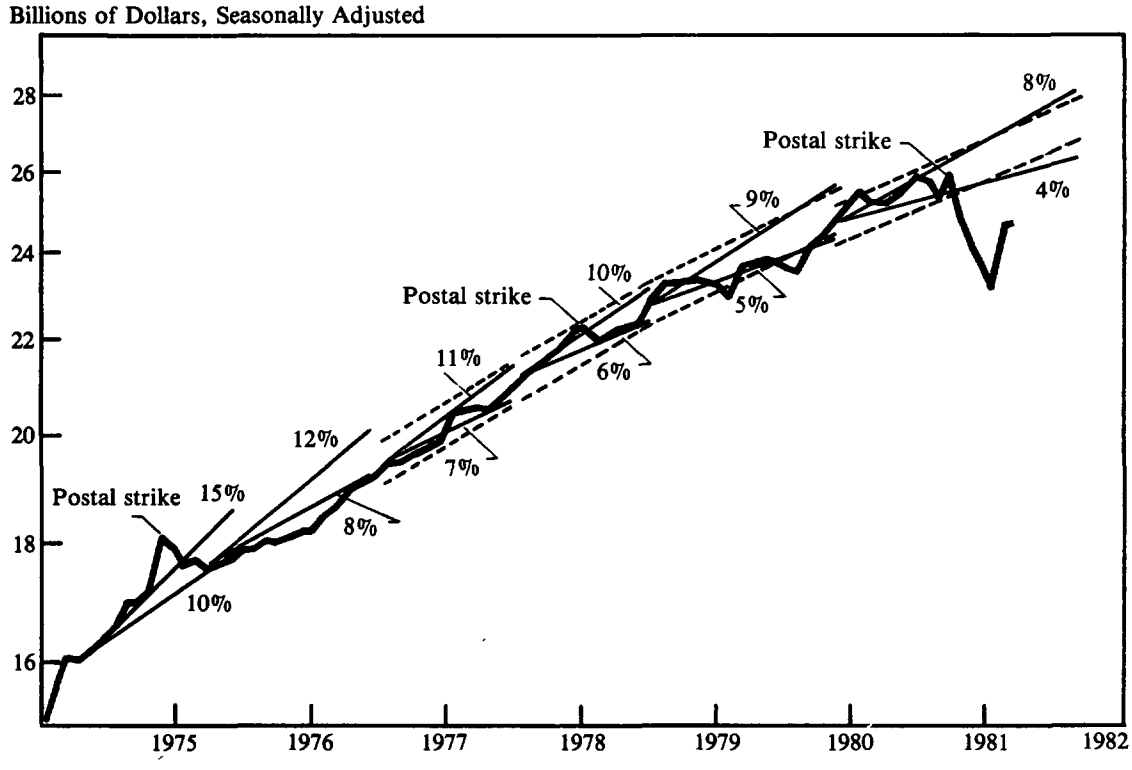
16 See, for example, G. Sellon and R. Teigen, "The Choice of Short-Run Targets for Monetary Policy: Part II," *Economic Review,* Federal Reserve Bank of Kansas City, May 1981, pp. 3-12.

17 For a discussion, see Sellon and Teigen, Part II.

18 See N. Cameron, "The Stability of Canadian Demand for Money Functions," *The Canadian Journal of Economics,* May 1979, pp. 258-81.

19 This is not to say that a broad aggregate cannot be defined in such a way that it has a stable demand function. Because M2 and M3 include only chartered bank deposits, however, they may be particularly affected by changes in the composition of financial intermediation.

Chart 1
MONEY SUPPLY AND TARGET GROWTH RANGES
(M1 Currency and Demand Deposits)



SOURCE: Bank of Canada, *Annual Report of the Governor to the Minister of Finance.*

bearing and noninterest-bearing deposits have a much lower interest elasticity. As a result, larger movements in interest rates are necessary to control the broader aggregates.[20]

20 For a discussion of this point, see W. R. White, "Alternative Monetary Targets and Control Instruments in Canada: Criteria for Choice," *The Canadian Journal of Economics,* November 1979, pp. 590-604, especially pp. 597-601.

The Implementation of M1 Targets

The Bank of Canada's M1 targets are long term in nature. The Bank is less concerned with weekly or monthly changes in money growth than with the trend rate of growth over a period of a year or longer. Chart 1 illustrates the evolution of M1 targets from 1975 to 1981. This chart can be used to highlight several features of the Canadian targeting system.

Since 1977, M1 targets have been defined in terms of a 2 percent band above and below the desired rate of monetary growth. For example, Chart 1 illustrates the band for the targeting period starting in September 1980. The desired rate of M1 growth during this period is 6 percent. Thus, the M1 target range is a band of uniform (4 percent) width around a 6 percent trend line.

Prior to 1977, the Bank of Canada specified targets in terms of a fan rather than a band. The main characterisitic of that approach is the use of a target range that is not of uniform width throughout the period—that is, the upper and lower limits of the target range start from the same level of M1. As shown in Chart 1, in the 1975 and 1976 targeting periods, the target range is very narrow at the beginning of the period and very wide at the end of the period.

The problem with the fan approach is that policymakers may overemphasize short-run variations in money growth at the start of the targeting period because of the narrow width of the target range. Thus, to avoid making policy artificially tight or easy at the beginning of a target period, the Bank of Canada switched to the band approach.[21]

Under the Canadian system, targets are announced retroactively and the target periods have not been of uniform length. Because the Bank's objective is to lower the trend rate of monetary growth, it is clear that the Bank must announce a series of progressively lower target ranges over time. Rather than announce a new range once a year, however, the Bank in the past has waited until it believes that money growth has stabilized near the midpoint of the current range before announcing a reduction in the range.

This approach avoids two problems with annual targets. First, with annual targets, if actual money growth is outside the target range near the end of the year, it may not be feasible to return money to target in the time remaining. In this situation, the targets may cease to be an effective guide to policymakers. Second, if actual money growth is below the annual target range at the time that a new range is adopted, policymakers may be caught between a desire to maintain credibility in their long-run policy of reducing the trend rate of monetary growth and a desire to avoid an unnecessarily restrictive short-run policy.[22]

When moving to a new target range, the Bank of Canada chooses a base period in a consistent manner. In general, the Bank chooses as a base period a month or average of months in which the actual level of M1 is near the midpoint of the previous target range.[23] Under certain circumstances, however, the Bank may choose a base period in a different manner. As noted above, financial innovations have occasionally caused a downward shift in the demand for M1. When the Bank believes that there has been a permanent shift in the demand for M1, it may choose a base period that is below the midpoint of the previous target range.[24]

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21 In the United States, the Federal Reserve has generally used the fan approach for its long-run monetary targets.

22 This conflict might occur, for example, in a situation where money growth is significantly below the target range at the end of the year, while at the same time, the economy is in a recession. A monetary policy designed to moderate the effects of the recession might imply a rate of money growth that is too high relative to the target range for the next year.

23 For example, in December 1979, the Bank announced a reduction in its target range for M1 from 6 to 10 percent a year to 5 to 9 percent a year. The new base period for the 5 to 9 percent range was the second quarter of 1979 with M1 measured at its average level in the second quarter. The actual growth in M1 from the previous June 1978 base period to the second quarter of 1979 was 8.0 percent, at the midpoint of the 6 to 10 percent range.

24 The Bank made such an adjustment in 1976-77 to account for the spread of cash management practices by corporations and in 1979 to adjust for the impact of the payment of daily interest on savings accounts.

Rationale for an Interest Rate Operating Target

The Bank of Canada attempts to control M1 by using an interest rate operating target. Generally speaking, this procedure involves setting an interest rate target that is thought to be consistent with the desired rate of monetary growth and subsequently raising or lowering the interest rate target as money growth is above or below the desired rate.

The Bank's decision to use an interest rate operating target is largely dictated by the combination of lagged reserve accounting and the Bank's discount policy. In any particular accounting period, the total demand for required and excess cash reserves by chartered banks must be equal to the total amount of reserves supplied by the Bank via discounting or cash reserve management. Under a lagged reserve accounting system, required reserves in a particular period are based on deposits in an earlier period. In addition, the limitation on discount borrowing largely eliminates the use of the discount window as a means of reserve management. Thus, in the short run, bank reserve adjustment falls mostly in excess reserves. If excess reserves are highly inelastic with respect to interest rates, large movements in interest rates might be necessary to balance the demand for and supply of reserves under a reserves targeting procedure.

As a result of these constraints, the Bank uses its cash reserve management techniques to moderate interest rate movements around a target level rather than attempting to achieve a target level of reserves. In effect, the combination of lagged reserve accounting and the administration of the discount mechanism requires the use of an interest rate operating target rather than a reserves target.[25]

The Role of the Exchange Rate

The Bank of Canada's targeting procedures are complicated by the important role of foreign trade in the Canadian economy. In Canada, exchange rate movements can have a significant impact on trade and capital flows through the prices of traded products and, hence, on output, interest rates, and inflation. In terms of monetary policy, the key issues are whether exchange rate movements might compromise the Bank's anti-inflation policy and whether policies to moderate exchange rate movements might impede monetary control.

The Bank of Canada has argued that actions to limit downward pressure on the Canadian dollar may play an important part in containing inflation.[26] That is, any sizable depreciation of the Canadian dollar would have the effect of increasing the prices of imported goods, putting upward pressure on costs and prices. Thus, unless the Bank were to take actions to limit downward pressure on the Canadian dollar, the favorable effect of a lower trend rate of monetary growth on inflation might be offset by short-run exchange rate movements.

In addition, the Bank of Canada has argued that a policy of moderating exchange rate movements does not compromise longer run monetary control. To the extent that exchange rate depreciation leads to higher inflation and nominal income growth, the demand for nominal money balances increases and may threaten to exceed the upper end of the target

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25 See, for example, C. Freedman, "Some Theoretical Aspects of Base Control," Working Paper No. 650, National Bureau of Economic Research, Inc., March 1981, especially pp. 34-41. In the United States, the combination of a lagged reserve accounting system and a penalty discount rate would lead to similar results. See J. A. Cacy, B. Higgins, and G. Sellon, "Should the Discount Rate Be a Penalty Rate?" *Economic Review,* Federal Reserve Bank of Kansas City, January 1981, pp. 3-10.

26 Bank of Canada, "Monetary Policy and the Exchange Rate," *Bank of Canada Review,* February 1979, pp. 15-19.

range. In this situation, actions by the Bank of Canada to moderate downward movement with exchange rates may help to keep money growth within its target range.[27]

REASONS FOR MONETARY CONTROL SUCCESS

Of the central banks that adopted monetary targeting procedures in the 1970s, few have had as successful a record as the Bank of Canada.[28] It is particularly significant that monetary control in Canada has been accomplished in a framework that emphasizes an interest rate approach to an operating target. In the United States, the Federal Reserve abandoned the interest rate approach in October 1979 in favor of a reserves approach because of dissatisfaction with the degree of monetary control afforded by the interest rate procedure. In this light, it is interesting to examine some of the possible reasons for Canada's monetary control success.

The major factors contributing to monetary control in Canada can be analyzed in the context of the simple model shown in Figure 1. In this model, the interest rate and the quantity of money are determined by the interaction of the public's demand for money and the central bank's policy response function. The public's money demand function, MD, is taken to be a decreasing function of the rate of interest. The policy response function depends upon how the central bank adjusts its interest rate operating target when money deviates from target. The policy response function, PR1, illustrates the case where the central bank fixes the interest rate at r^*. In contrast, the policy response function, PR2, shows the case in which policymakers adjust the interest rate target to deviations in money from target. That is, they raise the interest rate target when money is above target and lower the interest rate target when money is below target. As shown in Figure 2, the degree of monetary control depends upon how willing policymakers are to adjust the interest rate target when money is off track. For a given shift in the money demand curve from MD to MD′, monetary control is improved by the use of policy response function PR2. While money growth increases from M_0 to M_1 using PR1, it only increases to M_2 using PR2. Thus, monetary control is better when the central bank incorporates a greater feedback effect from money growth to the interest rate target.

Therefore, one possible explanation for the Bank of Canada's relatively greater success in using an interest rate approach to controlling money is its greater willingness to adjust the interest rate target to deviations in money growth. However, statements by officials at the Bank of Canada indicate that it does not pursue an aggressive short-run monetary control policy. That is, the Bank is willing to accept money growth that deviates from target for several months if it feels that these movements are temporary in nature and do not compromise its long-term objectives.[29] Recent empirical work supports this characterization of

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27 Bank of Canada, *Annual Report of the Governor to the Minister of Finance,* 1981, p. 30.

28 For a detailed discussion of other countries that have adopted monetary targeting, see M. D. K. Foot, "Monetary Targets: Their Nature and Record in the Major Economies," in *Monetary Targets,* ed. by B. Griffiths and G. Wood, New York: St. Martin's Press, 1981, pp. 13-40; and Organization for Economic Co-operation and Development, *Monetary Targets and Inflation Control,* Paris: OECD, 1979.

29 Bank of Canada, *Annual Report of the Governor to the Minister of Finance and Statement of Accounts for the Year 1975,* Ottawa: Bank of Canada, 1975, pp. 15-19; and 1981, pp. 29-34. One rationale for the Bank's approach is the problem of instrument instability which might result from attempts to control money precisely over a short period of time. See, for example, W. R. White, "The Demand for Money in Canada and the Control of the Monetary Aggregates: Evidence from the Monthly Data," Bank of Canada, Staff Research Study No. 12, 1976, especially pp. 93-119.

Figure 1

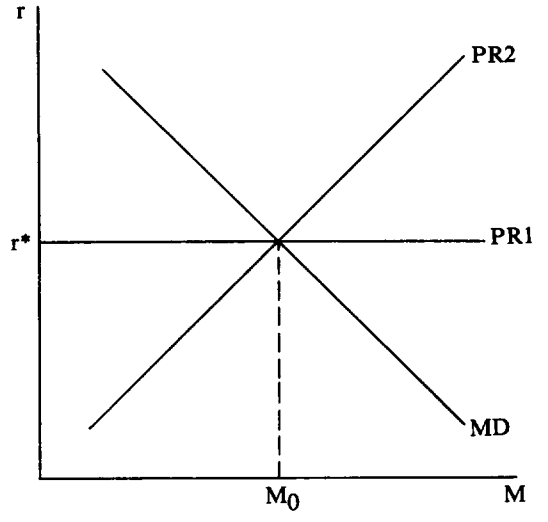
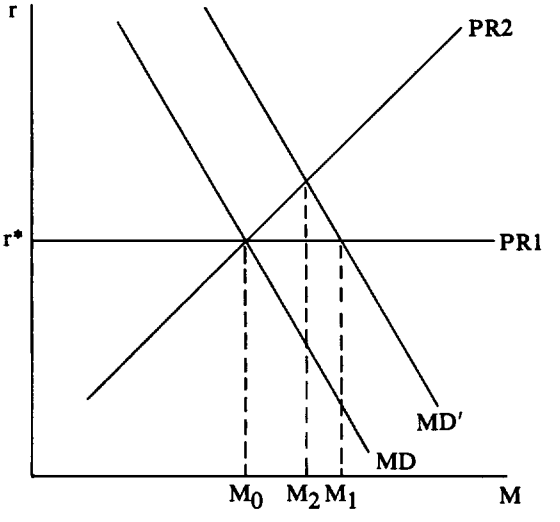


Figure 2



Bank behavior. Estimates of policy response functions for Canada and the United States for the 1975-79 period indicate a similar response of interest rates to money growth. That is, the slope of the policy response function in Canada does not seem to be appreciably steeper than the slope of the U.S. policy response function.[30]

Another explanation for the Bank of Canada's monetary control success focuses on the behavior of the demand for money. One potentially important factor in this regard is the interest elasticity of money demand. Empirical work on money demand in Canada indicates that the interest elasticity of the demand for M1 balances is quite high, approximately twice the elasticity of money demand in the United States.[31]

A greater interest elasticity of money demand can affect monetary control in two ways. First, as shown in Figure 3, any factor causing the money demand curve to shift will result in greater monetary control the more interest elastic is the demand for money. For a given change in money demand which shifts the MD1 and MD2 curves by the same horizontal amount to MD1′ and MD2′, respectively, money growth shows a smaller increase with the more elastic curve MD1. That is, money growth increases from M_0 to M_2 using the MD2 curve, but only increases to M_1 using the more elastic curve MD1. Thus, the more interest elastic is the demand for money, the less likely is money

30 R. Abrams and G. Sellon, "Monetary Control: A Comparison of the U.S. and Canadian Experience, 1975-79," Research Working Paper, Federal Reserve Bank of Kansas City, forthcoming.

31 Estimates of the long-run elasticity of money demand in Canada are generally between .20 and .30, while a comparable figure for the United States is .10. See, for example, L. Landy, p. 7.

Figure 3

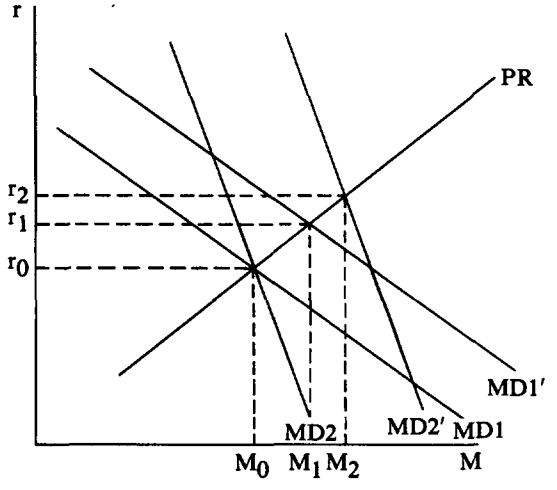
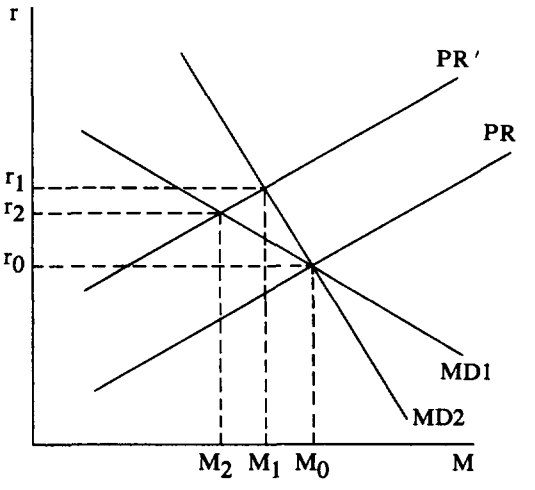


Figure 4



to deviate from target for a given central bank response function.

Second, a greater interest elasticity of money demand makes it easier for the central bank to return money to target after a shift in money demand. That is, a smaller policy action to change the interest rate target is needed, the more elastic is money demand. This point is illustrated in Figure 4. Suppose that the quantity of money is initially M_0 and that the central bank wishes to reduce this quantity. For a given policy action which shifts the PR curve to PR′, the reduction in money growth is greater the more elastic is money demand. Thus, money growth falls from M_0 to M_1 with the money demand curve MD2 and falls by a larger amount from M_0 to M_2 with the more elastic curve MD1. This fact may explain why the Bank of Canada does not need to make a rapid adjustment of its interest rate target as discussed above, because small changes in interest rates have a relatively large impact on money growth.

A final factor contributing to monetary control in Canada is the relative stability of estimated demand functions for M1. In Canada, the process of financial innovation in recent years has proceeded at a slower pace than in the United States. The absence of deposit interest ceilings in Canada appears to have been an important factor in slowing the innovation process and in keeping it within the banking system. The fact that interest-bearing transactions accounts and savings accounts paying market-related interest rates have existed for some time has probably contributed to the relative stability of money demand.

MONETARY CONTROL AND INFLATION

The rationale for a monetary control program such as that adopted by the Bank of

Canada is that a reduction in the trend rate of monetary growth is necessary in order to bring about a lower rate of inflation. The relationship between money growth and inflation involves two dimensions. First, if a high rate of inflation has persisted for a considerable period of time, inflationary expectations may have become ingrained in high nominal interest rates and wage demands in excess of productivity gains. To the extent that the central bank is able to establish a credible record of monetary control, it may be able to bring about a short-run improvement in the inflation rate by curtailing these expectations. Over a longer time horizon, the goal of the central bank would be to provide a noninflationary trend rate of growth in money and credit.

Second, while there is general agreement that lower monetary growth can lead to a lower inflation rate, there is considerable uncertainty about the length of time necessary to accomplish this result. Despite the success that the Bank of Canada has experienced in reducing monetary growth since 1975, there has been little visible progress in lowering the inflation rate. Indeed, as shown in Table 1, inflation fell from 10.8 percent in 1975 to 6.3 percent but has since rebounded to 10 percent in 1979-81.

Two types of explanations have been advanced for the apparent failure of monetary control procedures to reduce inflation in Canada. While some observers have focused on the implementation of monetary targeting in Canada, others have argued that the Bank of Canada has followed a consistent policy but that the favorable effects of slower money growth on inflation have been offset by other factors affecting the inflation rate.[32]

Those critical of the Bank of Canada's monetary control procedures have generally argued either that the procedures are sound but were implemented in too gradual a manner or that the procedures are technically deficient. At the time that the Bank adopted monetary targeting, inflation ranged from 11 to 15 percent and money growth ranged from 9.5 to 14 percent. The Bank decided to pursue a gradualist strategy of lowering money growth over an extended period rather than to pursue a policy involving a sharp reduction in money growth in a short period of time. This decision was made in the context of a worldwide recession in which the Canadian unemployment rate jumped from 5.3 percent in 1974 to 6.9 percent in 1975. Thus, the initial target range for M1 growth of 10 to 15 percent involved little initial reduction in monetary growth.

While, in retrospect, the Bank's policy may have been too gradual during the early years of monetary targeting, in the short run a less gradual policy would have implied higher unemployment, higher interest rates, and slower economic growth. Furthermore, if monetary policy was too gradualist during this period, other factors must have been responsible for the significant lowering in the inflation rate from 15.3 percent in 1974 to 6.3 percent in 1978. The presence of these other factors would appear to raise questions about the strength of the short-run linkage between money growth and inflation.

Other critics of the Bank of Canada have focused on the intermediate and operating targets used by the Bank. It has been argued, for example, that the Bank's procedures could be improved by using a broader aggregate such as M2 as an intermediate target and by adopting a reserves or monetary base operating target. In this view, inflation has not responded to lower money growth because the Bank of Canada has used the wrong monetary aggregate. As seen in Table 2, the slower growth in the narrow aggregates has not been accom-

32 For a general discussion of these issues, see *Canadian Public Policy*, Supplement 7, 1981, pp. 165-248.

panied by a similar deceleration in the broader aggregates. Moreover, given that the broader aggregates are relatively insensitive to interest rates, it has been suggested that a reserves or monetary base operating target may be necessary to control these aggregates.[33]

These critics argue that M1 targets not only were set too high but also that they are not reliable in the short run. Specifically, it is argued that in a period of inflation and high interest rates investors shift out of demand deposits into interest-bearing accounts and that this switch has the effect of lowering the demand for M1 but leaving demand for M2 unchanged. As a result, a given M1 target is not as restrictive as it may appear.

For this type of portfolio substitution to lower the reliability of M1 targets, it must be unanticipated by policymakers. If this activity can be forecast, policymakers can adjust their targets to offset its effects. This argument may have relevance both to the 1976-77 period when Canadian corporations were adopting more sophisticated cash management practices and to the more recent introduction of daily interest on savings balances. While the Bank of Canada was aware of these developments, an accurate estimate of their impact on M1 growth was difficult while the shift was underway.[34] To the extent that shifts out of M1 deposits reduced the demand for M1 more than the Bank anticipated, M1 targets were not as restrictive as intended.

A change in the Bank of Canada's operating procedures to the use of a broader aggregate as an intermediate target and a reserves or base operating target would require significant institutional changes. First, the current structure of reserve requirements specified in the Bank Act is not designed to control M2. Generally speaking, control over M2 would be enhanced by equal reserve requirements on its components.[35] Second, a shift from an interest rate operating target to a reserves or base target would require changes in the discount mechanism or the reserve accounting system. Given lagged reserve accounting, the use of a nonborrowed reserve target similar to the U.S. system would require the Bank of Canada to permit increased use of the discount window as a reserve adjustment mechanism. Alternatively, implementation of a total reserves or a monetary base target would necessitate a shift from lagged to contemporaneous reserve accounting.

Another explanation of the weak linkage between money growth and inflation in Canada focuses on factors other than monetary policy. It is suggested that factors such as fiscal policy and supply side disturbances tended to raise the inflation rate so as to offset the monetary policy actions taken by the Bank of Canada. Table 1 shows the change in the Canadian government's fiscal position toward higher deficits in the mid-1970s. To the extent that these deficits represented an expansionary fiscal policy, monetary and fiscal policy were working at cross purposes. Any inflationary gains resulting from monetary targeting would tend to be offset by the fiscal stimulus. In this situa-

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33 For a detailed discussion of these agruments, see T. Courchene, "On Defining and Controlling Money," *Canadian Journal of Economics,* November 1979, pp. 604-15; and *Money Inflation and the Bank of Canada,* Montreal: C. D. Howe Research Institute, 1976. More recently, Courchene has criticized the Bank of Canada for the degree of short-run volatility in money growth and for its exchange rate policy. He argues that these factors have a detrimental effect on inflationary expectations and on the credibility of the Bank's monetary targets. T. Courchene, *Money, Inflation, and the Bank of Canada: An Analysis of Monetary Gradualism 1975-1980,* Montreal: C. D. Howe Research Institute, 1981.

34 Bank of Canada, *Annual Report of the Governor to the Minister of Finance,* 1981, p. 30.

35 See, for example, J. A. Cacy, "Reserve Requirements and Monetary Control," *Monthly Review,* Federal Reserve Bank of Kansas City, May 1976, pp. 3-13.

tion the net results of these policies would tend to be higher interest rates, slower economic growth, and little visible progress in controlling inflation.

Other influences on the inflation rate came from the supply side of the economy. Oil price shocks and food price increases contributed to the Canadian inflation rate at various times during the 1975-81 period. In addition, the depreciation in the Canadian dollar over this time period added to the costs of imported goods and raw materials. Finally, the imposition of an incomes policy in 1975 may have contributed both to slower wage and price growth during the 1975-78 period and to the faster growth in wages and prices following the end of the control program. While these types of factors do not have a permanent effect on the inflation rate, they may have had a short-run impact on inflation and inflationary expectations that offset the inflationary gains achieved through the Bank of Canada's monetary control program.

SUMMARY AND CONCLUSIONS

This article has examined the recent Canadian experience with monetary targeting and inflation. Despite a successful record of monetary control in Canada, little progress has apparently been made in reducing the rate of inflation. Much of the success of the monetary control program appears to be due to the behavior of money demand in Canada. A relatively large interest elasticity of money demand tends to keep money growth on track and to speed the adjustment to policy actions when money deviates from target. In addition, the absence of deposit interest ceilings has improved monetary control by limiting the scope for unexpected shifts in money demand caused by financial innovation. In implementing its program, the Bank of Canada has demonstrated that an acceptable degree of monetary control can be achieved through the use of an interest rate targeting procedure.

The apparent failure of inflation to respond to a lower trend rate of monetary growth in Canada has broader implications. First, a successful record of monetary targeting does not appear to be sufficient to bring about a sharp reduction in inflationary expectations. The positive influence of a credible central bank policy may be easily undermined by other short-run factors influencing the inflation rate. Second, the linkage between monetary growth and inflation over a period of several years may not be as strong as was previously thought. While monetary control may be a necessary first step in reducing inflation, it may not be sufficient unless it is accompanied by fiscal restraint and the absence of supply side disturbances.