Recent Developments in the Monetary Aggregates and Their Implications

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- *The growth rate of transactions money picked up in 1999, reflecting the stronger expansion in economic activity and the stabilization of interest rates and conditions in the financial sector in 1999 following the financial turmoil in the autumn of 1998.*
- *The growth rate of M1 began to converge with that of M1+ and M1++ in 1999, suggesting that the influence of the special factors that have affected the growth rate of M1 has diminished.*
- *Narrow monetary aggregates have accelerated sharply in recent months. This robust expansion is consistent with a buoyant growth in real GDP in coming quarters. There are emerging signs of a possible rise in inflation. Over the longer run, to be in line with inflation remaining in the Bank's target range of 1 to 3 per cent, growth in narrow money should begin to decelerate.*
- *The very broad measure of money, M2++, grew at much the same rate in 1999 as in 1998. Within M2++, the growth of non-money-market mutual funds slowed, while that of assets such as fixed-term deposits accelerated somewhat, reflecting investor uncertainty about continuing increases in equity and bond prices. The recent growth in broad money is in line with inflation remaining in the inflation-control target range.*

This article discusses the recent behaviour of Canada's monetary aggregates and the implications of this behaviour for the Canadian economy. The first part of the article focuses on narrow, or transactions, money; the second part on broad money.

Transactions Money

Financial innovations and transactions money

The aggregate M1, which consists of currency, personal chequing accounts, and current accounts, has traditionally been used as a measure of transactions money in Canada; most of it is held by firms rather than by individuals. Historically, the behaviour of M1 has been explained quite well by its relationship with real GDP, the general price level, and movements in short-term interest rates. The surprisingly strong growth of M1 in the mid-1990s cannot, however, be explained by these variables. Although low short-term interest rates account for some part of the strength in M1, financial innovations and other special factors in the 1990s helped to boost M1 growth by a sizable amount.[1]

The rapid pace of technological change, the growing popularity of mutual funds, and the elimination of reserve requirements contributed to changes in the behaviour of transactions money in the 1990s.[2] Through the decade, the attractive rates of return on mutual funds encouraged households to move their

1. M1 was also affected by a series of financial innovations in the 1980s (Aubry and Nott 2000).

2. See Atta-Mensah and Nott (1999) for a fuller discussion of factors that have influenced M1 growth.

savings from fixed-term and notice deposits into these funds. This shift affected M1 mainly through growth in "free credit balances," which are transactions balances held at securities dealers.[3] With the elimination of differential reserve requirements on demand and notice deposits in the early 1990s, banks began offering tiered current accounts that paid near-market rates of interest.[4] At the same time, chartered banks encouraged small firms to hold larger portions of their liquid funds in demand deposits either by reducing transactions fees on non-interest-bearing accounts held by the firms, or by offering competitive rates to firms on their demand accounts. Corporations took advantage of these changes in terms offered by the banks by substituting funds from notice and term deposits into the tiered current accounts. While all these financial innovations boosted M1 growth, the rise in the number of small and medium-sized businesses after the 1990–91 recession may also have contributed to the increase. These firms tend to hold relatively large transactions balances to better buffer their uncertain flow of payments and receipts.

Acting in the other direction, improved electronic financial services and the growing popularity of debit cards, automated tellers, and telephone/computer banking in the 1990s may have encouraged economic agents to minimize balances in M1-type accounts by allowing easier access to their non-M1 accounts for transactions purposes. These technological improvements have helped to increase the degree of substitutability between demand and notice accounts, which has probably slowed the growth rate of M1.

According to Aubry and Nott (2000), innovations in the 1990s caused M1 to shift up by about $25 billion (43 per cent) between 1993 and 1998.[5] (See Box 1 for a description of how these shifts are estimated.)

Adjusting for the effects of financial innovations

Because of the financial innovations that took place in the 1990s, M1 has become less representative of transactions money in Canada. At the Bank, we have dealt with this through two approaches. First, we have been monitoring two other measures of transactions money. Second, we have attempted to model the size of the impact of special factors that has affected M1 growth.

Because of the difficulties in interpreting the information contained in M1, the Bank has been monitoring two broader measures of transactions money that include both demand and notice deposits: M1+ and M1++.[6] Although M1+ and M1++ internalize the substitutions between demand and notice deposits, they do not represent transactions money perfectly because they include accounts held for savings purposes. Nor do they obviate the effects of portfolio shifts between savings deposits included in M1+ and M1++ and the vast range of other savings vehicles.

Economists at the Bank use many different types of models to study the determinants of inflation. One of these is a vector-error-correction model (VECM) based on M1. This model exploits the long-run relationship between M1, prices, output, and interest rates. This relationship is based on the long-run demand-for-M1 function.[7] In this model, the deviation of M1 from its long-run demand, or the "money-gap," has provided good leading information about prices.[8] In general, the model has been found to predict inflation reasonably well.[9]

3. In 1987, changes to federal and provincial legislation allowed chartered banks to enter the securities industry. By 1988, Canada's six major chartered banks had either acquired or created investment dealer subsidiaries. The Bank of Canada's consolidation of the balance sheets of chartered banks and their subsidiaries in the late 1980s resulted in "free credit balances" held by individuals being grouped with personal chequing accounts (PCAs). These balances are used to purchase financial assets. Free credit balances held by businesses are included in non-personal deposits.

4. The phasing out of reserve requirements, which began in June 1992, when marginal reserve requirements were set to zero, was completed by June 1994. Previously, reserve requirements on demand and notice deposits had been 10 per cent and 3 per cent, respectively. These requirements had been imposed on the chartered banks but not on other deposit-taking institutions.

5. Simulations conducted by Adam and Hendry (2000) suggest that the shift in M1 could be on the order of 25 per cent.

6. M1+ is defined as the sum of currency held by the public and all chequable (demand and notice) deposits at chartered banks, credit unions and caisses populaires (CUCPs), and trust and mortgage loan companies (TMLs). M1++ is the sum of M1+ and all non-chequable notice deposits at chartered banks, CUCPs, and TMLs. Note that, unlike M1, the currency component in M1+ and M1++ excludes cash in the vaults of CUCPs and TMLs.

7. See Armour et al. (1996), Engert and Hendry (1998), and Adam and Hendry (2000) for more detailed discussions of the model.

8. The model also includes short-term U.S. interest rates, the exchange rate, a measure of the output gap, and a term to account for financial innovations in the early 1980s. A set of equilibrium conditions is imposed to ensure that the variables in the model follow plausible paths in the long run.

9. An interpretation of these results is that monetary disequilibria—represented here as deviations of M1 from its long-run demand—are part of the inflation process. That is, in the VECM, a "money gap" precedes inflation, and an aggregate money gap persists until prices change to help restore monetary equilibrium. Laidler (1999) discusses the link between the deviation of actual money from its desired level ("money gap") and inflation.

Box 1

Measuring the Shifts in the Narrow Aggregates

Financial innovations have affected how and where individuals hold their money. The question then is: What are the sizes of shifts in the components of the narrow aggregates?

To answer this question, Aubry and Nott (2000) propose a method of estimating the size of the shifts caused by the effects of two waves of financial innovations. For each period of innovation, Aubry and Nott estimate the shift by taking the change in real balances between the beginning and end dates of the shift, minus the estimated change related to change in real GDP:

$$\ln(shift/cpi)_i = \ln(M_i/cpi)_{end} - \ln(M_i/cpi)_{begin} - 0.6[\ln(GDP)_{end} - \ln(GDP)_{begin}],$$

where *end* is 1998, *begin* is 1993, in the case reported here, and 0.6 is the long-run elasticity of output for the M1-demand equation estimated by Hendry (1995). Using annual data, Aubry and Nott (see accompanying table) provide estimates of the size of the shifts in the narrow aggregates and their respective components.

Estimates of the Shifts Affecting the Components of the Narrow Aggregates
($ billions)[a]

Component	Size of shift 1993–98[b]
Currency	$3.0 (+11%)
Personal chequing accounts	$6.4 (+89%)
PCAs less free credit balances	$0.0 (0%)
Current accounts	$17.4 (+80%)
Gross M1	$24.8 (+43%)
Personal chequing notice accounts	$-7.8 (-13%)
Non-personal chequing notice accounts	$7.3 (+29%)
M1+	$32.0 (+20%)
Personal non-chequing notice accounts	$-28.0 (-42%)
Non-personal non-chequing notice accounts	$-1.4 (-29%)
M1++	$-10.0 (-4%)

a. The table is reproduced from Aubry and Nott (2000).
b. Estimates for the aggregates differ substantially from the sum of the shifts in the components because the shifts for the aggregates are estimated independently from the shifts for the individual components. Note also that an interest rate variable was not included in the estimating equation because short-term interest rates in 1992 were about same as in 1998.

However, the financial innovations in the 1990s and other factors that affected the growth of M1 also caused the parameters of the model to become unstable. We dealt with this instability by constructing a measure of M1 that was not affected by these special factors. We call this measure "adjusted" M1. As described in Box 2, adjusted M1 is constructed as a weighted sum of three components: currency, non-personal demand and notice deposits in chartered banks, and personal notice deposits in chartered banks.[10] The weights on these components, which are allowed to shift at two points in time, are inversely related to the degree to which the components are being affected by special factors. In other words, components that are relatively unaffected by financial innovations are given a high weight, and those that are significantly affected by the innovations are given a low weight. The growth in adjusted M1 could be interpreted as the amount of money growth that would have existed had there been no financial innovations in the 1990s and had the historical relationship between money, output, interest rates, and prices remained unchanged. Thus, the difference between the growth rates of adjusted M1 and M1 represents an estimate of the size of the special factors.

To sum up, because of financial innovations and other factors, M1 grew much more rapidly in the mid-1990s than was consistent with the economic fundamentals.

10. Note that personal chequing accounts are excluded because their recent growth is dominated by free credit balances, which are held to purchase financial assets such as mutual funds rather than to buy goods and services.

Box 2
Constructing an Adjusted M1 Aggregate

Adam and Hendry (2000) attempt to construct an aggregate that corrects the instability introduced when M1 is used in a vector-error-correction model (VECM)—a model used to forecast inflation. The aggregate, which they call "adjusted" M1, helps to measure the size of the distortion in M1. The construction of this aggregate involves two steps.

First, the VECM (estimated for 1956–93) is used to forecast "distortion-free" M1 growth from 1992Q1 to 1999Q4 using actual values for all other variables in the model. The distortion-free M1 is an estimate of what M1 would have been had there been no changes in the data-generating process in the 1990s. Second, the distortion-free money series is regressed on: currency, non-personal demand and notice deposits, and personal notice deposits. Based on data up to 1999Q4, Adam and Hendry calculate adjusted M1 based on the following weighted averages:

adjusted M1 = 1.66(*currency*) + 0.23(*non-personal*) for 92Q1 to 94Q3,

adjusted M1 = 1.01(*currency*) + 0.21(*non-personal*) + 0.20(*personal*) for 94Q4 to 99Q4,

where *non-personal* is the sum of current accounts and non-personal notice deposits and *personal* is all personal notice deposits.[1]

Adjusted M1 differs from M1 in two respects. First, adjusted M1 is based on notice accounts but does not vary with personal chequing accounts because they include investment dealer accounts (which currently represent more than half of PCAs). These investment dealer accounts appear to be held mainly to purchase financial assets such as mutual funds, stocks, and bonds, rather than to buy goods and services. Second, M1 uses fixed weights of 1 on each of its components, while the weights of adjusted M1 differ from 1 based on the estimation results. Adjusted M1 also permits the weights to change at discrete points in the sample.

1. The sample was divided into two subperiods to reflect the fact that the parameter estimates after 1994Q3 are substantially different from those prior to that period.

As a result, the empirical relationship between M1, output, prices, and interest rates has become more complicated, and economists need to take these complications into account when analyzing the behaviour of M1. To do this, a model-based adjusted M1 measure was constructed to estimate the size of the impact of special factors on the growth rate of M1, and the new aggregates M1+ and M1++ were developed.

Recent behaviour of transactions money

In 1999, measures of transactions money grew somewhat more rapidly than in 1998. In 1999, M1 grew over 9 per cent, while M1+, M1++, and adjusted M1 grew about 7 to 8 per cent (Table 1).[11] The growth rates of M1 and adjusted M1 were increased somewhat by the sharp rise in currency at the end of 1999 that resulted from precautions taken by the public (including non-bank financial institutions) prior to the Y2K date change. The annualized growth rate of currency in the fourth quarter of 1999 was 15 per cent—substantially higher than in previous years. Adjusting for the year-2000 effects, we estimate that currency would have grown at an annualized growth rate of 5 per cent in the fourth quarter of 1999. For the year as a whole, currency would have grown by about 7 per cent, which suggests that growth rates for M1 and adjusted M1 were boosted less than 1 per cent by precautionary actions taken in anticipation of the year 2000. In the case of M1+ and M1++, we suspect that their growth rates were affected only marginally by the liquidity buildup related to year-2000 concerns because most of

11. Annual growth rates are calculated as the fourth quarter of one year over the fourth quarter of the preceding year.

Table 1

Growth Rates of Selected Monetary Aggregates and Their Components

	Amounts outstanding as of December 1999[1] ($ millions)	Annual growth rates,[2] per cent									
		1986–1990	1991–1995	1994	1995	1996	1997	1998	1999	1999 1H	1999 2H
Currency	34,281	6.7	6.5	7.1	2.8	4.2	5.5	6.8	9.0	6.9	11.2
Personal chequing accounts	16,337	10.8	11.6	10.5	11.7	22.4	16.7	16.1	16.1	15.2	17.0
Current accounts	43,590	2.4	9.1	8.3	12.9	19.6	25.2	8.1	8.3	7.2	9.5
Gross M1	93,412	4.8	8.1	7.6	8.6	12.7	14.9	7.8	9.4	8.7	10.2
Net M1	95,156	5.0	8.0	7.8	5.7	16.5	12.2	9.1	5.2	-1.9	12.8
Non-personal chequable notice deposits	37,419	17.7	6.6	9.1	1.9	9.2	6.3	7.5	16.1	4.4	29.0
Non-personal non-chequable notice deposits	3,125	10.4	-3.2	-5.2	-15.9	2.7	2.2	-7.8	-8.3	-4.3	-12.1
Personal chequable notice deposits	55,571	7.2	-2.1	-2.9	-5.1	6.2	5.0	-0.9	3.2	3.8	2.5
Personal non-chequable notice deposits	36,668	13.2	-8.2	-13.6	-5.3	-1.9	-7.8	-10.3	0.0	3.1	-3.0
Personal fixed-term deposits	203,851	12.6	17.5	13.4	11.2	-1.7	-2.7	0.3	3.3	4.9	1.8
Total personal savings deposits	296,837	11.0	8.1	5.6	6.0	-0.1	-1.1	-1.4	2.9	2.5	3.4
M2	470,682	11.7	3.5	2.7	4.0	2.3	-1.4	1.2	4.1	2.5	5.7
Near-bank deposits[3]	161,659	12.6	-3.3	-4.5	1.5	0.8	-9.3	2.8	6.5	4.0	9.1
Money market mutual funds[4]	45,911	56.5	30.6	-1.2	19.3	55.7	12.6	6.0	12.8	29.8	27.4
Annuities	39,049	14.8	5.8	-1.5	1.6	-2.6	-7.3	-8.4	-5.6	-3.3	-7.8
M2+[4]	675,365	11.3	4.4	2.2	4.3	3.7	-1.2	1.1	5.4	4.5	6.3
CSBs	27,329	-5.4	-2.4	-3.9	-2.3	6.5	-2.2	-8.0	-4.0	1.2	-6.7
Non-money market mutual funds at deposit-taking institutions[4]	96,886	59.7	42.8	42.1	-8.1	13.0	44.5	26.3	6.0	5.0	7.0
Adjusted M2+[4]	799,580	9.8	5.1	3.9	3.1	4.4	2.0	3.2	5.1	4.3	5.9
Other non-money market mutual funds[4]	241,547	57.9	30.6	40.3	13.9	30.8	40.6	27.4	14.4	12.0	16.8
M2++[4]	1,041,122	10.6	6.8	6.8	4.3	7.4	7.4	7.6	7.1	6.0	8.3
Non-personal fixed-term deposits	109,572	4.6	8.0	13.7	1.9	21.3	35.8	1.4	6.4	-1.3	14.7
Foreign currency deposits by residents[5]	55,034	7.6	24.9	33.4	23.6	17.7	16.0	24.7	4.5	-2.9	12.4
M3[5]	629,015	10.8	4.8	5.0	4.8	5.2	4.7	3.2	4.5	2.5	6.5
Memorandum items:											
Adjusted M1	70,974	4.8	6.5	10.1	0.7	7.1	5.2	3.2	7.5	7.0	7.9
M1+[6]	214,574	7.4	4.8	4.1	2.1	10.2	10.0	5.0	8.2	6.7	9.6
M1++[7]	268,243	9.0	0.2	-2.2	0.1	4.7	5.5	1.9	6.8	5.6	7.9
Interest rate on 90-day commercial paper (level)	5.14	10.48	6.68	5.53	7.14	4.46	3.56	5.07	4.92	4.88	4.96

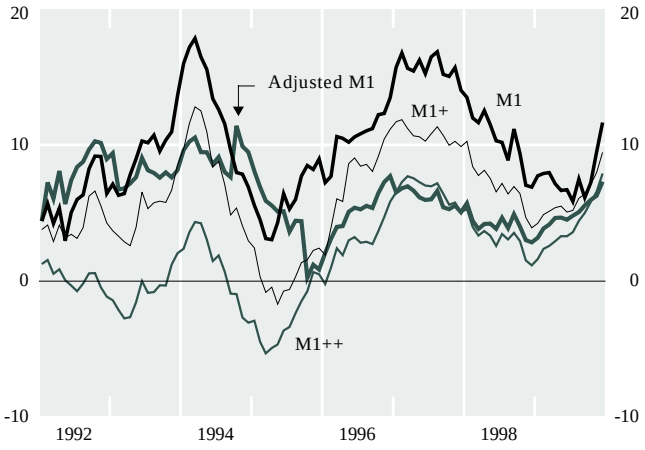
1. Seasonally adjusted except for non-personal fixed-term deposits and foreign currency deposits. In general, the monetary aggregates do not equal the sum of their respective components because of independent seasonal adjustment of components and continuity adjustments. Definitions and sources are given in the *Notes to the Bank of Canada Banking and Financial Statistics*, January 2000.
2. Growth rates are calculated as follows: 1986–1990: 1990Q4 over 1985Q4; 1991–1995: 1995Q4 over 1990Q4; annual rates for 1994 to 1999 are for the fourth quarter of one year over the fourth quarter of the preceding year. Half-year growth rates are for the levels in the second or the fourth quarter over the level two quarters earlier.
3. Includes deposits at trust and mortgage loan companies, credit unions, caisses populaires, Alberta Treasury Branches, and the Province of Ontario Savings Office
4. Data on mutual funds are calculated from series provided by *Globe Information Services*.
5. Adjusted for exchange rate variation
6. M1+ is the sum of currency and all chequable (demand or notice) deposits at chartered banks, credit unions and caisses populaires (CUCPs), and trust and mortgage loan companies (TMLs).
7. M1++ is the sum of M1+ and all non-chequable notice deposits at chartered banks, CUCPs, and TMLs.

the additional flow of funds into currency appears to have come from notice accounts, which are included in these aggregates.[12]

The pickup in the growth rate of the narrow aggregates in 1999 can be largely explained by the vigorous expansion in economic activity, as well as the stabilization of interest rates and conditions in the financial sector in 1999, following the turmoil in the autumn of 1998. The convergence of the growth rates of these aggregates suggests that the influence of the special factors (excluding the effects of Y2K) that have affected the growth rates of M1 in the past is diminishing (Chart 1). Based on the difference between the growth rates of adjusted M1 and M1, we estimate that special factors boosted M1 growth by about 2 per cent in 1999, down from 5 per cent in 1998. If these special factors had not been present, we estimate that M1 would have grown at about 7 per cent—somewhat higher than the 3 to 4 per cent long-run growth rate that is estimated to be consistent with the inflation-control target.

Chart 1

Year-Over-Year Growth Rate of Narrow Money

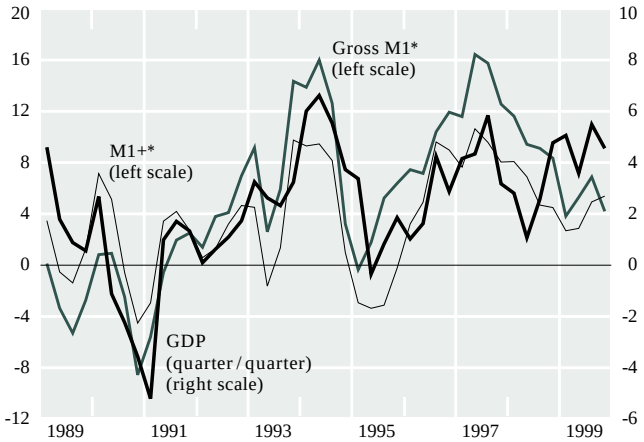


Despite the impact of financial innovations, the transactions aggregates continue to yield useful information for the Bank. In particular, transactions money provides leading information about real GDP in the short term (Chart 2), and adjusted M1 is helpful in predicting inflation over a longer horizon (Chart 3).

12. Note that cash in the vaults of non-banks is excluded from the currency component of M1+ and M1++.

Chart 2

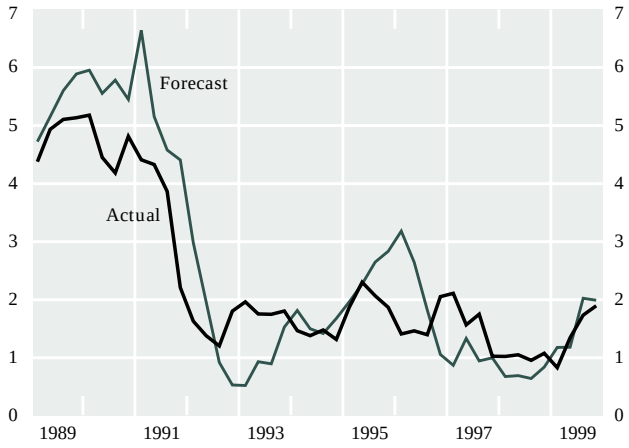
Real GDP Growth and Growth in Real Gross M1 and M1+



* Two-quarter moving average of growth in gross M1, M1+ (deflated by the consumer price index excluding food, energy, and changes in indirect taxes), one quarter earlier.

Chart 3

Forecast and Actual Year-Over-Year Growth Rate of CPI*



* Forecast based on the Bank of Canada's VECM

Adjusting for the impact of the "Y2K factor" on the growth rate of currency, all measures of transactions money have grown rapidly in recent months, indicating a strong growth of total spending in the coming quarters. Simple indicator models, based solely on the growth rate of transactions money, suggest that

output growth will be about 4 to 5 per cent in the first half of 2000.[13]

Since there is currently some evidence of a buildup of inflationary pressures, a continued expansion of M1 at its current rate would not be consistent with inflation remaining in the Bank's target range of 1 to 3 per cent. The Bank's VECM, which is based on M1, suggests that the current stock of money is close to its estimated long-run demand. This means that M1 would have to decelerate from its current pace for inflation to continue to remain in the Bank's target range.

Broad Money

Broad monetary aggregates measure the "store of value" characteristic of money. Since household savings represent deferred consumption, broad money should provide leading information about future spending and, hence, about inflation.

The Bank's preferred measure of broad money is M2++. This aggregate is defined as M2+ plus Canada Savings Bonds and cumulative net purchases of non-money-market mutual funds (excluding capital gains / losses) offered by deposit-taking institutions and independent sponsors. Prior to the formulation of M2++, the Bank used M2 and M2+ as its measures of broad money.[14] However, M2 and M2+ have become less reliable as indicators of future inflation because the increasing use of mutual funds by households as a vehicle for long-term savings has distorted their relationship with nominal spending. M2++, which internalizes the substitution between savings deposits (notice and fixed-term) and mutual funds, is better at capturing information about the long-run spending plans of households. The demand function for this aggregate has been found to be stable. Moreover, M2++ has also been found to be a useful predictor of inflation over a horizon of one to two years (Chart 4).[15]

Chart 4

Two-Year Growth Rates of M2++ and Inflation

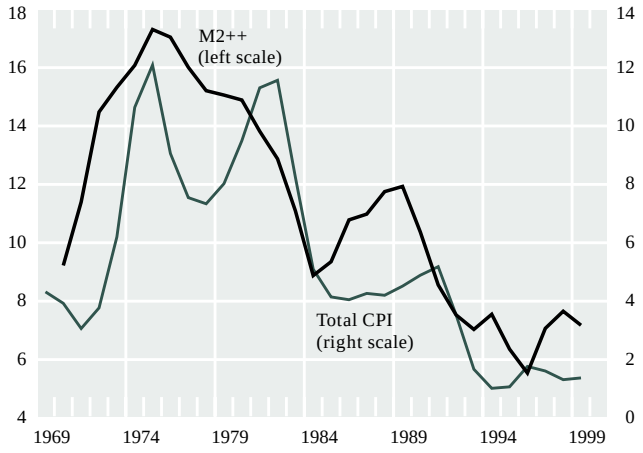


Table 2

Average Posted Rates of Return on Mutual Funds

	Category				Memo item: Current rate, one-year GICs
	Money market	Bond	Mortgage	Canadian equity	
1990	12.21	5.52	10.41	-13.38	10.89
1991	9.50	18.84	14.22	13.23	7.01
1992	6.13	9.98	9.16	2.45	5.72
1993	4.77	13.70	10.02	34.48	3.95
1994	4.17	-4.37	1.47	-1.85	6.09
1995	6.18	16.56	10.57	10.27	5.15
1996	4.26	11.68	8.62	27.26	2.57
1997	2.41	7.26	4.22	15.89	3.08
1998	3.83	5.77	4.62	-5.83	3.55
1999	3.97	-1.57	1.77	16.92	4.21
Quarterly					
1999Q1	4.00	4.62	4.33	-6.64	3.60
1999Q2	4.09	3.06	3.78	-5.69	3.52
1999Q3	4.07	1.75	3.50	15.74	4.02
1999Q4	3.97	-1.57	1.77	16.92	4.21

Note: The annual figures refer to the fourth quarter: mutual fund returns are fourth-over-fourth quarter; the GIC rate is the average of Wednesdays. The quarterly mutual fund returns refer to the return over the four quarters ending the given quarter.

In 1999, M2++ grew at a rate of about 7 per cent, slightly lower than in 1998. The growth rate of non-money-market mutual funds slowed in 1999 compared with the previous year, and households' net contributions to these mutual funds fell to about

13. The indicator models are of the form:

$$GkRGDP_t = \beta_0 + \beta_1 GkRM_{t-k} + \beta_2 GkRM_{t-k-1} + \varepsilon_t,$$

where *GkRM* is the *k*-quarter growth of real M1, or real M1+, or real M1++. The real M1 model also includes a dummy variable to capture the special factors that have affected the relationship between M1 growth and economic activity in the 1990s; it is set to 0 before 1990Q1 and 1 afterwards. At the Bank, we forecast for $k = 2$, 3, and 4.

14. M2 includes net M1 plus personal savings and non-personal notice deposits at chartered banks; M2+ adds to M2 deposits at near-bank institutions, life insurance company annuities, and money-market mutual funds.

15. See McPhail (2000) for a detailed discussion of the empirical properties of M2++.

$33 billion from $61 billion in 1998. This suggests that some investors may have decided to return to safer assets such as money market mutual funds and fixed-term deposits because of the weak performance of some funds in 1999, particularly bond mutual funds (see Table 2), and overall uncertainties about equity prices. This is reflected in the rise in the growth rates of these safer assets (Table 1).

Historically, broad money has provided useful information about current and future inflation. On this basis, the growth of M2++ in 1999 is consistent with inflation near the middle of the inflation-control target range over the next couple of years.

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