Bank of Canada Review

Winter 2005–2006

Special Issue
70 Years of
Central Banking
in Canada

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SPECIAL ISSUE
70 YEARS OF CENTRAL BANKING IN CANADA

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Silver Presentation Salver

Jane Boyko, Archivist, Bank of Canada Archives

On 31 July 1933, Parliament established the Royal Commission on Banking and Currency. Named for its Chairman, The Right Honourable Lord Macmillan P.C., K.C., the Macmillan Commission was charged with reviewing the operations of Canada's banking and monetary systems and examining the provisions and working of the Bank Act. It would also investigate the possibility of establishing a central bank.

The timing of the Macmillan Commission coincided with the approaching expiry date of the charters of the Canadian banks, which Parliament had reviewed and reissued every decade since 1871, when the Bank Act was passed. With each review, Parliament also had the opportunity to revise the national banking code. By 1933, Parliament felt that it was necessary to survey the existing financial structure and its operation with a view to answering questions created by the Depression and the international economic environment and to providing future economic direction to the country.

Within eight days of its creation, the Commission held its first meeting—all hearings were completed by 11 September 1933. Lord Macmillan submitted the Commission's report to the Government of Canada on 27 September, and on 20 November Prime Minister Bennett announced his intention to proceed with the establishment of the Bank of Canada. The Bank commenced operations on 11 March 1935.

The sterling presentation salver displayed on the cover is encircled by an everted rim, richly chased and engraved with a pierced foliate vine, c-scrolls, scallop shells, and a decorative floral motif. The salver rests on four chased and engraved feet, each in the shape of a beaver. Measuring 64.8 cm in diameter and 8.3 cm in height, the salver is inscribed: *Presented to The Right Honourable Lord Macmillan, P.C., K.C., LL.D. by the Government of Canada in grateful appreciation of his services to Canada as Chairman of The Royal Commission on Banking and Currency in Canada, Ottawa 1933.*

The salver, which was bequeathed to the Bank of Canada by Lady Macmillan in 1967, is part of the artifact collection of the Bank of Canada Archives.

Photography by Mone Cheng, Innovacom, Ottawa.

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70 Years of Central Banking in Canada

Remarks by David Dodge, Governor of the Bank of Canada, to the Canadian Economics Association

The Bank of Canada sponsored a special seminar, "70 Years of Central Banking in Canada," at the Canadian Economics Association meeting in May 2005 to celebrate the 70th anniversary of the Bank's founding. Four distinguished panellists, Angela Redish, David Laidler, John Chant, and John Helliwell—all former special advisers to the Bank—offered their reflections on the development of monetary policy during the past 70 years. Their presentations are reproduced in this issue of the Review*, beginning with the Governor's introductory remarks (below).**

—John Murray, Guest Editor

It gives me great pleasure to be here today with you, and to chair this special conference session celebrating the 70th anniversary of the Bank of Canada.

The Bank opened its doors on 11 March 1935, at the height of the Great Depression, and immediately faced enormous challenges. In meeting those challenges, the new Bank of Canada drew on the experience of other, established central banks. It received valuable guidance in functions such as the issuance of bank notes,managing foreign exchange reserves, and promoting financial stability.

However, such guidance did not prove to be much of an advantage in what has become the main function of the Bank of Canada—monetary policy. Up to the time that the Bank was founded, monetary policy had been subject to the tight discipline of the gold standard—a topic that Angela Redish has explored in her work. That discipline severely limited the authorities' room to manoeuvre.

The notion that countries, acting through their central banks, might actually try to stabilize macroeconomic activity within their borders is a relatively new one.

The notion that countries, acting through their central banks, might actually try to stabilize macroeconomic activity within their borders is a relatively new one. As a consequence, over the past 70 years, the Bank of Canada and other central banks have had to learn by doing—by experimenting and gradually refining the art and science of monetary policy implementation. We have received a great deal of help in this effort from the academic community, including the people here today. But it has not been an easy exercise—nor is it finished. Monetary policy is still very much a work in progress.

* Although all of the authors provide references for additional reading, readers may also consult the following for historical details and context relating to the article by John Helliwell: D. McQueen, "Economic Research at the Bank of Canada: 1935–65," *Canadian Business Economics* 5 (2–3): 89–95 (1997); and P. Duguay and D. Longworth, "Macroeconomic Models and Policy-Making at the Bank of Canada," in *Empirical Models and Policy-Making: Interaction and Institutions*, ed. M. Morgan (New York: Routledge, 2000). The former is reproduced on the Bank's website (www.bankofcanada.ca).

The Evolution of Monetary Policy

Let me now briefly review some of the significant changes in monetary policy that have taken place over the past 70 years. The Preamble to the Bank of Canada Act states that the Bank should:

> mitigate by its influence fluctuations in the general level of production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally . . . promote the economic and financial welfare of Canada.

Seventy years later, this is still an accurate description of our goal. However, the Act does not provide any practical guidance as to how this objective should be pursued.

Through the late 1930s and the early post-war period, the main concern of the central bank was to try to eliminate, and then to avoid a return to, the deflation and high unemployment of the Depression years. The government shared this preoccupation, as evidenced by the 1945 federal White Paper on Employment and Income.

We've realized that a low, stable, and predictable inflation rate is probably the best contribution a central bank can make to the economic welfare of the nation.

Things started to change in the late 1950s and early 1960s, when economists led authorities to believe that there was a permanent trade-off between a little bit more inflation and a little bit less unemployment. All authorities had to do, it was believed, was pick their preferred point on a downward-sloping Phillips curve. But the bitter inflationary experiences of the 1970s and a belated recognition that the Phillips curve might be vertical in the longer run—if not slightly upward sloping—eventually led to an increased focus on price stability as the goal for monetary policy. We began to appreciate what Olivier Blanchard calls the "divine coincidence"—that is, the realization that aggregate demand-supply equilibrium and price stability are complementary objectives. We've realized that a low, stable, and predictable inflation rate is probably the best contribution a central bank can make to the economic welfare of the nation.

Since inflation was viewed as being "everywhere and always a monetary phenomenon," monetary aggregates were used as intermediate targets. But, eventually, they proved to be an ineffective anchor. As Gerald Bouey said, we didn't abandon monetary aggregates, they abandoned us. And so at the beginning of the 1990s, in the search for a new policy anchor, central banks started to focus directly on inflation, either through implicit or explicit inflation targets.

Monetary Policy Transmission and Policy Effectiveness

The instruments that we have used for the transmission of monetary policy have also changed over the years. In the first 35 years of the Bank's existence, we relied on a "belt and braces" approach to policy execution, in the belief that credit was fungible and that every possible financial avenue had to be covered.

The result was a complex mix of primary and secondary liquidity requirements, interest rate ceilings, quantitative limits, outright restrictions and prohibitions, foreign exchange market intervention, and—when all else failed—a healthy dose of moral suasion. Attempts to describe the conduct of monetary policy turned into a bewildering stream of arcane details that left listeners confused or—it was sometimes hoped—in awe of the economic alchemists who plied this mysterious craft.

This started to change in the 1960s, particularly following the Royal Commission on Banking and Finance in 1964, chaired by Chief Justice of Ontario Dana Porter. It would be hard to overestimate the impact of this analysis, and the sea change in official thinking that was initiated by the Porter Commission.

Today, the Bank simply announces its target overnight rate, and the market does the rest—a form of virtual, yet effective, control.

The Commission's revolutionary analysis threw out the old reliance on extensive control over the financial

system. As a result, Canadian officials were among the first to understand that reserve requirements and various other controls are actually inimical to the efficient operation of the financial system. The government gradually abandoned these controls in its regulation of financial institutions, and so did the Bank in its implementation of monetary policy. Today, the Bank simply announces its target overnight rate, and the market does the rest—a form of virtual, yet effective, control, back-stopped by the Bank's ability to borrow and lend near-infinite amounts of liquidity. After decades of research, and trial and error, we have reduced the conduct of monetary policy to its essential elements—perhaps a form of alchemy, after all!

From there, the next logical step was to make the conduct of monetary policy more transparent and accountable. In the past, central banking had often been cloaked in deliberate secrecy, relying on the element of surprise for its presumed effectiveness. Governance and accountability were not considered important. Communications and reporting were limited to an annual report and a few public addresses. Now, following on the work of John Chant—albeit with a significant lag—we have a clear, highly transparent paradigm for the conduct of monetary policy, and the Bank can be held accountable for its performance. Effective communication is an essential part of that transparency.

Monetary Policy and a Flexible Exchange Rate

Finally, let me talk about the role of the exchange rate in monetary policy. Canada moved to a flexible exchange rate in 1950 and again in 1970—well before most other countries. Although this gave Canada monetary policy independence, a flexible exchange rate alone does not provide a "coherent monetary order," as David Laidler has noted. The monetary policy framework still requires a nominal anchor to help guide decisions and expectations.

As I've said before, the Bank searched for that anchor throughout the 1970s and the 1980s. The outcome of that search was our eventual adoption of inflation targets in 1991. And this anchor has exceeded our most optimistic expectations.

Looking Ahead

This isn't to say that we have reached the end of monetary policy history. The Bank of Canada and other central banks are constantly looking for improvements. The inflation-targeting framework that the Bank and the government put in place 14 years ago has performed well. It is up for renewal in 2006, and we are now in the process of assessing both its past performance and possible refinements for the future.

As in the past, we are drawing on the work of researchers both outside and inside the Bank. A long tradition of successful modelling and analysis underlies our work, going back to people such as John Helliwell, who put the Bank on the frontier of macro-modelling in the late 1960s with initiatives like RDX. This research and external networking continues and was evident in the conference that the Bank hosted last month on "Issues in Inflation Targeting."

The inflation-targeting framework that the Bank and the government put in place 14 years ago has performed well.

As we move forward and add to the Bank's proud history, it is always useful to look back. Special occasions, such as this 70th anniversary, are valuable opportunities to reflect on the work of those who have preceded us.

I look forward to the presentations of our four distinguished panellists—John Chant, John Helliwell, David Laidler, and Angela Redish—all of whom have served as special advisers to the Bank. I want to thank them for the contribution they made while at the Bank, and for their continued efforts in advancing the practice of monetary policy in Canada. They will each speak for about 15 minutes. After that, I will open up the proceedings for questions and comments.

70 Years of Central Banking: The Bank of Canada in an International Context, 1935–2005

*Michael D. Bordo and Angela Redish**

- *Canada's experience with central banking has unique features, but inflation outcomes in the twentieth century were also affected by global forces.*
- *Canada adopted central banking in the 1930s (relatively late) in response to the economic and, more importantly, political turmoil of the times.*
- *Following World War II, Canada was a pioneer in floating the exchange rate, and success encouraged broader international acceptance of floating rates.*
- *Monetarism was an early weapon in the attack on the inflation engendered by the end of the Bretton Woods system in the 1970s, but had limited success.*
- *Since the early 1990s, "inflation targets" have been seen as crucial to maintaining low inflation.*

On 11 March 1935, the Bank of Canada opened its doors. What did it see? An economy in turmoil and well-wishers from all sides of the political and economic spectrum who believed the Bank could solve their problems. Did it? What did the Bank do? That is too large a question for a 15-minute talk. We will leave aside important questions about the Bank's role in financial stability, currency management, and debt management, focusing instead on the question of monetary policy and, specifically, on the Bank's contribution in an international context: What did central banks in general do over the past 70 years, and where was Canada a notable innovator?

At the beginning of the twentieth century, a monetary orthodoxy had been created, wherein a "developed" country had a monetary unit defined as a given weight of gold and a central bank that managed the note issue and protected the value of the currency. These institutions were challenged by World War I, and especially the debts and reparations that lingered after the war, but the system was more or less re-established in the mid-1920s. By the early 1930s, the exigencies of the Great Depression led many countries to abandon the convertibility of their currency into gold, but this was widely seen as a transitory phenomenon, and a return to some link to gold was anticipated.

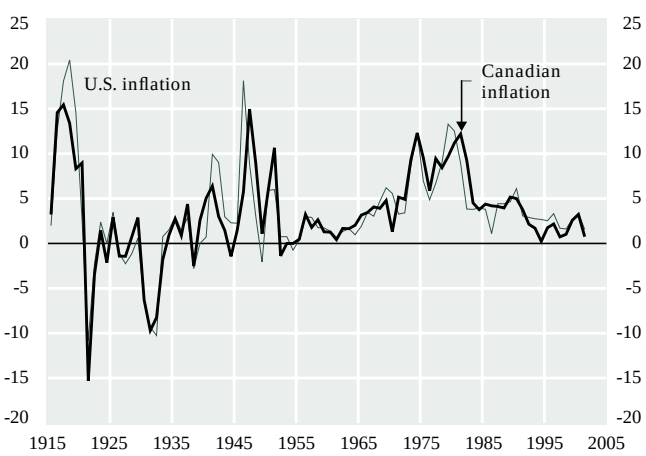
During World War II (what Temin [2002] and others have called the later phase of the second Thirty Years' War), exchange rates and foreign exchange—like many other prices and quantities—were administered by government fiat. At the conclusion of the war, at the famous hotel in Bretton Woods, New Hampshire, delegates from 44 countries designed a new international monetary regime. They established the Interna-

* Michael Bordo teaches at Rutgers University and is a Research Associate at the National Bureau of Economic Research. Angela Redish is a professor in the Department of Economics at the University of British Columbia. This paper was prepared for a panel discussion in honour of the 70th anniversary of the establishment of the Bank of Canada at the annual meetings of the Canadian Economics Association, May 2005, in Hamilton Ontario. The authors wish to thank Robert Gateman, Donna Howard, and the editors for comments.

Chart 1

70 Years of Inflation

(12-month rate of change in the consumer price index, December)



Source: Cansim I: US – D139105; Canada – P100298

tional Monetary Fund (IMF) and the World Bank; countries would gradually open up their current accounts, and currencies would become convertible; the United States—which had in fact banned the holding of gold by private individuals—would maintain the convertibility of the dollar into gold at its traditional parity, and other countries would simply maintain convertibility of their currencies into U.S. dollars, thereby creating indirect gold convertibility. The gold standard that had provided a nominal anchor to the monetary system from the 1880s to 1914 was re-established, but the chain was now rather elastic (Redish 1993).

The Bretton Woods pact finally ended in 1973, when the United States suspended the gold convertibility of the dollar.[1] The subsequent decade is known for the "Great Inflation," which, in Canada and the United States, peaked at the end of the decade at about 15 per cent (annualized). The early 1980s saw aggressive disinflation in both countries, and inflation rates have stabilized at around 2 per cent in the majority of the G–7 countries since the last decade of the twentieth century.

Where does the Bank of Canada fit into this story? The behaviour of inflation is evidence of the important background fact that there can't be a completely idiosyncratic Canadian story—inflation rates, at least, performed more or less the same in Canada and the United States (Chart 1).[2] However, there can still be an important role played by the Bank of Canada. Perhaps the Bank managed to minimize the negative consequences of inflation and disinflation for the Canadian economy? Perhaps Canadian policy led U.S. policy? Perhaps Canadian policy was implemented more efficiently? Again, we focus on only a piece of the answer, on the half-dozen issues where Canada, for better or worse, was slightly out of step with (ahead or behind!) international experience:

- lack of a central bank in the early years
- the floating rate in the Bretton Woods period
- the explicit monetarism of the mid-1970s
- the adoption of inflation targets in the early 1990s, and
- the implementation of monetary policy with standing facilities in the 1990s.

The Establishment of the Central Bank

The core Western countries operating on the gold standard (e.g., the United States, the United Kingdom) all had central banks that held a monopoly over the note issue and performed, to differing extents, such functions as clearing house, lender of last resort, and centra reserve depository. The gold standard, however, operated as a nominal anchor that severely constrained their ability to operate monetary policy.

Canada also held to the gold standard, but without a central bank. Notes were issued by competing private banks and, like central bank notes, were convertible into gold on demand.[3] The government did issue a statutorily limited amount of notes in small-denomination (up to $5) notes, which constituted about 20 per cent of the note issue, and "large legals."[4] Both were legal tender and convertible into gold on demand. The government also operated a discount

1. The United States was following an inflationary policy that was inconsistent with the dollar being the central reserve currency. See Bordo (1993).

2. The U.S. data are used because they are easy to find; a more complete graph would have inflation rates for all of the G–7 countries, but the picture would be broadly the same.

3. More correctly, they were converted into legal tender, which included gold coin and Dominion notes (see below).

4. Large legals were Dominion notes in large denominations that were only legal tender between banks and were therefore "theft-proof" and superior to gold as a means of handling reserves. Data for 1913 (McIvor 1958, 67).

window at which the banks could borrow Dominion notes. The association of the chartered banks—the Canadian Bankers' Association (CBA)—operated the clearing house. While attempts to establish a central bank had been made at various times in Canadian history, the system appeared to function relatively well. So why create a central bank in 1934?

In a previous paper (Bordo and Redish 1987), we argue that the primary reason was political expediency. A variety of constituencies were in favour of a central bank: Western populists wanted to take the power to create money out of the grubby profit-maximizing hands of eastern banks; others believed that a central bank would remove the potential power of money creation from the greedy hands of government. Academic economists argued that a central bank would "manage the currency and credit in the best interests of the Canadian economy" and would provide impartial economic advice to the government, as well as facilitating greater international co-operation and policy coordination (McIvor 1958, 144).

Ironically, one of the strongest arguments traditionally adduced for central banks—that they can be a necessary lender of last resort—was substantially weakened in the early 1930s when one-third of U.S. banks failed, while no Canadian bank did.[5] The CBA argued against the establishment of a central bank on the grounds that note issue by the private (chartered) banks created elasticity in the money supply that enabled the Canadian system to handle shocks particularly well.

The Bank of Canada was established to satisfy a political desire for government action during the most serious business-cycle downturn Canada had experienced.

Perhaps the critical argument for a Canadian central bank was "national pride." The 1930s was generally a decade of assertive nationalism: the founding of Trans-Canada Airlines (forerunner of Air Canada), the creation of the Canadian Broadcasting Corporation (CBC), and the passing of the Statute of Westminster were three other features of this time. At two major international conferences designed to restore and maintain the international financial system, the International Financial Conference in Brussels in 1931 and the World Economic Conference in 1933, the major powers called on all developed economies to establish a central bank to provide the tools for international coordination. Finally, Prime Minister Bennett, speaking in 1933, declared that he had in fact decided in December 1931 to establish a central bank:

> I learned to my surprise that there was no direct means of settling international balances between Canada and London, that the only medium was New York, and the value of the Canadian dollar would have to be determined in Wall Street. I made up my mind then and there that this country was going to have a central bank (Stokes 1939, 65).

The Bank of Canada, then, was established to satisfy a political desire for government action during the most serious business-cycle downturn Canada had experienced. The Bank expected that the gold standard would be re-established, perhaps in an environment of greater international coordination.[6]

Floating in a Sea of Fixed Currencies

Canada had been an enthusiastic contributor to the Articles of Agreement that established the IMF. Canadian officials had argued that Canada would be a definite beneficiary if a stable system of exchange rates were established after World War II, rather than returning to the somewhat chaotic exchange rate system of the late 1930s, when some currencies were inconvertible and payments were cleared bilaterally rather than multilaterally.

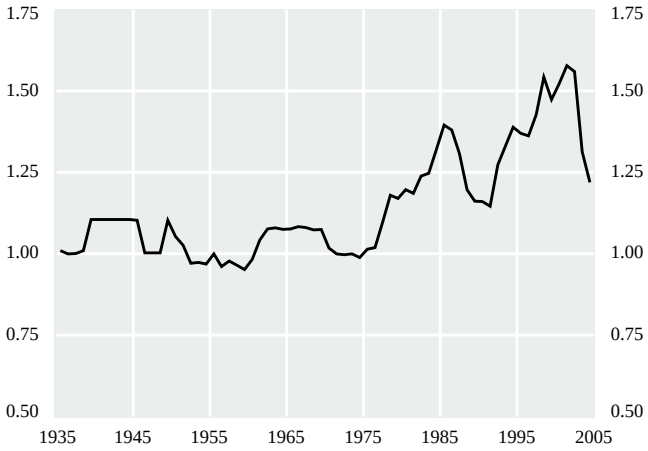
The Canadian dollar was fixed against the U.S. dollar during the war, and in July 1946, was revalued to parity against the U.S. dollar (Chart 2). In late 1949, Canada joined Britain and a number of other countries in devaluing against the dollar, returning to the wartime rate of 90 cents. But through 1950, capital inflows generated by investment opportunities in the resource sector, and accelerated by the onset of the Korean War, led to a significant increase in international reserves. This in turn encouraged speculation that Canada would revalue, generating short-term capital inflow;

5. We note, however, the argument of Kryzanowski and Roberts (1993) that it is unclear whether this reflected financial soundness or regulatory forbearance.

6. The Bank of Canada Act required that notes be convertible into gold on demand, with the provision that the government could suspend convertibility if it so desired, which it immediately did.

Chart 2

Price of a U.S. dollar (in Can$)



Source: 1950 on, Cansim II: V37426 Noon spot rate; December observation
Before 1950, Bank of Canada *Statistical Summary*, various years

in October 1950, the decision was made to float the dollar. The Minister of Finance (speaking in 1952) stated that, "No one could decide with any reasonable assurance what new fixed rate could be maintained. We had no choice but to leave the rate free to find its own level in the market" (cited in Wonnacott 1960, 58).

The decision to float the currency in the absence of either fiscal exigency or financial crisis was possibly without precedent. The government argued—at least as rhetoric for allaying the concerns of the IMF—that the float was a transitory adjustment mechanism rather than the permanent adoption of a fiat money currency.

Surprisingly to some, the float itself was relatively tranquil—at least for the first decade. The Canadian dollar appreciated and by mid-1952 was at a 4 per cent premium relative to the U.S. dollar. It remained in the $1 to $1.05 range through the 1950s before depreciating well below parity with the onset of the Coyne Affair in 1961. In that traumatic event in Canadian monetary history, the Minister of Finance requested the resignation of James Coyne, Governor of the Bank since 1955. Coyne initially refused, but resigned six weeks later, after a government bill declaring the governorship vacant was defeated in the Senate. The stability of the currency in the 1950s became a key data point in the debate over fixed vs. flexible exchange rates that raged in the late '60s and early '70s. Advocates of flexible rates argued that the Canadian experience showed that flexible rates would not necessarily bring the competitive devaluations and currency chaos of the 1930s. Speculation would tend to be stabilizing rather than destabilizing.

Canadian experience showed that flexible rates would not necessarily bring the competitive devaluations and currency chaos of the 1930s. Speculation would tend to be stabilizing rather than destabilizing.

With hindsight, there are a couple of caveats: (a) Canada was a small open economy, and (b) was operating in a larger world that had maintained its nominal anchor. The first didn't require hindsight! Writing in 1935, Lionel Robbins had stated "While it may be quite possible, and not necessarily very harmful to the rest of the world, for small countries acting in isolation to attempt to solve their local problems by such expedients [i.e., flexible exchange rates], their general adoption in the big financial centres can only lead to perpetual confusion and instability" (cited in Wonnacott 1960, 21). Without necessarily buying into the second half of this statement, we can note that what works for a small open economy may not work for a global system.

Extending this argument, it is critical to contextualize the Canadian experience. We now know that having a nominal anchor is a key ingredient for successful monetary regimes. The Canadian experience, which was emphasized as being transitory in nature, and which occurred in a world where the leading currencies were attached (albeit loosely) to gold, was not able to provide evidence about the need for a nominal anchor. Thus, when flexible rates were widely adopted in the 1970s, it took time to develop monetary stability.

Monetarism

The 1970s have become known as the decade of the "Great Inflation," and Canada, like many other countries, including the United Kingdom and the United States, experienced unprecedentedly high rates of inflation. Today, the causes and sources of the inflation are hotly debated, with blame being variously attributed to oil shocks, poor data, or poor economic models. In 1975, the rate of inflation in the Canadian consumer price index (CPI) hit 14 per cent, and the Canadian government responded. The government adopted

wage and price controls, and the Bank adopted monetarism as an anti-inflation policy. Monetarism in its purest form is associated with the *k* per cent rule proposed by Friedman (1960). He argued that the combination of the lags in policy-making, the imperfect information available to policy-makers, and the potential expediency of policy implied that countries should adopt constitutional amendments that required a monetary aggregate to grow at a fixed rate annually, that rate being something like 5 per cent.[7]

The end of the Bretton Woods system led many countries to search for a nominal anchor—a clear target for monetary policy — and as inflation rose, many adopted variants of this monetarist prescription. The Bundesbank targeted reserves; the Bank of England targeted sterling M3; the Bank of Japan announced forecasts for M2 beginning in 1978 (Bernanke and Mishkin 1992). In the United States, the Federal Reserve announced targets for three monetary aggregates, but appeared to be more interested in monitoring monetary growth than targeting it. Bernanke and Mishkin argue that Fed policy was not particularly restricted by monetary targets before Volcker's announcement of a new commitment to combatting inflation in October 1979.[8] The Bank of Canada targeted M1 and chose a gradualist approach, starting with a target growth range for M1 of 10 to 15 per cent, and then over time lowering the range to 8 to 12 per cent and then 4 to 8 per cent. Relative to the Fed, the Bank was much more committed to the monetarist rhetoric, at least in the '70s.[9]

But the monetarist experiment was not a success. After an initial pause, undoubtedly helped by wage and price controls, inflation returned to double-digit levels, despite a growth rate of M1 that was less than the target rates for most of the 1975 to 1980 period. Essentially, a potent combination of very high nominal interest rates, reflecting inflationary expectations, and the diffusion of computing power dramatically reduced the demand for demand deposits.[10] Households switched from demand deposits to daily-interest chequing accounts (which legally allowed the banks to claim "notice" of withdrawals so were not demand deposits), while firms used sweeps to minimize their overnight balances.[11]

In November 1982, arguing that "the targets abandoned us," the Bank officially ended M1 targeting. Yet Chart 1 shows that, by 1983, inflation had been, if not vanquished, at least brought under control. What ended the Great Inflation of the 1970s? There was no clear replacement for the policy target, and indeed there would be no new paradigm until the introduction of inflation-targeting in the early 1990s. The general consensus is that the Bank of Canada piggybacked on the U.S. anti-inflation policies by adopting an implicit exchange rate target. As the United States raised interest rates, and the U.S. dollar appreciated, Canada chose to follow U.S. rates up. The result was a negative rate of real money growth (M2), a 4 per cent decline in real gross domestic product (GDP), and a fall in inflation from 12.5 per cent in 1981 to 5.8 per cent in 1983.

Inflation Targets

In February 1991, the Minister of Finance and the Bank of Canada jointly announced that the Bank would target the CPI inflation rate.[12] At the time, the inflation rate was close to 6 per cent, and an initial target of 3 per cent for the end of 1992 (to be gradually reduced to 2 per cent by 1995) was announced. Inflation targeting has been broadly successful. Whereas in past decades monetary policy has been controversial and has generated heated debate in the literature, today, there is broad acceptance—possibly disinterest—amongst Canadians about the conduct of monetary policy.

Ironically, it was Governor Bouey who (in 1982) spoke of "finding a place to stand," because that is precisely what inflation targeting has provided. But it is important to remember what inflation targeting isn't. Inflation targets are not necessary to cause disinflation, or even to stabilize inflation; as noted earlier, the United States has a similar inflation history without explicit inflation targets. Inflation targets were not involved either in the end of the Great Inflation of the '70s, a much more critical anti-inflation step. Nor is there much evidence that they made the decline in inflation less expensive in terms of unemployment (Laidler and Robson 1993, 137). It should also be emphasized—as

7. That is, a rate that if accompanied by real growth of 3 per cent per year and a fall in velocity of 2 per cent per year would yield price stability.

8. Paul Volcker became Chairman of the Federal Reserve Board in August 1979.

9. See Bernanke and Mishkin's conclusion that the rather haphazard schedule for announcing new targets, and their base periods, implied a lack of commitment.

10. Freedman (1983, 103) notes that "Unlike the situation in the United States, deregulation played absolutely no role in the developments in either the household or the corporate sector." See also Courchene (1983, 37–51).

11. The differential reserve requirements (3 per cent for notice deposits, 10 per cent for demand deposits) were undoubtedly a factor in the banks' strategy. See Courchene (1983, 44).

12. The Bank of Canada was not the first central bank to adopt inflation targets. The Reserve Bank of New Zealand adopted them in March 1990.

the Bank has on many occasions—that inflation targeting is not inconsistent with a concern for employment (as required by the Bank of Canada Act).

What is inflation targeting? As conducted in Canada, it is an explicit commitment by the Bank of Canada to orient policy to attain a particular rate of growth of the CPI, currently 2 per cent. The tools that the Bank uses to attempt to attain that goal include (a) using a projection model to determine what overnight interest rate would be consistent with a 2 per cent inflation rate within 8 quarters, and setting the target for the overnight rate at that level,[13] and (b) a communications strategy. There was a dramatic change in the transparency of monetary policy between 1994 and 2000. This is probably most starkly put by noting that, in 1994, individuals in the economy had to guess that the Bank had changed its monetary policy stance—there was no announcement. For example, Laidler and Robson (1993, 77) describe how "students of the Bank of Canada's actions" may want to look at the spread "between overnight rates and the yields on such money market securities as T-bills" as an indicator of the stance of monetary policy. There were no announcements; there was no *Monetary Policy Report* (*MPR*); the market would learn that the Bank's policy had changed because the Bank was intervening at a different rate than yesterday morning.

At the beginning of the twentieth century, the gold standard provided a nominal anchor for the monetary system . . . [but it] was an anchor that could shift arbitrarily and that imposed real resource costs; fiat money avoids these disadvantages.

Have we come full circle? Have we just switched anchors? At the beginning of the twentieth century, the gold standard provided a nominal anchor for the monetary system, and central banks were seen as handmaidens to the gold standard, which could ease necessary adjustments and facilitate international co-operation. There is a broad congruence—inflation targets provide a visible, comprehensible characterization of the monetary regime—but there are definite limits to the parallels.

- The gold standard evolved over centuries, and its credibility reflected that history.
- The gold standard was, in an important way, an automatic system; inflation targets require greater skill.
- The gold standard was closer to a price level than inflation targets, since it did not incorporate base drift.
- Most significantly, the gold standard was an anchor that could shift arbitrarily (with gold discoveries or any changes in demand and supply to gold), and that imposed real resource costs; fiat money avoids these disadvantages.

Implementation of Monetary Policy Using Standing Facilities

The mechanisms for implementing monetary policy have evolved gradually over the decades, but the changes in the 1990s were sufficiently important that they merit special mention. These changes include:

- the phase-out of reserve requirements (1992–94)[14]
- the shift from focusing on the 3-month treasury bill rate to setting a 50-basis-point (bp) range for the overnight rate (mid-'94), implemented by manipulating the supply of settlement balances using changes in the amount of government funds on deposit and open-market operations
- first issue of the *MPR* (May 1995)
- setting the Bank Rate as the top of the target range for the overnight rate (rather than having it tied to the T-bill rate) and issuing press releases to announce changes in the target (February 1996)
- introduction of the Large Value Transfer System (LVTS) in February 1999 (see below)
- introduction of "fixed dates " for announcing monetary policy decisions (December 2000).

13. In the language of Courchene (1976), the instrument of monetary policy is the overnight rate, and the intermediate target is the forecast of the inflation rate.

14. This change—the reduction of the required reserve ratio to zero—was less radical than it might appear. By the mid-1990s, the high demand for currency to stock automated teller machines, which also, of course, could be used to satisfy reserve requirements, combined with the stagnant demand for demand deposits, meant that the existing ratio was barely binding.

In the 1990s, the majority of large economies moved from a deferred net settlement system to a real-time gross settlement system, primarily to give real-time finality to large payments and to reduce systemic risk. In Canada, the LVTS came on-line in 1999, and at the same time the Bank also began paying interest on settlement balances. Direct clearers (mainly the large banks and non-bank financial institutions) now operate in an environment where the Bank provides (a) an infinitely elastic supply of settlement balances (collateralized) at the Bank Rate (defined as 25 bp above the target for the overnight rate), and (b) an infinitely elastic demand for deposits paying interest at the target overnight rate less 25 bp. The spread (which far exceeds the bid-ask spread on overnight loans of about 10 to12 bp) is wide enough to encourage participants to use the market for overnight funds rather then the Bank's facilities.[15]

The net effect of the elimination of reserve requirements, the introduction of the LVTS, and the establishment of standing facilities for overdrafts and deposits has been to streamline the operation of monetary policy. The overnight rate stays very close to the target—far closer than in the United States for example (Woodford 2000), and the reserve tax that led to a distortionary wedge between financial institutions (banks and others) and between different liabilities of the same institution (demand deposits and notice deposits) has been eliminated.

Conclusion

The Bank of Canada has been in operation for just over 70 years and has seen dramatic changes in the Canadian economy, in the structure of international finance, and in the nature of money. The change in the balance sheet of the Bank between March 1935 and March 2005 (Table 1) highlights some of the changes: the absence of gold on the asset side and the absence of bank reserves—or today's equivalent, deposits made by members of the Canadian Payments Association (CPA)[16]— on the liability side. Yet, as noted earlier, there is also remarkable continuity in its mission.

The current monetary situation would appear to be as calm as any that the Bank has experienced, but we should beware of complacency. The history of the Bank is one of being buffeted by both sharp crises and slower-moving evolutionary forces. One hundred years ago, in 1905, the gold standard was working smoothly, and the Canadian economy growing robustly. But the financial crisis of 1907, and the cataclysm of 1914, were not far distant. It is, of course, difficult to foresee the particular direction from which threats to the stability of the monetary system may come, but that they will come cannot be in doubt.

Table 1

Balance Sheet of the Bank of Canada

	March 1935 $ millions	March 2005 $ billions
Assets		
Gold	106	
Government securities	152	42.9
Miscellaneous	11	0.9
Total	269	43.8
Liabilities		
Notes in circulation	45	
Notes in chartered banks	51	
Bank deposits	149	
Notes (including $3 billion in banks)		41.7
Government deposits		1.4
Miscellaneous	24	0.7
Total	269	43.8

Note: The ratio of Bank of Canada assets to gross domestic product was 6 per cent in 1935, and 3 per cent in 2004.
Source: Bank of Canada *Statistical Summary*, and Bank of Canada website

It is difficult to foresee the particular direction from which threats to the stability of the monetary system may come, but that they will come cannot be in doubt.

In the meantime, the environment in which the Bank operates continues to evolve, and the forces of globalization and technological change (and the nature of the state), which have driven the evolution of central banking, will largely determine the look of the Bank in another 70 years.

15. On a typical day, the average overnight rate is quite close to target, and use of the two facilities is limited.

16. CPA member deposits were less then $1 billion in 2005.

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Free Banking and the Bank of Canada

*David Laidler**

- *The Bank of Canada came on the scene rather late in the country's history, and its performance was uneven in the post-war years. The high esteem it currently enjoys is mainly the result of its policies in the years since 1990.*
- *The need for a central bank has often been questioned. A free-banking system made up of competitive commercial banks, it is sometimes claimed, would deliver price-level stability, not because anyone would set such a goal, but because the self-interested behaviour of the individual banks would generate it.*
- *A free-banking system would probably guarantee the value of its liabilities through a form of currency convertibility (e.g., the gold standard), but the centralizing tendencies in reserve holding inherent in banking systems would undermine its competitiveness. By the 1950s, central banking had become the norm, and a consensus had developed that monetary policy should help the government pursue goals set by the electorate.*
- *Initially, the Bank of Canada was mandated to provide both a stable external value for the currency and a measure of stability to the domestic economy. Unresolved issues about the content of monetary policy and the appropriate division of responsibility between the government and the Bank came to a head in the Coyne Affair of 1961, resulting in a dual-responsibility doctrine that protects the Bank of Canada from becoming completely subservient to the government.*
- *Although Canadian central banking has developed some of the features of free banking, critical differences remain. The most significant is that the Bank of Canada's inflation targets provide the anchor for orderly price-level behaviour rather than the convertibility guarantee of a free-banking system.*

The Bank of Canada's Foundation

It is easy to take the Bank of Canada for granted. As it tells visitors to its excellent website, it is Canada's central bank, something that, to judge from today's appearances, no self-respecting country would ever want to be without. And yet there are a few oddities here.

To begin with, today we are celebrating the Bank's 70th birthday, and yet Canada is nearly twice that age. Evidently, the country was able to get along without a central bank for quite some time, and it is notable that the representatives of the local banking industry on the Macmillan Commission that played midwife at the Bank's birth would have preferred that event not to have occurred. Furthermore, it is not very long since such distinguished commentators as Herbert Grubel (1999) and Tom Courchene and Richard Harris (1999) were suggesting that life without the Bank of Canada might once again be worth experimenting with, and it seems unlikely that we have as yet seen the end of the debate they stirred up.

In 1935, the infant Bank inherited many of its traits from a certain old lady, resident in Threadneedle Street. Walter Bagehot (1873) had long before then declared that lady's central position in the British monetary system to be peculiar to her political and economic circumstances, and had contrasted British arrangements unfavourably with the more natural ones that he believed to prevail in the United States,

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another country that was seemingly able to do without a central bank for a long time (but nevertheless got one in 1913). Monetary history in the twentieth century under central banking, moreover, was not pretty. The Bank of Canada can hardly be blamed for the severity of the Great Depression, but other central banks, not least the Fed, can and have been, with considerable plausibility; and the Bank must surely take some responsibility for the local version of the Great Inflation that began in the late 1960s and finally came to an end around 1990. The high esteem in which the Bank of Canada is now widely, though not universally, held is recent, being mainly a product of the years since 1990.

In short, the Bank of Canada came late on the scene, was not wanted to begin with in certain well-informed quarters, did not begin to live up to anyone's expectations until very recently, and still has its share of critics. Perhaps, then, Bagehot was right. Perhaps it is possible to live comfortably without a central bank, and perhaps there is something about the Bank of England model that has made it hard to transplant. Perhaps monetary systems would have worked better had they been allowed to develop along the lines he considered natural, Canada's included.

Free Banking

The banking system that Bagehot thought "natural" was made up of many competitive commercial banks of more or less equal size, each one holding its own reserves of gold, and issuing its own notes and deposits, and his ideas here were not unique.[1] As Lawrence White (1984) stressed, they are to be found in earlier nineteenth-century British debates about the configuration of the monetary system, nor did they quite die out after he wrote (see, e.g., Smith 1936). However, they represented a minority view. Mainstream monetary economics then and later had it that unregulated competitive banking would be inflation-prone, and that the ministrations of some central agency were required to impose a limit on the creation of money that market mechanisms could not spontaneously generate.[2] Only with such an institution in place could desirable price-level behaviour be guaranteed, though quite what form it might take and how much discretionary powers it might be given were more controversial matters.

Mainstream monetary economics then and later had it that unregulated competitive banking would be inflation-prone, and that the ministrations of some central agency were required to impose a limit on the creation of money that market mechanisms could not spontaneously generate.

So matters stood among most monetary economists until the 1970s, when it became once more apparent, and painfully so, that central banks could develop inflationist tendencies of their own, though widely held ideas about a "new inflation," driven by deep sociological causes, stood in the way of the recognition of this fact for a while. Persuasive also were arguments derived from then-new analysis of "public choice," that governments and their agents might themselves have an interest in generating inflation, and by the 1970s it was clearly time for another look at the theory of free banking, and at the considerable amount of empirical evidence that had been generated in the many economies that had not been blessed with a central bank since the eighteenth century but had continued to function nevertheless. Here it will suffice to mention a few early landmarks in the literature that ensued—Benjamin Klein (1974), Earl Thompson (1974), Friedrich von Hayek (1976)—and to note that these and subsequent contributions would ultimately have enough of an impact on mainstream thought to transform what had originally been regarded as cranky notions that could be safely ignored into a critique of conventional wisdom that had to be taken very seriously indeed.

Conventional wisdom had held that free banking would be inflation-prone because individual banks would have both incentives and opportunities to debase their liabilities at the expense of an ill-informed public. Not so, said the free bankers: rather, it was central banks, acting as agents of government, which had those incentives and opportunities. Private banks, on

1. In the nineteenth century, the phrase "free banking" indicated a system in which banks could be created without having to seek a charter to operate, provided they complied with certain general legislation. Nowadays, it refers to a competitive system that operates without a central bank. George Selgin and Lawrence White (1994) provide an excellent survey of modern literature on the topic.

2. For an influential twentieth-century statement of this view, see Milton Friedman (1960, especially pp. 4–9). Friedman wanted monetary policy to be constrained by a quasi-constitutional rule, mainly to prevent the central bank, whose existence he deemed necessary, from abusing its powers.

the other hand, would find it profitable to create and maintain reputations for probity for the simple reason that such reputations had a positive market value. Competition, moreover, would force such banks to pay interest on their monetary liabilities at the market real rate of return minus the real marginal cost of maintaining them in circulation, plus a premium to offset any expected rate of depreciation in their purchasing power. If the public preferred that the money they held did not depreciate, which seemed plausible, if only because of the extra computational costs that would be thus avoided, then competition would also ensure that the expected rate of depreciation in question would converge on zero. Competitive banks could, and therefore would, signal their good intentions in this regard by guaranteeing commodity convertibility in some form, and the system as a whole would be likely to settle on a common commodity (or bundle thereof) for this purpose, which would also function as the medium in terms of which interbank clearing imbalances were settled.[3]

Now, of course, the free bankers knew very well that, in the days before central banks, or, in the case of Britain, before the Bank of England had become conscious of its role as such, many banking systems had been prone to instability, but this characteristic, they argued, was not inherent in competitive banking. Rather, it was typically the product of measures that restricted—and in some cases altogether eliminated—the ability of private banks to issue their own currency. Strong seasonal swings in the public's demand for currency, associated in particular with the harvest in what were still predominantly agricultural economies, artificially created fragility that would not have existed had each bank been free to vary the ratio of currency to deposits among its own liabilities. Where such freedom existed, suspicions about the solvency of any particular institution would have been unlikely to generate contagious bouts of fear about the liquidity of the system in general, and such problems could then have been managed without disruption to the market as a whole. Thus the need for a central "lender of last resort" to come to the aid of the system as a whole, and to "solvent though illiquid" members of it in particular, in times of general crisis would have been, if not eliminated, then certainly significantly reduced.

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Nor was the foregoing case for free banking advanced on a purely *a priori* basis. An extensive literature reexamined various episodes in monetary history, and if it did not quite make the case that the analysis advanced in support of free banking in the 1970s was right in every respect, it certainly established beyond reasonable doubt that a great deal of what economists had previously thought they knew about certain crucial facts of monetary history was at least as much the result of viewing them through the prism of conventional views about the inherent instability of systems unfortunate enough to lack central banks as it was of a dispassionate weighing of the evidence.

Centralizing Tendencies Inherent in Banking

According to Bagehot, the Bank of England's unique role in the British financial system of his day arose from the fact that the country's gold reserves were concentrated there and that its liabilities (notes and deposits) had become the principal reserve asset of the rest of the banking system. It was these facts that imposed upon the Bank, a privately owned for-profit joint stock company, a public responsibility for the system's overall stability. But these facts, Bagehot believed, were the consequences of a particular and uniquely British history of government intervention in the financial system. That is why he presented his analysis as relevant only to Britain. But he was wrong to do this, because he was also wrong to believe that

3. The free-banking literature contains many ingenious schemes for convertibility anchors that go far beyond simple metallic standards, such as those based on gold and silver. As Angela Redish has reminded me, some work goes so far as to speculate about the potential stability of systems with no such anchor at all. Selgin and White (1994) survey this material, which there is no space to discuss here, with admirable clarity. Suffice it to say that I share their skepticism about the viability of systems that lack any convertibility anchor, and that to it I add a further personal judgment: namely, that, to be politically durable, monetary policy arrangements need to be kept simple, and that some of the more complex schemes that have appeared in the free-banking tradition, though apparently theoretically viable, would probably fail this test in practice.

there were no centralizing tendencies inherent in the nature of banking.

That there was indeed just such a tendency had been sensed as early as 1802 by Henry Thornton, but it was not until 1888, and therefore after Bagehot's death, that its nature was fully set out by Francis Y. Edgeworth in his "Mathematical Theory of Banking." The first two words of this title must have been forbidding indeed to potential readers among Edgeworth's contemporaries—as they perhaps remain even today—which is perhaps why he took pains to explain its central message by use of a most appealing analogy. Consider, he suggested, the problem faced by the chef of a London club. He had to be able to provide dinner on demand to all members who required it, but their number would fluctuate day by day. However, that chef could rely on two things: first, the more members his club had, the smaller would be the proportional variation in the number of dinners demanded from day to day; and second, his fellow chefs at other clubs in the city faced the same problem. From these considerations it followed that, if those chefs got together and centralized their stocks of ingredients, they could operate more cheaply than if each worked independently. This was not only because of the usual workings of the law of large numbers, but also because, on any given evening, some of the members missing from one club would be found at another, dining as guests of their friends.

And so it was with banks. Some demands on their reserves would come from creditors who wanted to convert deposits into cash, and some would be the result of adverse clearing balances with other banks. Economies of scale were inherent in the holding of reserves, and, as with the chefs, it would pay the banks to pool their reserves and have them managed for the benefit of the system as a whole.

Though he himself did not dwell on this point, Edgeworth's analysis implied that, quite apart from the unintended consequences of a particular history and set of legal restrictions in the particular case of Britain, there is a good economic rationale for the centralization of reserves within any banking system. This is not to say that much of what Bagehot had to say about the role of the former in the evolution of the Bank of England was not crucially relevant to determining the particular path that centralization took in Britain, but it is to say that what he took to be the configuration of banking in the United States—a single layer of banks of rather similar size, each holding its own stock of reserves—was anything but natural, and would not have developed in Britain under any circumstances, as indeed it had not in the United States either.[4]

There is a good economic rationale for the centralization of reserves within any banking system.

By the 1870s, the U.S. system had already moved a long way towards centralizing its reserves, and it was also displaying the same tendencies to periodic crises that were evident in Britain. Rural banks were holding reserves in the banks of the large cities in their regions, and among the latter, New York was beginning to form yet another layer in the pyramid where other city banks held reserves of their own with institutions that also provided crucial links between the domestic and international monetary systems. Canadian banking, furthermore, though operating in a very different legislative environment, was in many respects a component of this U.S. system.

A good case can be made that crises occurred in Britain in the nineteenth century because the Bank of England would not exercise the responsibilities that its place in the system imposed on it, but though it is tempting to argue that the problem was even more intractable in the United States because no similar institution even existed there to take on the job, this would not be quite right. In the U.S. system, as Richard Timberlake (1993, Chapter 14) shows, the role analogous to that assigned by Bagehot to the Bank of England could, and sometimes was, taken on by the clearing-house associations through which the banks of the larger cities transacted with one another, and for a similar reason: those banks tended to pool some of their reserves with the clearing house, which was then in a position to manage them on behalf of its members.

This is not to say that the clearing-house associations were always good managers. Indeed, it has long been accepted that their behaviour during the 1907 crisis, which gave a considerable impetus to the foundation

4. Richard Timberlake (1993) provides an underappreciated but thorough and perceptive account of the evolution of the U.S. monetary system from the days of Alexander Hamilton up to the early 1990s.

of the Federal Reserve System, was particularly inept, and certainly worse than in 1873.[5] But we need to keep a certain sense of perspective here. If we follow conventional wisdom in treating the Baring Crisis of 1890 as marking the final emergence of the Bank of England as a credible central bank, we must also concede that this was the culmination of more than a century of trying to get things right. Furthermore, a comparison of the performance of American clearing-house associations in 1907 with that of the Fed in the period 1929 to 1932 hardly favours the latter. Had they been given a little longer to learn, the clearing houses might well have emerged as competent executants of what we usually think of as some of the key functions of a central bank, notably that of lender of last resort, and perhaps the New York house might have ended up providing such services to the system as a whole.[6]

The foregoing argument is relevant far beyond the specific history of the American monetary system. Rather, it amounts to a conjecture that, as a general matter, market mechanisms, left to themselves, are capable of creating a stable monetary system unaided by the activities of government, beyond those aimed at providing a legal framework of well-defined property rights buttressed by sanctions against theft and fraud.

And yet, the argument is not quite complete. Though it makes a plausible case that such a system would be capable of providing a good measure of monetary stability, based on commodity convertibility kept in place by the self-interest of individual banks, the key role it assigns to the clearing system and the centralization of reserves there seems to imply that such arrangements are prone to a natural-monopoly problem. Access to the business of banking on a competitive footing would appear to depend upon access to the clearing system, and in an exercise in conjecture such as we are here pursuing, it is surely fair to ask whether some form of government intervention might not be called for to regulate the clearing house. Or to put it another way, an institution evolving from market forces to perform some of the functions that we associate with actual central banks might, by force of necessity, have acquired another of their features, namely, being the object of government control.

5. This is a view that goes back at least to Oliver Sprague (1910).

6. And, it should be recalled, the Depression saw no bank failures in Canada, despite the absence of a central bank during its early, but crucial, years. The existence of branch networks, co-operation among banks, and perhaps, regulatory forbearance kept the system viable.

Twentieth-Century Central Banking

Whether market mechanism might indeed have been capable of evolving and supporting stable monetary systems unaided by government must remain an open question in the face of the simple fact that the history of the twentieth century did not permit the experiments that might have settled it to be carried out.

Underlying the free-banking scenario is the hypothesis that such a system would have guaranteed the stability of the value of its liabilities by offering some kind of commodity convertibility. But commodity convertibility (predominantly in the form of the gold standard) as an unquestioned fact of monetary life did not survive World War 1. In the real world, governments have functions beyond the purely economic, and, after 1914, the exigencies of war finance forced governments almost everywhere to subordinate the preservation of monetary stability to other more pressing needs, while after 1918, the system proved to have become too badly dislocated to be mended with the tools available within the post-war international political system.

Demystifying the gold standard . . . robbed it of much of its moral and political authority.

But there were other reasons for the demise of the gold standard, and these had deep roots in economic ideas. The monetary debates of the second half of the nineteenth century, and particularly the controversy about bimetallism, generated great advances in our understanding of how commodity convertibility worked, and, as I argued in Laidler (1991), by demystifying the gold standard in particular, they robbed it of much of its moral and political authority. From being, in Thomas Tooke's (1844) phrase "the *sine qua non* of a sound monetary system," gold convertibility became simply one among several possible foundations upon which a monetary order could be built, and one that seemed to have a number of apparent drawbacks as well, two of which are crucial in the present context.

The first of these was noticed even in the nineteenth century, by, for example Alfred Marshall (1887): namely, that gold convertibility at a fixed price was not, after all, necessarily the best way of guaranteeing domestic

price-level stability, and that in designing alternative monetary arrangements, a choice between the two objectives might have to be made. The second was also well known in the nineteenth century, but attained great practical importance from 1914 onwards: namely, that gold convertibility, and indeed commodity convertibility of any sort, would prevent governments from using their monetary systems as sources of revenue. As economics developed from the 1920s onwards, it also became apparent that it would prevent them using monetary policy to attain other goals, notably on the output and employment front.[7]

By the 1950s, developments in economics had created something close to an intellectual consensus, well represented in Canadian literature by H. Scott Gordon (1961), according to which, rather than have a monetary system designed to limit the actions of government, its configuration should be such as to help the government pursue a wide range of undoubtedly worthy goals that electorates set for it. No policy apparatus that lacked a central bank, preferably working in close co-operation with other branches of government, seemed complete, and those who questioned this seemed to be either hopelessly unenlightened representatives of conservative political interests, or otherworldly intellectuals. The simplest thing that can be said about the place of ideas about free banking in an intellectual marketplace dominated by such views is that there wasn't one.

Highlights in the Bank of Canada's History

The Bank of Canada was founded while this intellectual consensus was still developing. That is probably why it was mandated to provide both a stable external value for the currency and a measure of stability to the domestic economy as well. In 1935, informed opinion had not given up hope for the gold standard, even though it was already alert to the possibilities of activist stabilization policy, nor had it yet swallowed the idea that, because fiscal measures could also be directed to the latter end, a high degree of subservience of the Bank to elected governments would be desirable. Indeed, the fact that the Bank was initially set up with significant private ownership suggests that its founders also took a large degree of independence on its part for granted.

As we know, the Bank became a Crown corporation in 1938, without any attention being paid to modifying its governing legislation to clarify the division of policy responsibility between it and its new sole owners, and as we also know, this would in due course lead to serious trouble at the end of the 1950s in the form of the Coyne Affair.

There is no space here to go into the many convoluted details of this series of events. Suffice it to say that, though Governor Coyne's monetary policies were based on an uncertain grasp of the inter-relationships among Canadian interest rates, domestic saving, international capital movements, and hence the growth of foreign ownership in the Canadian economy, he also held strong doubts about the possibility of using macro policy in the pursuit of goals for real economic variables. His skepticism on this latter score was completely at odds with the activist views that dominated the economic thinking, not just of the government of the day, but of informed opinion in general, and played a significant role in precipitating a clash of irreconcilable opinions about both the content of Canadian monetary policy and the appropriate division of responsibility between government and Bank for its design and conduct. Something had to give, and in the short run, it was the Governor, who was forced into resignation in 1961.

Thereafter, however, the Bank remained protected from becoming completely subservient to domestic macroeconomic goals by the interaction of a widely perceived political necessity of maintaining the exchange rate peg that had been put in place in the immediate aftermath of the exchange rate crisis in which the Coyne Affair culminated, with the dual-responsibility doctrine that had been agreed to in its wake.[8]

Even after the Canadian dollar was again floated in 1970—upwards be it noted—the protection provided by this doctrine remained, and the Bank of Canada never became as completely subservient to government

7. Free banking is not, of course, dependent upon gold convertibility per se, as has already been noted in footnote 3, above. Hence, the weakening of support for the gold standard among economists should not, and did not, affect the popularity of such ideas. What really consigned them to the fringes of intellectual respectability was the development of a consensus that monetary policy was an essential tool of a generally interventionist macroeconomic policy.

8. To a significant degree, the doctrine is the creation of Louis Rasminsky, who succeeded Coyne as Governor. It has two pillars, the so-called directive power of the Minister of Finance, ultimately enshrined in an amended Bank of Canada Act in 1967, which allows the Minister to exercise final authority over monetary policy only by issuing a specific, written, and public order to the Governor, and a clear understanding, not written into the Act, that upon receipt of such a document, the Governor will resign. This arrangement gives both parties strong incentives to settle policy disagreements in private, and it has never been tested in practice.

policy as did, say, the central banks of the United Kingdom, Australia, or New Zealand. That is perhaps one reason why, bad though it was, Canada's experience during the years of the Great Inflation of the '70s and '80s was nevertheless somewhat more comfortable than theirs. Only somewhat, however, and Canadian experience in the '70s and '80s made its own contribution to a large body of evidence that seemed to warn of the dangers inherent in setting an over-ambitious agenda for monetary policy, and about the difficulty of finding a viable and simple alternative.

By the end of the 1980s, . . . debates about monetary policy began to focus on the creation and maintenance of price stability as its only goal.

By the end of the 1980s, the relevant lessons had been learned, and, in the wake of Governor John Crow's memorable (1988) Hanson Lecture, debates about monetary policy began to focus on the creation and maintenance of price stability as its only goal. The outcome of these debates, a regime centred on an inflation target of 2 per cent per annum for the consumer price index, fell somewhat short of Crow's aspirations, but as Laidler and Robson (2004) have documented, this regime has proved to be both largely successful, and durable too. These issues need no further discussion here, but certain aspects of Canada's central banking regime are nevertheless intriguing: namely, the extent to which it has developed features in common with free banking, and the extent to which, where these differ, central banking seems to have an advantage.

Points of Contact between Canadian Central Banking and Free Banking

As we saw above, a fully developed free-banking system would seek to deliver price-level stability, not because any central agency decreed it, but because the self-interest of individual banks operating in a competitive environment would lead them towards such an outcome. Such stability would most likely be guaranteed by commodity convertibility of some sort, and the reserves needed to make such a guarantee credible would be held centrally, probably at a clearing-house association that was, in turn, subject to some minimal government regulation designed to ensure competition among its members.

Transactions among banks would likely be carried out using deposits at the clearing house that represented claims on those reserves, which themselves would actually be needed only for transactions with outside entities. There would have to be an interbank market in those deposits to enable the system to function smoothly, and it is likely that the clearing-house association, if it was to be able to exercise lender-of-last-resort powers, would have the power to grant overdrafts to members, a power that commodity convertibility would keep safe from abuse, but also perhaps render less effective in a real emergency. Within such a system, commercial banks would be free to manage their own deposit and note-issue business, which might also be subject to regulations designed, at a minimum, to prevent fraud.

Until recently, such a regime apparently differed sharply from any based on central banking, which seemed to have been specifically configured to enable policy goals to be set by the central bank or its political masters, goals whose pursuit would be likely to compromise price stability. Before the 1990s, moreover, there was much empirical evidence available to support this view.

This once-crucial distinction between free banking and central banking has largely disappeared in the Canadian case with the adoption of low inflation as the sole aim of monetary policy. If, furthermore, we look at the framework within which monetary policy is actually conducted nowadays, it is apparent that the clearing system plays essentially the same role within it as it would under free banking. Interest-bearing deposits with the Bank of Canada (rather than with a clearing house) are the medium in which clearing imbalances are settled; there is an interbank market in such deposits, moreover; and the Bank of Canada can and does grant overdrafts to participants in it.[9] Instead of a convertibility constraint, however, it is the Bank's obligation to keep inflation on track that prevents abuse of this privilege.

Canada's current monetary order nevertheless differs in other respects from one based on free banking. For example, the Bank (together with the Royal Canadian Mint) has a monopoly in the issue of currency, which

9. The clearing system is actually the creature of the Canadian Payments Association rather than of the Bank of Canada, to be sure, but this division of administrative responsibilities is surely a legacy of the arrangement that preceded central banking and has little substantive significance.

is nowadays the institution's main source of revenue. But since it supplies currency on demand to the market, this hardly raises the financial-stability issues that such a monopoly did in the nineteenth century. It is worth noting, furthermore, that the Bank's monopoly over currency would disappear should perfectly legal "electronic currency" schemes, such as Mondex, ever catch on with the public. Were this ever to happen, the main question it would raise would be how to pay the Bank's operating costs. It would not alter Canada's overall monetary order in any significant way, and it is therefore hard to get excited about this matter. For a fuller discussion of this issue, see Charles Freedman (2000).

The major difference between central banking . . . and any viable free-banking alternative undoubtedly lies in the institutional underpinnings of the assurances of orderly price-level behaviour that these two arrangements offer to the public.

A second, potentially more important difference is that the Bank of Canada is currently mandated to act as the federal government's agent in the markets for foreign exchange and public debt. Under free banking, these roles would be played by private institutions, as indeed they were before the Bank's creation. In theory, current arrangements pose an ever-present threat to the Bank's ability to pursue its assigned inflation targets, because it is not hard to conceive of instructions that the government might issue that would undermine monetary stability. However, it is hard to see how this could become a practical issue under the current inflation-targeting regime, for the simple reason that this is a joint project of the Bank and that same government, and is also subject to the dual-responsibility doctrine.

The major difference between central banking as it is currently practised in Canada and any viable free-banking alternative undoubtedly lies in the institutional underpinnings of the assurances of orderly price-level behaviour that these two arrangements offer to the public: administratively mandated inflation targets under central banking as opposed to a convertibility guarantee under free banking. Here, comparisons must rest on the relative quality of the two guarantees. It is hard to disagree with the free banker's argument that a promise that emerges naturally from market processes is likely to be more credible in the long run than one that is the result of an agreement between elected politicians and a central bank. Against this consideration, however, a number of other factors come into play.

First, if monetary stability really is what the public wants, it seems likely that, once political processes have delivered that outcome, it will become quite hard to undermine it again through those same processes: inflation targets have now been in place for 15 years in Canada; they have been met; and there is much less public skepticism about them now than there was in their early years. Nor must we forget that, even in the heyday of the gold standard, some very distinguished commentators—for example Alfred Marshall (1887), Irving Fisher (1912), and Knut Wicksell (1898)—noted that it was not the ideal scheme for generating price stability, and proposed alternatives. Wicksell, in particular, went so far as to advocate the complete abandonment of any kind of convertibility and its replacement by a regime in which central banks used their control over domestic interest rates to deliver the desired end, a system that is surely the intellectual prototype of present-day arrangements. Finally, it is worth recalling that, nowadays, gold is a traded commodity, whose market price is very sensitive to variations in monetary arrangements, so it is hard to see how it could suddenly be used to provide an anchor for those same arrangements.

Though there are many other kinds of commodity convertibility, these are, as noted earlier (footnote 3) complicated and hence hard to explain to the public at large. That is one reason why all recent proposals for reforming Canada's monetary order that envisage replacing inflation targets with a system underpinned by convertibility rest, not on a commodity of any sort, but on either a brand new North American currency or the U.S. dollar. Given the Americans' total lack of interest in giving up a shred of control over their own currency, let alone abandoning it for something else, the only proposals among these that are practically possible are those involving either the outright unilateral adoption by Canada of the U.S. dollar as its currency, or the creation of a new Canadian currency linked to the U.S. dollar by way of a currency board. From the perspective of this article, the adoption of either of these would amount to a further step in an evolutionary

process that has already seen the Canadian model of a monetary system anchored by a central bank move significantly in the direction of the "free-banking" alternative.

Concluding Comment

There is no point in rehearsing recent debates about these matters here.[10] It is not out of place, however, to note that neither unilateral dollarization nor the creation of a currency board would in fact lead to the disappearance of central banking for the Canadian system, but only to the replacement of the domestically located Bank of Canada by the U.S.-based Federal Reserve System, which would continue to set goals conceived purely in terms of the behaviour of the United States economy, with no regard to their consequences for Canada. For many, this possibility will be reason enough to conclude that Canada has proceeded quite far enough down the road to free banking already, and to wish the Bank of Canada "many happy returns" on this occasion with particular enthusiasm.

10. See Laidler and Robson (2004) for a recent discussion of these debates, and references to key contributions to them.

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Towards a Made-in-Canada Monetary Policy: Closing the Circle

*John Chant**

- *From its inception, the Bank of Canada had the option of following either the British or American model as it developed approaches to the instruments it uses for monetary policy.*
- *Although some aspects of the Bank's early monetary policy, such as the role of discount facilities, the use of moral suasion, and the need to develop a money market reflect the British example, some important differences shaped a distinctly Canadian approach.*
- *Faced with a rudimentary money market, the Bank relied on transfers of government deposits to manage bank liquidity, thus developing a monetary policy instrument that bypassed the money market. It also adopted lagged reserve requirements and on two occasions floated the Bank Rate.*
- *In response to the development of an active and vibrant money market and superior communications and payments systems, and the resulting enhanced transparency, a number of initiatives undertaken since the 1980s have strengthened the Bank's influence over its short-run operating target, the overnight interest rate.*

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I want to discuss how, through its 70-year life, the Bank of Canada has developed and adopted distinctive approaches to the instruments its uses for monetary policy. My starting point will be the origins of the Bank, when the government had the option of following one of two dominant models: the long-established Bank of England and the more recent Federal Reserve System of the United States.

Initial Influences

In the 1930s, the Bank of England and the Federal Reserve approached monetary policy in quite different ways. Both operated in well-developed, liquid money markets. The British, however, had developed intricate market arrangements built around discount houses that specialized in trading money market securities and whose existence was sustained by the Bank of England's avoidance of direct transactions with banks. [1, 2] The Federal Reserve, in contrast, dealt with banks and with securities firms in conducting its open market operations. The Bank and the Federal Reserve also differed in their views of the proper use of their discount facilities. While bank use of the Bank of England's discount window was the exception, banks' access to the Federal Reserve was a normal part of their reserve management. Finally, the two traditions differed in their overall philosophy: the Bank of England leaned heavily on "informal," or non-market, techniques, particularly moral suasion, while the Federal

1. The discount houses imparted an almost club-like atmosphere to central banking. Officials from the discount houses rotated through the senior management positions at the Bank, including the post of Governor, for relatively short terms, until the pattern was broken by Montagu Norman, who stayed as Governor for 24 years.

2. The avoidance had its limits: the Bank would deal with banks when the discount houses lacked maturities desired by the Bank.

Reserve primarily used market measures such as open market operations.

The matter of which tradition to follow was decided very early, possibly by default. Lord Macmillan, who had headed the United Kingdom's Commission on Finance and Industry, chaired Canada's Royal Commission on Banking and Currency, which recommended the creation of a central bank.[3] The British influence continued when J. A. C. Osborne, a former Secretary of the Bank of England, was seconded to be the first Deputy Governor of the Bank of Canada in order to provide "someone with extensive central banking experience, that is, someone from abroad" (Watts 1993, 23). Osborne served in this capacity from 1934 to 1938. Another influence was the extensive correspondence maintained between Graham Towers, the first Governor of the Bank of Canada, and Montagu Norman, the Governor of the Bank of England.

Finding Its Way

At the start, all appearances seemed to favour the Bank adopting a British approach to monetary policy. In the event, it took some time for the Bank to develop any approach. Confronted with the halting recovery from the Depression, the Bank spent its first years intent on providing adequate liquidity to the chartered banks. The Bank set its Bank Rate at 2 1/2 per cent when it opened its doors in March 1935 and kept it there for almost nine years, before lowering it to 1 1/2 per cent in February 1944. It raised the rate for the first time six years later, in 1950.

Neither the British nor the American experience could prepare Canadian central bankers for the conditions under which they conducted monetary policy.

Neither the British nor the American experience could prepare Canadian central bankers for the conditions under which they conducted monetary policy. Both the Federal Reserve and the Bank of England operated in liquid money and security markets. The Canadian money market in the 1930s, in contrast, was rudimentary: the first treasury bill tenders were held just days before the Bank opened for business. Moreover, although reference was made in the Bank's early annual reports to the desirability of broadening the treasury bill market, it was slow to develop, in part because the Bank was faced with other concerning issues, including the slow recovery from the Depression, continued high unemployment, and financial difficulties experienced by some of the provinces (Watts 1993, 34). Another factor was strong demand from the chartered banks for treasury bills. Neufeld was able to declare years later that "there was always a demand for bills at the Banks, and in fact in only that limited sense could it be said that a bill market existed in Canada before 1954" (1955, 38).

Cash reserves

The Bank also departed immediately from the Bank of England's practice of having no formal cash reserve requirement by establishing a minimum daily cash reserve of 5 per cent of deposits, a departure recommended by the Macmillan Commission. Watts (1993) suggested that the requirement had been intentionally set low at the outset relative to banks' cash-holding practices. In practice, the banks maintained actual cash reserves at levels around 10 per cent of deposits, a tendency that was not surprising, given the difficulties for day-to-day cash monitoring posed by their far-flung branch system and the absence of an active money market.

The government adopted a distinctly Canadian approach to reserve requirements in the revisions to the Bank Act of 1954. At that time, the Bank of Canada was given the authority to vary the minimum ratio between 8 and 12 per cent (Watts 1993, 98). More significantly, the calculation of required reserves was drastically changed. Both deposits and the note component of reserves for any month were to be calculated on the basis of the average of the Wednesday values for the preceding month. The remaining component of reserves, deposits held by the chartered banks at the Bank of Canada, was to be maintained on a daily-average basis over the month. This method of determining reserves reduced uncertainties for the banks,

3. One other commissioner was a former director of the Bank of England. In addition, the Chairman was assisted by an adviser who had been involved in the establishment of other central banks in the empire. The adviser was responsible for drafting Chapter 5, "The Existing Canadian Financial System and the Establishment of a Central Bank" (Watts 1993, 11).

giving the Bank greater scope for managing the reserves available to the chartered banks.

The details of the cash reserve requirement have been altered several times since 1954. The requirements were lowered and set at different levels for different types of deposits in 1967; two reserve-averaging periods for each month were added in 1980; and, finally, the reserve requirement was gradually reduced to zero between 1992 and 1994. Nevertheless, the distinctive reserve-averaging period remained a feature of the Bank's approach until extensive changes were made in 1999 when the Large Value Transfer System (LVTS) was introduced.

The distinctive reserve-averaging period remained a feature of the Bank's approach until extensive changes were made in 1999 when the Large Value Transfer System (LVTS) was introduced.

Transfer of government deposits

In the absence of a developed money market, the Bank also adopted a different monetary policy instrument that bypassed the money market. The Bank did so by actively managing the government's deposit balances between itself and the chartered banks. While a significant portion of these transfers represented the neutralization of the liquidity effects of government receipts or disbursements, there was also a monetary policy component whereby movement of deposits added to bank liquidity by increasing bank claims on the Bank of Canada, while transfers from the banks to the Bank had the opposite effect. The Bank's use of this technique was distinctive in that it turned management of government-deposit balances into an active instrument to bring about changes in bank liquidity.

The transfer of government deposits remained a significant instrument for the Bank well into the 1990s,[4] in part because of their immediate effect on liquidity compared with the settlement delays of market transactions. How these balances were transferred evolved with changes in the government's deposit arrangements. In 1986, the Receiver General introduced competitive auctions for government deposits in excess of day-to-day operating needs. These auctioned deposits, which ranged in maturity from overnight to seven days, shrank the pool of funds transferred daily. However, these deposit transfers were important as a monetary policy instrument until the introduction of the LVTS.

The Bank Rate

The Bank of Canada firmly followed the British Bank Rate practice by discouraging borrowing by banks and regarding it as a sign of weakness. The rarity with which discount windows were used reduced the Bank Rate to being primarily a signal of the Bank's intentions. At times, even this limited role posed problems for the Bank. Rate changes are a blunt instrument for conveying the Bank's intentions and cannot convey subtle messages.

These deliberate abstentions from setting the Bank Rate were distinctly Canadian.

On two occasions, the Bank, apparently judging the costs of ambiguity as more than offsetting the value of the signal, did away with the explicit signal altogether. From 1956 to 1962 and again from 1980 to 1996, the Bank Rate was tied to the 3-month rate established at the most recent treasury bill auction, relieving the Bank from making discrete changes. These deliberate abstentions from setting the Bank Rate were distinctly Canadian.

Closing the Circle

The conditions facing the Bank in the 1990s had evolved significantly from the past. The money market emerged as active and vibrant after years of hesitant growth following its forced feeding in the 1950s; the banks' branches were now linked through advanced information technology; and an electronic payments system handled the bulk of payments by value.

4. Use of this instrument has never been completely abandoned, but currently it serves in only a marginal capacity.

The "made-in-Canada" approach to policy consists of a series of initiatives taken through the 1990s to take advantage of these changes in order to sharpen the Bank's monetary policy instruments. These initiatives altered reserve requirements; changed the Bank's use of government deposit transfers; and transformed the role of the Bank Rate. Overall, these measures strengthened the Bank's influence over its short-run operating target, the overnight interest rate.

The first step was the reform of the cash reserve requirements. Long recognized as a tax on banking services, the cash reserve requirement was phased out between 1992 and 1994. Instead of holding positive reserves, banks were expected to maintain zero clearing balances over the reserve-averaging period. At the same time, incentives to meet the zero cash requirement were strengthened by balancing the costs of holding deficits and excess balances. These price incentives eliminated the Bank's reliance on moral suasion to discourage borrowing from the central bank (Howard 1992).

The Bank added clarity and emphasized its focus on short-term rates by adopting an explicit 50-basis-point operating band for the overnight rate, the limits of which were reinforced by the SPRAs and SRAs.

The Bank moved next to give greater guidance to market participants with respect to its intentions. While the overnight rate had been central to the Bank's focus, its influence on market rates took place indirectly through operations in the market for treasury bills or through managing the availability of cash to the banks. Moreover, the Bank Rate, since 1980, had been tied to the rate for 3-month treasury bills, leaving market participants uncertain whether rate movements were shaped by the Bank's intentions or by market pressures. By the mid-to-late 1980s, the Bank began offering Special Purchase and Resale Agreements (SPRAs) and Sale and Repurchase Agreements (SRAs) to influence the overnight rate. In 1994, the Bank added clarity and emphasized its focus on short-term rates by adopting an explicit 50-basis-point operating band for the overnight rate, the limits of which were reinforced by the SPRAs and SRAs. Though this range was not publicly announced (as a fixed Bank Rate would be), changes in the range would quickly become apparent to market participants through observing the Bank's operations in money markets. The Bank made the target range for the overnight rate still clearer in 1996 when it returned to fixing the Bank Rate, setting it as the upper limit of the operating band for the overnight rate.

The introduction by the Canadian Payments Association in 1999 of a new electronic payments system, the LVTS, made immediate clearing and settlement possible for large transactions, allowing further changes in the Bank's monetary policy techniques. Control of the overnight rate was strengthened by several measures. The midpoint of the operating band, unless specified otherwise, served as the Bank's operating target rate, and the Bank planned to reinforce the target through its SPRA / SRA technical operations if the market traded above or below that rate. The Bank also revamped its approach to reserve management: the level of clearing balances was to be maintained at roughly zero,[5] typically confining government deposit transfers to neutralizing the impact of public sector flows. Arrangements for government deposit transfers for preceding-day value were replaced by same-day settlement. As well, given the fact that Canadian banks knew with certainty their positions at the end of each business day and had a period to trade surpluses and deficits with each other before final settlement of their LVTS clearing balances at the Bank of Canada, the need for a reserve-averaging period to smooth fluctuations was eliminated.

Conclusion

The founders of the Bank of Canada looked to the British example from the beginning. Some aspects of the Bank's approaches reflect this choice, including the role of the discount facility, the use of moral suasion, and the need to develop money market institutions. In many important ways, however, the development of central banking in Canada followed its own distinctive path. The Bank delayed for 20 years turning seriously to the development of the money market and instead relied on transfers of government deposits to manage

5. These balances are typically maintained at $50 million. For further information, see Howard (1998) and Clinton (1991).

bank liquidity. It also adopted lagged reserve requirements and on two occasions floated the Bank Rate. The initiatives over the 1990s, in a sense, closed the circle. The changes reflected both the monetary authorities' policy needs and the changing environment brought about by the new payments arrangements and a highly sophisticated money market. Many of the monetary policy arrangements that had reflected earlier features of the Canadian financial system were replaced by new measures designed to give tighter control over the overnight rate. The reforms of the 1990s were a coming of age in the evolution of a "made-in-Canada" approach to the conduct of monetary policy.

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From Flapper to Bluestocking: What Happened to the Young Woman of Wellington Street?

*John F. Helliwell**

- *In 1961, the Royal Commission on Banking and Finance (the Porter Commission) was established to investigate the roles and responsibilities of the Bank of Canada. Based on submissions from the Bank, the Commission favoured a credit-conditions approach as the most appropriate way for conceiving of the structure of monetary policy.*
- *As part of a group of macro and monetary economists from across the country advising the Porter Commission in 1962, John Helliwell participated in the surveys of and interviews within large corporations to determine the effect of monetary policy on them. In this first encounter with the Bank he learned much about the workings of the Canadian economy and met many of those who would influence the Bank's direction.*
- *The Porter Commission promoted the Bank's preparedness to deal with future monetary policy research, encouraging the use of fellowships to attract researchers and publication of the Bank's research and statistical work with the aim of improving Canadian monetary and financial information.*
- *From 1965 on, the Bank began to develop a quantitative research capacity. Helliwell and his colleagues worked on the construction of an econometric model of Canada—RDX1, followed in rapid succession by RDX2.*
- *On its completion in 1971, RDX2 was drawn immediately into the policy arena with the Nixon shocks, the end of the Bretton Woods system, and the oil-price shocks of 1973. Bank researchers were giving papers at meetings of the Econometrics Society around the world, and the Bank of Canada was on its way to operating in the front ranks of the world's evidence-based policy research institutions.*

We first met in 1962. Although we were both still in our 20s, she was, from my vantage point, a serious older person, although not what you would think of as a bluestocking intellectual. When she was approaching the age of 30, her parents saw fit to send her out for career counselling, and thus established, in late 1961, the Royal Commission on Banking and Finance (the Porter Commission) to do the job. Perhaps you are already wondering, in this age when gender is negotiable, how I am able to ascribe femininity where the legislation did not, and when it could still be said that "the primary qualities of good Board members should be intelligence, wisdom and good judgement. We believe these can best be found by choosing highly qualified men from varied backgrounds and experience" (Porter Commission, 548). First, there are her strong family links to the Old Lady of Threadneedle Street, established at the time of the Macmillan Report in 1933, and continued by several of the witnesses called before the Porter Commission. This assumption of femininity was confirmed when I was first employed in the Research Department of the Bank, in the fall of 1965, assigned to build a structural model of the foreign exchange market.[1] To gain better insights into the workings of the market, I spent an afternoon in the interbank foreign exchange trading room in Montréal.

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1. The exchange rate was determined at the intersecting point of separately identified and estimated private and official net excess-demand equations for foreign exchange (Helliwell 1969).

A fairly lively session was ended by "she's in for 50" (units of 100,000 $US), and there was no doubt about who "she" was. That settled the gender question for me once and for all, but it is getting ahead of the story.

When she was approaching the age of 30, her parents saw fit to send her out for career counselling, and thus established, in late 1961, the Royal Commission on Banking and Finance (the Porter Commission) to do the job.

For this history,[2] the important parts of the Porter Commission relate to what it heard and what it said about the research base for monetary policy. The basis for the Commission's approach was provided by the Bank's own submissions (Bank of Canada 1962). The only echo there of the preceding Coyne Affair is Governor Rasminsky's communiqué of 1 August 1961 (Appendix to Submission 2, 23–24), which contains his view that "in the ordinary course of events he believed that the Bank of Canada had the responsibility for monetary policy, but that if the government disapproved of that policy it had the right and responsibility to direct the Bank as to the policy which was to be followed" (Porter Commission, 540). He subsequently made clear, as have his successors, that if he were to receive such a directive, he would immediately resign. As one might have guessed, there has never been a directive issued.

The main substance of the Bank's submissions relate to what they and the Porter Commission described as the "credit conditions approach to monetary policy." The Porter Commission was preceded by the Radcliffe Report in the United Kingdom and the Commission on Money and Credit in the United States, and perhaps partly for that reason was able to tell a more complete and coherent story about the objectives, structure, and constraints of monetary policy. Credit conditions are "reflected in the availability of credit as well as in the effective yields obtainable on financial assets of various kinds" (Bank of Canada 1962, 11). The Bank submissions were clear that credit conditions were to be thought of as endogenous variables influenced by the structure of financial markets, by changes in the demand for goods and services, and of course, by Bank policies, operating principally through variations in cash reserves (Bank of Canada 1962, 28). Monetary policy was seen as part of an overall mix of fiscal, monetary, and debt-management policies appropriate to "the degree of utilization of the nation's productive capacity and labour supply, the degree of pressure on price levels, and the state of its balance of payments" (Bank of Canada 1962, 9).

The credit-conditions approach was in turn adopted by the Porter Commission, both as a basis for its survey and other empirical work on the effects of monetary policy on expenditures (Porter Commission, Chapter 21, plus Appendix volume), and as the most appropriate way for conceiving of the structure of monetary policy. The cost and availability of credit both mattered, as did the term structure of interest rates. It should be no surprise that debt management merited both a separate submission (Submission 4), and a Porter Commission research study by Jacques Parizeau so soon after the Conversion Loan of 1958, which was one of the few debt-maturity increases large enough to have had macroeconomic consequences.[3]

The Porter Commission assembled in 1962 an impressive fraction of the country's macro and monetary economists. By one of those lucky breaks that optimists assume in the same way that economists often assume perfect information, I was invited along as a young spear carrier in the wake of the University of British Columbia's John Young, one of the assistant directors of research (with Don Daly and the Bank's Bob Johnstone) under Research Director Bill Hood, then at the University of Toronto. Harry Johnson, oscillating between Chicago and the London School of Economics, spent the summer in the Porter Commission's offices (in Toronto at Yonge and St. Clair) producing with John Winder an early econometric analysis of monetary policy lags. Grant Reuber of the University of Western Ontario was there doing his pioneering estimation of monetary policy reaction functions (Reuber 1964), later followed up in the Bank's own RDX models, many years before they became known as Taylor rules.

2. In revising the paper for publication, I have been much aided by confirmations, amendments, and corrections kindly provided by Fred Gorbet, George Post, and Ian Stewart.

3. As subsequently revealed by simulations of RDX2 (Helliwell, Christofides, and Lester 1976).

Ron Shearer worked on the current account, learning in the process that the gnomes of Zurich were in fact the treasurers of importing and exporting firms changing their foreign exchange purchase and sales patterns in fundamental ways when times were uncertain (Porter Commission 298–99; Young and Helliwell 1964, Chapter 11). And times they were indeed uncertain, as on 2 May 1962, Canada ended its 11-year period of floating exchange rates much as it had begun, as a means of dealing with uncertainty. Canada had opted for a flexible exchange rate because officials were unable to find a fixed rate that would settle the markets. At the end, in early 1962, at least as I heard the story, the Minister of Finance wanted assurance that, if the rate was left to float freely (reserves were flowing out fast in April as the government tried informally to hold the rate at 95 cents U.S. per Canadian dollar), it would not drop below 90 cents. Officials could not provide that assurance, even though they believed the equilibrium was well above that rate, so it was decided to peg the rate. And 92.5 cents was apparently chosen as the simple average of the 95 cents they had been defending and the 90 cents no one wanted to breach.

The prevalence of rules of thumb for capital-spending decisions prepared us for the subsequently perennial finding that a highly smoothed cost of funds always dominates more immediate measures of interest rates in econometric estimates of business fixed-capital expenditures.

The main empirical work of the Porter Commission, under the direction of John Young, was a large mail and interview survey of the effects of monetary policy on corporations. By including interviews with presidents and treasurers of the largest corporations in the country, it was possible to cover directly about half of the country's business-capital spending, and the Dominion Bureau of Statistics managed stratified sampling of the rest. There were critics of the interview approach to untangling complex decisions, but texture gained thereby was important. The prevalence of rules of thumb for capital-spending decisions prepared us for the subsequently perennial finding that a highly smoothed cost of funds always dominates more immediate measures of interest rates in econometric estimates of business fixed-capital expenditures. And it was also easy for us to see, especially from the experiences of the smaller firms, how tightness in bank lending fed through pretty quickly to inventory squeezes. Most helpful of all, getting back to the uncertain times, was the fact that there were two periods of tight money in recent management memory, 1956 to 1957 and 1959, and even as the Porter Commission questionnaire was being prepared there came the foreign exchange crisis of May 1962, accompanied by a striking, if short-lived, bout of tight money.

The survey and interviews took us everywhere, and thereby I got to meet John Young's Ottawa friends: Gerry Bouey, then Chief of the Bank's Research Department of 72 persons (including library and clerical support staff) lodged in the wooden temporary building on Sparks Street, and Simon Reisman, then in the Department of Finance. It was by this route that I was first introduced to the young woman of Wellington Street, as well as indirectly through the Bank's Bob Johnstone, and later Al McKay, working for the Porter Commission.

I have described the Bank's credit-conditions approach to monetary policy as having a big impact on the Porter Commission approach and conclusions. This approach has stood the test of time remarkably well, being fully consonant with what I take to be the forefront of current research on the effects of monetary policy. In return, the Porter Commission asked how the Bank might be better prepared for dealing with future monetary policy and research. They took the position that the growth in research training and tools would require expansion of the Bank's small-scale use of outsiders on summer projects and temporary assignments. They "might create occasional fellowships to encourage studies of financial markets and policy of value to the Bank" (Porter Commission, 552). That part is now in welcome operation, although with a 40–year lag that would have looked long even to Harry Johnson and John Winder. The Porter Commission also approved the Governor's suggestion that the Bank might undertake more econometric and other work on the impact of monetary policy on spending decisions and hoped (552) "that the Bank will not hesitate to publish more of its own research and statistical work as part of a continuing program designed to improve Canadian monetary and financial information."

So when she reached 30 in the mid-60s, when the young were being advised "never to trust anyone over 30," the Bank started to develop a quantitative research capacity. George Post had already been brought in

with his newly minted PhD in the econometrics of investment, and I turned up in the fall of 1965 on a back-and-forth sharing with Nuffield College, Oxford.[4] In early 1966, Ian Stewart was brought in from Dartmouth to be the full-time Bank leader of modelling, and Larry Officer and Harold Shapiro were brought in as academic consultants. All three of them had constructed econometric models of Canada for their PhD theses; George Post was spearheading the development of a computerized data bank; and Mike McCracken was developing econometric software at the Economic Council of Canada. The first Bank modelling was started in the summer of 1966, and by the following summer, boxes of computer cards were sent off every night by bus to the Université de Montréal computer centre, to be returned the following morning with the first mis-punched card turned upright in the box. All of this was taking place in the building seen immediately to the left of the Bank, shown in the photo taken from the far side of Wellington Street. Modelling teams were sometimes sent off to spend the night at the Université de Montréal computing centre to increase the number of daily turnarounds. It was a time when it really paid to follow the old carpenter's adage, so often ignored when computing is too easy, to "measure twice and cut once."

The first model was a Meade-Mundell-Fleming open-economy affair with a supply side based on an expectations-adjusted Phillips curve, detailed modelling of the housing and mortgage markets, and a monetary policy reaction function for the short-term interest rate.

Progress really speeded up when the Bank acquired a terminal connected by long-distance modem to a university computer in Salt Lake City. It was pretty hard even then to send a full deck of cards without a line failure, and the late-night teams needed to be fuelled by large tins of cookies. But well-being is evaluated, I have learned since, by how one's current circumstances compare with where one started, and with one's expectations of what is feasible. We were happy with our lot, and with our progress.

Wellington Street (*c.* 1963). (Photo courtesy of the Bank of Canada Archives, PC 300.5-236)

The first model was a Meade-Mundell-Fleming open-economy affair with a supply side based on an expectations-adjusted Phillips curve, detailed modelling of the housing and mortgage markets, and a monetary policy reaction function for the short-term interest rate.[5] Even George Freeman, the management enthusiast for our modelling efforts, thought that we might in this case be going too far: "How could it be possible to reduce the complex art of Bank decision-making to a simple equation?" We researchers argued that such decisions were probably systematic, in which case an equation might establish the key historical determinants. Or perhaps they were just random, in which case nothing would turn up, so why not let the chips fall where they may? We compromised by carrying on as planned, and reducing the possibility of potentially embarrassing commentary by simply including the reaction function in the model under the generic labelling of "short-term interest rate equation." If the Bank had been more adventurous, might the results have been Rasminsky instead of Taylor rules? With prices quasi-fixed in the short run and flexible in the longer term, the model offered short-term policy trade-offs that disappeared in the longer term (as depicted in Helliwell, Officer, Shapiro, and Stewart 1969).

4. George Post reminds me that the stage was well set for us by the quantitative research already being done at the Bank by Peter Cornell, Bernie Drabble, Dave McQueen, and others.

5. We did not even consider using the perfectly mobile capital version of the model so often used in later theoretical work, since it was then, as now, importantly at odds with the data.

The model was initially named HOSS, after the initials of the main contributors, with attendant horseplay about what was needed to make HOSS run. Something more formal was needed if the model was to be a flagship for the increasingly sophisticated 30-something woman of Wellington Street. Calling the model RD for Research Department sounded like too much of a commitment to Senior Deputy Governor Robert Beattie, who thought RDX would better reflect the experimental nature of this research. So it was called RDX1, before we could be reminded by Paul Bradley, originally a chemical engineer, that RDX was already the name of an explosive. When it came time to publish a series of model papers in 1969, fulfilling the commitment to make Bank research available to researchers outside the Bank, the Deputy Governor dropped the other shoe: "Isn't it premature to publish a model which is still in the experimental phase?" But George Freeman prevailed, and the Bank of Canada Staff Research Studies series was born.[6]

RDX2 was the first, and remains perhaps the only, model to have an integrated hierarchy of factor demands (including hours and intensity of use) based on their relative speeds and costs of adjustment.

RDX1 was not yet in print by the time RDX2 was under construction. The original conception had been to move from the aggregate model RDX1 to a sectoral RDX2, and much industrial-level modelling had been put in train. However, industrial disaggregation would have starkly limited the development of a fuller and tighter integration of the supply side of the economy, of mutually consistent short- and long-term dynamic properties, of an integrated financial system, and of fuller and more integrated linkages with other economies. Seen in those terms, the choice was easy. The aggregate business sector became the core of the private sector in RDX2, with factor-demand equations consistently derived from hierarchical modelling of cost-minimizing behaviour. The same aggregate firm was used as the basis for a congruent set of equations modelling price-setting, short-term adjustment of employment and average hours, and factor-utilization (or, equivalently, inventory-accumulation / decumulation) responses to unanticipated changes in demand or profitability. RDX2 was the first, and remains perhaps the only, model to have an integrated hierarchy of factor demands (including hours and intensity of use) based on their relative speeds and costs of adjustment.

Both RDX1 and RDX2 differed from previous models in their detailed modelling of the government sector, with separate treatment of the main expenditure and revenue components for both federal and provincial (and municipal) governments. The explicit treatment of the demand-side and policy forces governing the evolution of fiscal balances, spearheaded by Fred Gorbet's research for his PhD thesis, permitted the behaviour of automatic stabilizers to be studied more realistically than previously, contingent on the model's inherent dynamic structure, always the hardest part to pin down (Helliwell and Gorbet 1971).

While the real side was based on the emerging literature on consistent modelling of output supply and factor demands, the links between the financial and real sectors were inspired by Tobin's (1969) general-equilibrium approach to monetary theory. Fuelled by the innovative portfolio modelling of Gordon Sparks (including measures of portfolio disequilibrium used for modelling the effects of credit availability on investment spending), RDX2 was the first and probably only full-scale embodiment of Tobin's *q* theory of investment and of the supply price of capital (both described in Tobin 1969), with the latter driven by prices in both bond and equity markets. The supply price of capital was defined in both nominal and real terms, differing by the endogenous expected rate of change of the consumer price index, with the expectations process derived from modelling the relative demands for debt and equity.

Development of matching book and market values of the business-capital stock took a lot of work, as did consistent measurement and modelling of the domestic and foreign-ownership ratios that were needed for the explanation of international flows of capital services. We should probably have automated these data-assembly processes to a greater extent in the first instance, as they proved difficult to maintain in later years as staff turned over.

6. The first seven Bank of Canada Staff Research Studies described the RDX models and their supporting research. The Staff Research Studies series, and the contemporaneous creation of the *Bank of Canada Review*, put into effect the Bank's commitment to enlarging and opening the national capacity for quantitative macroeconomic research.

RDX2 was designed for international linkage on four major fronts: trade in goods and services, direct and portfolio capital movements, migration, and exchange rate determination. By the time RDX2 was released to the world in 1971, Canada was back on a flexible exchange rate system, and we were scrambling to make RDX2 equally usable under fixed and flexible exchange rates (Helliwell and Maxwell 1972). Recognizing the large share of trade and capital market linages with the United States, and taking advantage of a somewhat similar (but much more closed) MPS model of the United States then under construction,[7] all Canadian flows of goods, services, capital, and people were split between US and the rest of the world (ROW). The US flows were then linked to variables endogenous to the MPS model of the United States, and the ROW flows linked to relevant aggregates of ROW variables. When I was at the Bank in 2003–2004, I politely (I hope) bemoaned the fact that the Bank now runs, in different departments, separately conceived U.S. and Canadian models without explicit linkage. Some things are easier when research groups are smaller.

With the completion of RDX2 in 1971, the Bank's bluestocking conversion was complete, and papers were being given at the world and regional congresses of the Econometric Society in Australia, New Zealand, the United Kingdom, and the United States. The RDX team relied heavily on effective combination of full-time researchers, part-timers, and student assistants, some of them economists whose later careers included a Nobel Prize, presidencies of major universities, and many federal appointments at the deputy minister level, as well as, of course, senior Bank of Canada management.[8] Collaborations with other central bank modelling teams were developing apace, and Project Link was just getting started. The RDX2–MPS bilateral linkage was not part of the forecasting structure of Project Link,[9] but was included because it was the only international modelling project that extended linkage beyond goods into services, direct investment, portfolio flows, and exchange rate determination, directions that others were keen to travel when data and modelling resources permitted.

By the time RDX2 was completed in 1971, the Bank's bluestocking conversion was complete.

The Bank thus went in a very few years from flapper to serious bluestocking. Especially because this was done with the active involvement of university-based researchers, this took the Bank and its research into the public arena in ways that even now seem pretty adventurous. I spent 1970 full time at the Bank, paid for by a Killam Fellowship from the Canada Council, taking days off to be an expert adviser to the House of Commons Finance Committee, then studying tax reform. We even developed within the Bank, and subsequently published, a stochastic general-equilibrium model (Helliwell 1968) of the macroeconomic implications of the highly contentious tax-reform proposals of the Royal Commission on Taxation. Gerry Bouey and George Freeman took the progressive view that it should be possible to keep the Bank's reputation and independence unsullied by the other involvements of its part-time researchers, and their optimism seems to have been justified.

Once RDX2 became operational, it was drawn into the policy arena pretty quickly. Less than a month after the Nixon shock of 15 August 1971, the Federal Reserve Bank of Boston held its annual conference, this one fortuitously focused on financial relationships between Canada and the United States. Governor Brimmer of the Fed was given the unenviable job of defending the application to Canada of import surcharges designed to convince other countries to revalue their exchange

7. The model was known under different names, e.g., MPS for Michigan, Penn, and the U.S. Social Sciences Research Council; and MIT-Fed, for MIT and the Federal Reserve Board. It became the Federal Reserve Board's macroeconometric workhorse.

8. Fred Gorbet adds: "My major comment is that you are missing what to my mind is one of the most significant contributions the Bank made through its pioneering modelling efforts, and that was serving as a centre for the creation of intellectual capital that later became deployed in public policy-making through the transfer through the Bank and into government of people like George, Ian, myself, and a host of bright young researchers from Quebec, particularly, who were attracted by the intellectual rigour of the research being done at the Bank and who have gone back to very senior positions in the Quebec public service. Michel Caron, Gilles Godbout, Jean-Guy Turcotte, Jean St. Gelais, and Henri Paul Rousseau are a few of the names that come to mind immediately. This is a very important public good that the Bank's pioneering efforts created." I agree with him.
The Bank was very farsighted in hiring people like me, who had not yet completed their PhD dissertations, and giving them time, space, and the support (intellectually as well as otherwise) to do so.

9. The first major world meeting of Project Link, under the direction of Lawrence Klein, was held in Hakone, Japan, in 1969. Stephen Goldfeld (1974, 279), reported, I am sure on good information from Ian Stewart, that RDX2 alone had more computer code than all of the national models of Project Link put together. The national models used in the first years of Project Link are described in Ball (1973), which also includes a chapter on the RDX2-MPS bilateral linkage.

rates (Brimmer 1971). Since Canada had already been back on a floating exchange rate for a year by then, and the Canadian dollar had already been revalued by the market, the Canadians present, including Deputy Governor Bill Lawson and George Post, were inclined to cry foul. Round-the-clock work by Ian Stewart had generated RDX2 simulation results (Helliwell 1971) showing that Governor Brimmer was wrong to have expected the 1970 revaluation of the Canadian dollar to have produced more immediate effects on the bilateral current account. The quality of the Canadian evidence in response far exceeded that underlying the original policy and its defence. Participants from both countries were more convinced by the solidly established research base for the Canadian case, and the ability to produce the simulated bilateral current and capital account consequences on demand. RDX2 appeared at two subsequent Boston Fed conferences. The first, on international aspects of stabilization policies, in 1974, was a natural place to show how the bilateral transmission of monetary and fiscal policies was influenced by alternative ways of modelling trade, capital movements, exchange rates, and migration. While the qualitative results were regarded as useful, and endogenous migration proved a more important channel than many would have expected, Stephen Goldfeld noted that much depended on model dynamics, especially in the MPS model, that were difficult to pin down with either firm theory or strong evidence. This, in my view, was the weakest link of the large quarterly models, with or without endogenous expectations; relatively small changes in specification could lead to quite large changes in dynamic responses, even if the longer-term equilibrium properties are pinned down by the appropriate restrictions. This inability to discriminate conclusively among alternative short-term adjustment paths is part of what led many subsequent modellers, both inside and outside the Bank, to rely more heavily on annual data, and to impose more explicitly forward-looking expectations structures when and where these are also consistent with the data.

Almost from the time of RDX2's birth, and of the Nixon shock that marked the beginning of the end of the Bretton Woods system, commodity prices, including most importantly, the price of oil, had begun their upward spiral that would soon lead, spurred by the Arab-Isreali War, to a trebling of world oil prices in 1973–1974. The challenge for modellers, and for monetary authorities, was whether to treat this as a price-level shock to be accommodated or something that needed to be offset by drops in other nominal prices so as to keep the overall price level stable. On average, the central banks of the world treated the shock as a one-off level shock and were prepared to provide monetary accommodation to partially cushion the immediate effects on aggregate output and employment, hoping that wages would not start an upward spiral. It was not as common then as it is now to make use of price indexes with the more volatile components removed and to stake out a middle ground that had some potential for accommodating the oil-price-level effects while assuring those setting wages and prices that non-energy inflation would not accelerate.

There was always bound to be some stagflation in the train of the oil-price increases; the issue related to how to manage monetary policies, and, most importantly, expectations of monetary policy. In retrospect, the first oil shocks should have been accommodated less fully. Once inflation rates started to approach double digits, people forming expectations started to change gears (to follow the terminology introduced by John Flemming in 1976), altering their emphasis first from the price level to the rate of inflation, and then to the rate of change of the rate of inflation.

The stagflation of the 1970s inspired the Boston Fed to hold their 1978 Edgartown conference, entitled "After the Phillips Curve: Persistence of High Inflation and High Unemployment." This was the conference where Lucas and Sargent (1978, 50) made their assertion "that modern macroeconomic models are of *no* value in guiding policy, and that this condition will not be remedied by modifications along any line which is currently being pursued." Challenged by Ben Friedman to state exactly where the predictions of macroeconomic models had been "wildly incorrect," they replied that, in 1970, leading models had suggested that 4 per cent growth could be accompanied by 4 per cent inflation. To an evidence-based researcher like me, it was an eye-opener that comparing *ceteris paribus* model properties to a shock-ridden period of history would constitute grounds for dismembering an entire line of empirically based research. My assignment for the conference, as the discussant for Lawrence Klein's paper, was to assess the extent to which the Project Link national models had in fact been able to forecast, starting in 1973, the stagflation between 1974 and 1976. They had all predicted stagflation, even if less than that which had actually occurred. All of the models were capable of capturing the broad stagflationary consequences of a supply-side shock, although at that time there was still little empirical basis to permit the modelling of gear-changing inflationary expectations. I concluded that the models all needed work on the

modelling of inflation expectations, and many also needed a supply-side better equipped to deal with oil-price changes. But I had certainly found no evidence to support what Lucas and Sargent had been saying in the previous session.

Parallel cost-benefit modelling soon showed that the presumed immediate need for frontier energy resources was a fiction.

What was even more surprising to me was that the equilibrium real-business-cycle approach Lucas and Sargent offered as their preferred alternative was to be based not on estimation and formal testing of one structure against another, but on whether a calibrated version of their theoretical model could be used to derive distributions of endogenous variables that looked something like the actual distributions. This seemed a very unsatisfactory way for evidence-based social science to operate. When I eventually realized that the production core of the real business-cycle-model was nested within the RXD2 supply-side framework, it was then easy to do nested hypothesis testing, and to show at remarkably high levels of significance that the so-called "Solow residuals" taken to represent exogenous changes in technology in fact contained the largest part of the variance of output, easily explicable within the RDX2 factor-utilization framework (Helliwell 1986).

The Bank was approaching 40 during the aftermath of the first oil-price shock. Canada was partially sheltered by a flexible exchange rate, but faced the excise-tax features of oil-price increases. The federal government responded with a temporary price freeze on domestically produced oil, a process that took several years to unravel. Canadian oil and gas exports were taxed and restricted, and the National Energy Board, provincial and federal governments, and the oil and gas industry were united in the view that, despite the price increases, the production curves for oil and gas were on a downward slope that made gas from the Mackenzie Valley Pipeline essential to meet domestic needs by 1980. Driven by student interest in modelling the macroeconomic effects of such a large project, a pipeline sector was developed at the University of British Columbia for RDX2, and the results entered the public policy arena pretty quickly. The Bank then really needed to rely on its policy, adopted earlier by Gerry Bouey, of a clear separation between Bank and non-Bank uses of Bank research and models. Just as well, because parallel cost-benefit modelling soon showed that the presumed immediate need for frontier energy resources was a fiction. This pitted a few academic scribblers (Pearse 1974) with RDX2 in their toolkits against the National Energy Board and the vast weight of government and industry opinion.

I marvelled then, and often since, that the trust and mutual respect among Bank and non-Bank collaborators was such that the modelling co-operation proceeded unimpeded for the whole decade of the 1970s. I have since learned, in the course of research into the determinants of well-being, that such trust not only fosters good research and policy-making, but also increases the happiness of all concerned. This makes it that much easier to build and maintain the intellectual capital required to keep the Bank at the forefront of macroeconomic research. The growing size and maturity of the Bank's internal research teams meant that there was less need for active outside leadership. The woman of Wellington Street was by now a freestanding bluestocking able to recruit with the best of universities, to offer challenging research careers, and to operate in the front ranks of the world's evidence-based policy research institutions.

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Speeches

Introduction

In the three speeches published in this issue, Governor David Dodge focused on factors that add to the vitality of the Canadian economy. Speaking to L'Association des MBA du Québec on 9 November, he emphasized the importance of a sound pension system and the contribution it can make to the efficiency of Canada's financial markets and to the economy overall.

Improving Canada's productivity performance requires more efficient allocation of labour and capital resources and continued innovation in both products and production process was the message he delivered at a 28 November conference organized by the Canadian Council for Public-Private Partnerships. On 12 December, Governor Dodge told the Regina Chamber of Commerce that Canada's economic record over the past 15 years demonstrates the value of focusing monetary policy on keeping inflation low, stable, and predictable.

All three speeches are reproduced in this issue. The full text of other speeches given by the Governor can be found on the Bank's website (www.bankofcanada.ca).

14 November 2005	Remarks to a Conference on the occasion of the 80th anniversary of the Banco de Mexico, Mexico City, Mexico
4 November 2005	Remarks at the international symposium of the Banque de France, Paris, France
26 October 2005	Opening statement by David Dodge to the Standing Senate Committee on Banking, Trade and Commerce
25 October 2005	Remarks by David Dodge to the RCMP management retreat, Ottawa, Ontario
25 October 2005	Opening statement by David Dodge to the House of Commons Standing Committee on Finance
20 October 2005	Opening statement following the release of the *Monetary Policy Report*
22 September 2005	Remarks to the Toronto CFA Society, Toronto, Ontario
9 September 2005	Remarks by David Dodge to the Spruce Meadows Roundtable, Calgary, Alberta
14 July 2005	Opening statement following the release of the *Monetary Policy Report Update*
28 June 2005	Remarks to the Canada-U.K. Chamber of Commerce, London, U.K.
15 June 2005	Remarks to the Winnipeg Chamber of Commerce, Winnipeg, Manitoba
8 June 2005	Remarks to the Canadian Chamber of Commerce in Japan, Tokyo, Japan
2 June 2005	Remarks to the Canada China Business Council, Beijing, China
30 May 2005	Remarks by David Dodge to la Conférence de Montréal, Montréal, Quebec
6 May 2005	Remarks to the Ottawa Chamber of Commerce, Ottawa, Ontario
20 April 2005	Opening statement to the Senate Committee on Banking, Trade and Commerce
19 April 2005	Opening statement to the House of Commons Finance Committee

Our Approach to Monetary Policy: Inflation Targeting

Remarks by David Dodge
Governor of the Bank of Canada
to the Regina Chamber of Commerce
Regina, Saskatchewan
12 December 2005

I am happy to have the opportunity to speak in Regina during Saskatchewan's centennial year. Throughout 2005, the people of Saskatchewan have been celebrating the many remarkable contributions that this province and its citizens have made to Canada. Gerald Bouey and Gordon Thiessen, two of my predecessors as Governor, are examples of individuals with deep Saskatchewan roots who have made great contributions to the Bank and to our country. As this province turns 100, you can be proud not only of your history, but also of your modern, increasingly diversified economy that positions Saskatchewan for success in the future.

This year also marks the 70th anniversary of the creation of the Bank of Canada, and we too have taken the time to celebrate our contributions to Canada. At such times, while it is appropriate to look back and celebrate history and accomplishments, it is also a good opportunity to look forward and think about where we are headed. In this spirit, I'd like to talk to you today about one of our main responsibilities; that is, the conduct of monetary policy. I want to recount a bit of the Bank's history and talk about how we developed our current framework for conducting monetary policy. At the Bank of Canada, we strongly believe that targeting inflation is the best way for us to fulfill our mandate to Canadians. I also want to look forward a bit, and talk about the future of inflation targeting, as we prepare to renew our inflation-targeting agreement with the federal government next year.

The Bank's Mandate

Let me begin with a brief discussion of the Bank's legislative mandate. The preamble to the Bank of Canada Act instructs us to "regulate credit and currency in the best interest of the nation." It goes on to say that the Bank should mitigate "fluctuations in the general level of production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally . . . promote the economic and financial welfare of Canada."

So the question is, How can the Bank best provide the conditions for sustainable economic growth, bearing in mind the words in our mandate: "so far as may be possible within the scope of monetary action"? Over time, it has become clear that the best way for monetary policy to promote sustainable economic growth is to anchor expectations about the future purchasing power of money. In other words, it is important for Canadians to have confidence that the value of their money will not be eroded over time. Focusing on domestic price stability is the best contribution that monetary policy can make to economic stability and sustainable long-term growth.

It is important for Canadians to have confidence that the value of their money will not be eroded over time.

After the bitter inflationary experiences of the 1970s, it became clear that central banks needed to focus on achieving low inflation. But monetary authorities around the world were struggling to figure out how

best to do this. At the Bank of Canada, we were trying to determine how to achieve price stability in a way that would allow us to accomplish three things: first, as I just said, we wanted to anchor Canadians' expectations about the future purchasing power of their money; second, we wanted an operational framework for the conduct of monetary policy; and third, we wanted an approach that would help markets, politicians, and the Canadian public to understand what we were doing, and what actions they could expect from us.

Throughout the 1980s, we at the Bank worked to come up with such an approach. By 1991, we had decided that targeting inflation was the best way to achieve high, sustainable growth in output and employment. And so the Bank and the Government of Canada agreed on a series of explicit targets for inflation. To be clear, however, inflation targeting is not an end in itself. Rather, as I said, it is the best means of fulfilling our commitment to promote the economic and financial welfare of Canadians.

The Canadian Version of Inflation Targeting

Once the Bank and the government agreed on the concept of inflation targeting, we needed to make some choices to put the concept into practice. Like many other central banks, we chose a target for the annual rate of inflation. Initially, our focus was on reducing the rate of inflation, which was running at more than 5 per cent annually in 1991. The target was set to bring inflation down gradually—first, to the 3 per cent midpoint of a 2 to 4 per cent target range by the end of 1992, and then to the 2 per cent midpoint of a 1 to 3 per cent range by the end of 1995. The target has remained there since then. Let me take you through some of the other key decisions that we made in 1991, and the rationale behind our choices, as we set out the details of our framework.

First of all, why did we choose the consumer price index (CPI) as our measure of inflation? The key reason is that the CPI is the measure of inflation most familiar and relevant to Canadians. Choosing a well-known indicator as a target makes it easier to explain our actions and to be accountable.

Second, why do we have a range? This is because there are some components of the CPI—such as some energy and food items—whose prices tend to move a lot, both up and down. These movements can cause large fluctuations in the index. If we tried to target inflation too precisely, we would then be adjusting our policy interest rate sharply and frequently, which would lead to greater instability in the economy. Having a range reflects the inherent volatility of the CPI. But to be clear, the range is *not* a zone of indifference—we *do* aim to achieve the 2 per cent target.

Another concern is that this volatility can obscure the underlying trend of inflation. So for operational purposes, we use a measure of core inflation. This measure strips out eight of the most volatile components of the CPI and the effect of changes in indirect taxes on the rest of the items. In this way, core inflation provides a better forward-looking indicator of the trend of inflation.

Finally, since today's monetary policy actions only affect future inflation, we needed to choose a time frame in which to achieve our target. From the beginning, we said that if inflation was pushed off target, we would conduct monetary policy so as to return inflation to target over a period of 18 to 24 months. This is because research has suggested that historically it takes 12 to 18 months for changes in interest rates to have most of their impact on output, and 18 to 24 months to have most of their impact on prices. Of course, there is always uncertainty about the lags involved, and I'll have more to say about this later on.

We worry just as much about inflation falling below target as we do about it rising above target.

Before I move on, I want to emphasize three points about our inflation-targeting framework. The first is that we operate in a *symmetric* way, and we make it clear to everyone that we do so. By this, I mean that we worry just as much about inflation falling below target as we do about it rising above target. When the demand for goods and services pushes the Canadian economy against the limits of its capacity, and inflation is poised to rise above target, the Bank will raise interest rates to cool off the economy. And when the economy is operating below its production capacity, and inflation is poised to fall below target, the Bank will lower interest rates to stimulate growth. Paying close attention to signs that inflation is moving away from our target—in either direction—promotes timely action.

This is how we keep the economy operating near its full capacity and thus keep inflation low, stable, and predictable.

The second point I want to stress is that having an inflation target as an anchor is very helpful in terms of the Bank's accountability. If inflation persistently deviates from the target, we are committed to explaining the reasons why, what we will do to return it to target, and how long we expect the process to take.

The third point is that any central bank that runs an independent monetary policy and targets inflation must allow its currency to float. It is simply not possible for a central bank to successfully control both the domestic and external values of its currency at the same time. We have only one instrument—our policy interest rate—so we can have only one target. Thus, with inflation as our target, we naturally operate with a floating currency.

Canada's Experience under Inflation Targeting

Now, let me quickly review our record with inflation targeting. As we look at inflation and economic growth in Canada since 1991, it is quite clear that the benefits we had hoped would come from inflation targeting have, in fact, materialized. We expected inflation to become more stable—and it did so, sooner than we had anticipated. Since settling on the 2 per cent target for inflation at the end of 1995, actual inflation has averaged very close to 2 per cent. And it has remained within the 1 to 3 per cent target range, with only rare exceptions. We expected our credibility to increase and inflation expectations to become well anchored—and this has also happened.

By keeping inflation close to the target, monetary policy has helped to keep the economy operating near its potential.

We also thought that inflation targeting would help the economy to avoid the exaggerated "boom-bust" cycles of previous decades—and it has. The business cycle is still with us, but economic volatility has diminished. By keeping inflation close to the target, monetary policy has helped to keep the economy operating near its potential.

Finally, and very importantly, our transparent framework has allowed markets and analysts to better predict how we will react to different economic outcomes. Within the Bank, too, focusing on inflation has brought increased discipline and clarity to our monetary policy decision process.

Canada was the second country after New Zealand to adopt explicit inflation targets. But over the past decade and a half, about 20 other central banks have also adopted this framework. Some, like the central banks of the United Kingdom and Sweden, are from advanced, industrialized economies. Others, such as the central banks of Chile and Brazil, are from emerging-market economies. In every case, inflation targeting has been a success: inflation rates have been reduced, and central banks have generally been able to hit their targets. Inflation has become less persistent where inflation targeting is practised, and it is reasonable to assume that well-anchored inflation expectations are a good part of the reason why.

Given this success, it seems likely that other countries will join the ranks of inflation targeters in coming years—indeed, just last week the central bank of Turkey announced that it will move to formal inflation targeting next year. Inflation targeting is also being discussed in the United States where Ben Bernanke, Alan Greenspan's designated successor at the Federal Reserve, has been an enthusiastic proponent.

However, some have argued that inflation targeting is too limiting an approach, and that it can constrain a central bank's ability to act or to apply judgment in the case of extraordinary events. But this has not been our experience in Canada. For example, in the immediate aftermath of the 9/11 terrorist attacks, we lowered interest rates quickly and decisively to underpin confidence. When a major loss of confidence did not materialize, we were able to reverse course in fairly short order and withdraw some of that monetary stimulus. Our inflation-targeting framework did not restrict our ability to act. Indeed, because our framework is transparent, financial markets were able to appreciate why we made these rapid rate adjustments.

The Bank of Canada focuses on inflation at the *national* level. This can lead to suggestions that some of Canada's regions may not have the appropriate policy for their particular circumstances. We hear these comments more often during times such as these, when economic

prospects and growth rates vary from sector to sector and—because of the geographic concentration of sectors in Canada—also from region to region. These comments reflect a fairly common misunderstanding about monetary policy. Remember that in any market economy, adjustments are always taking place. Markets and prices send clear signals that indicate how economic resources should be allocated, shifting resources to rapidly growing sectors from slower-growing ones. Because our monetary policy targets inflation for the country as a whole, it does not try to mask these important price signals—nor should it. To do so would impede the adjustment process and, ultimately, lead to lower economic growth.

But this does not mean that we ignore what is happening on a regional basis—far from it. Indeed, the information we receive from our five regional offices, and from our *Business Outlook Survey*, is an important input to our monetary policy deliberations. Our job is to add up what is going on across the country and to conduct monetary policy so that we achieve our inflation target for the country as a whole.

The Future of Inflation Targeting

Despite our success to date with inflation targeting, I shouldn't leave you with the impression that this somehow represents the end of monetary policy history. Prudent policy-makers should always be striving to find better ways of getting things done. As I said at the beginning, our agreement with the federal government is up for renewal next year. So at the Bank, we have been busy thinking about those elements of our framework that we would not want to change, as well as others where changes might be considered.

From the Bank's point of view, the basic arrangement of aiming inflation at the 2 per cent midpoint of a 1 to 3 per cent target range has served Canadians well, along with the use of the total CPI as the target, and a measure of core inflation for operational purposes. The Bank will also continue to recognize the importance of communications and transparency. Inflation targeting does a good job of anchoring expectations, but it works better when a central bank communicates well. I expect that these basic elements of our framework will remain in place.

This is not to say that we haven't examined these elements. Indeed, we have asked ourselves if 2 per cent is the right target. When we last renewed the inflation-targeting agreement in 2001, we looked closely at this issue. At the time, our research could not convincingly demonstrate that the benefits of moving to a lower target would outweigh the costs. More recent research, while still inconclusive, provided a little more support for a lower target. Of course, we will continue to look at this question, but the evidence would have to be quite compelling before the target would be changed.

Another issue that we continue to examine is whether we should target the actual *level* of prices rather than the inflation *rate*. Let me explain what I mean. Had the annual rate of inflation been exactly 2 per cent since 1995, when we settled on that figure as our target, the consumer price index would have risen from a level of 102.8 in December 1994 to 127.6 in October of this year. The actual price level for October was 128.5—a minimal difference, as it turns out. But in the future, it is possible that we could get a series of shocks that moved inflation predominantly in one direction, either up or down. And, so, the price level could move significantly away from where it would have been if we had hit the 2 per cent target exactly over a period of years. Under price-level targeting, monetary policy would be set so as to offset those deviations from the desired price level. But under inflation targeting, those past price-level movements are essentially forgotten; they would not change the conduct of policy going forward. Economic theory tells us that, over the longer term, having certainty about the future price level would yield somewhat greater benefits than just having certainty about the future rate of inflation. But to date, it has not been possible to conclusively measure the costs and benefits of targeting the price level versus targeting the inflation rate. We are still working at building better analytical tools and methods to examine these questions, and we will continue to look at new evidence as it becomes available down the road.

Another issue that we are looking at is the appropriate time frame for returning inflation to target following various kinds of shocks. As I said before, we now conduct monetary policy with the goal of bringing inflation to target within an 18- to 24-month time frame. But there are questions as to whether this time frame is appropriate for every type of unexpected development that could affect inflation. There could be reasons to look at adjusting the time frame in response to inflationary pressures from major movements in asset prices—be they real estate, equity prices, or the exchange rate. Given the success we have had to date in dealing with various shocks within an 18- to 24-month horizon, we should not change that horizon lightly. But as inflation targeting and the global economy evolve, we will need to continue considering the appropriate

time horizon and some of the other issues I discussed today. The Bank of Canada remains committed to conducting and encouraging research in these and other important areas.

The Bank's symmetric approach of keeping inflation low, stable, and predictable has laid the groundwork for solid, sustainable growth in output and employment.

Conclusion

I want to conclude by emphasizing a few key points. Despite the issues I've just raised, the economic record of the past 15 years shows that inflation targeting has served Canada well. The Bank's symmetric approach of keeping inflation low, stable, and predictable has laid the groundwork for solid, sustainable growth in output and employment. With inflation targeting, monetary policy is more focused, our communications are clearer, and inflation expectations are more solidly anchored. As we look forward, it is important that we maintain an anchor to keep monetary policy focused. From my perspective, inflation targeting is the best anchor we've seen.

Investing in Productivity

Remarks by David Dodge
Governor of the Bank of Canada
to the Canadian Council for Public-Private Partnerships
Toronto, Ontario
28 November 2005

Today I want to discuss the importance of efficiency in Canada's economy. Specifically, I'll focus on some of the elements that contribute to productivity growth in Canada—a subject that I've addressed before and that you've been hearing a lot about lately.

Let me start by explaining what we mean when we talk about productivity. Measures of productivity tell us how much output we produce from the use of tangible inputs—such as skilled workers and capital equipment—and intangible inputs—such as technological advances and managerial and entrepreneurial know-how. Productivity rises over time as we boost output by finding new and more efficient ways to use these inputs.

We care about productivity because it is critical to our national standard of living.

When measuring productivity, economists often prefer to use a measure called *total factor productivity*, which includes all these inputs—capital, labour, innovation, and know-how. In practice, however, it is very difficult to measure total factor productivity. That's why analysts usually focus on the more commonly used and better-understood measure, labour productivity. This measure tells us how much output is produced per worker or per hour worked. Labour productivity has the added advantage of being closer to measures of standards of living and more directly comparable across countries. Of course, labour productivity is affected by experience and education, by the amount of capital equipment (notably machinery and equipment) that is available to workers, and by innovation and know-how.

We care about productivity because it is critical to our national standard of living. There are other factors that affect our living standards—changes in our terms of trade and in employment-to-population ratios, for instance—but productivity growth is the main contributor to *sustained* improvements in real incomes and rising standards of living over the long term. But productivity growth in Canada, measured as real gross domestic product per hour worked, has averaged less than 1 per cent per year so far in this century. Frankly, we must do better.

The Components of Productivity

But what does "doing better" actually mean? First, it means increasing the amount and the quality of physical capital per worker—giving employees better tools to work with. It also means allocating resources more efficiently and being more innovative. In my remarks today, I'm going to focus on the two latter elements—efficient allocation and innovation.

I'll start with efficient allocation. At any point in time, we allocate resources among competing uses, always trying to use the resources we have as efficiently as possible. The goal is to move to the point where, given current production practices and knowledge, we are getting the absolute most out of the labour and capital resources at our disposal.

The second element of productivity is innovation. This means generating new knowledge, improving technology, and enhancing both the processes and the organization of production. To take advantage of innovation, we also need to upgrade the skills of our labour force and, in some cases, change our business and managerial practices. Innovation and skills

enhancement, when combined, lead to continuing growth of output per unit of input.

For long-term improvements in productivity, we need both innovation and more efficient allocation. And so enterprises, sectors, and governments must follow the practices and policies that not only will allocate resources more efficiently, but also provide the framework to encourage innovation.

Enterprises, sectors, and governments must follow the practices and policies that not only will allocate resources more efficiently, but also provide the framework to encourage innovation.

Productivity through Innovation

When we talk about encouraging innovation, we're talking about two things. First, there are the incentives to encourage *product* innovations. These include the encouragement of research and development (R&D) that generate the "eureka!" kind of knowledge creation that's done at universities, research institutes, and knowledge-intensive companies. But just as important, although sometimes overlooked, are the research and development that lead to incremental improvements in the design and performance of existing products.

This kind of innovation requires investment. In Canada, we make quite large public investments in research through our public institutions. Research spending by Canadian companies and private sector institutions, on the other hand, tends to lag that of other countries.

But dollar amounts don't tell the whole story. Research success depends not only on the amount that you invest, but also on how efficiently you invest it. That's why it is hard to judge the innovative capacity of an economy or an enterprise by the raw dollars that it spends on R&D. The fact that the R&D budget of Apple Computer has lagged behind the computer industry average would come as a surprise to anyone who has a new iPod on his or her Christmas list. Others are probably in a better position than me to offer advice on ways to get more bang for your research buck, but this will be an important part of future discussions on productivity.

The second type of incentive to encourage innovation relates to improving the *processes* used by an organization. For example, how can an organization use new technology to restructure its business and managerial practices? And what incentives drive that restructuring? Well, the most obvious incentives are the need to maintain a competitive edge, the desire for profit, and the fear of going bankrupt. That is why economies that have intense competition in domestic markets—from both domestic and foreign firms—are the most innovative. Indeed, competition encourages both product and process innovation.

But innovation means taking risks. Enterprises must also be given the incentives to take those risks. And they should be rewarded by the market when they do so. Among other things, this requires a financial system that appropriately prices the risks and potential returns being taken on by investors.

Finally, we know that innovation is not a government-driven process: It occurs on the shop floor, in the start-up's laboratory, and in the minds of entrepreneurs. In our businesses and public sector institutions, we need to develop a culture that encourages both the "eureka!" moments and the incremental improvements that come from the incentive to stay just one step ahead of the competition.

Productivity through Efficient Allocation

Let me now talk about improving productivity through more efficient allocation of resources. Some of the policies that promote better resource allocation are the same ones that encourage innovation. Let me mention four elements that are critical.

First, we need an appropriate legal framework of property rights, including intellectual property and contract law. This framework must also include suitable penalties for those who break these laws, breach the public trust, or commit fraud.

Second, labour markets must operate efficiently, encouraging the flow of resources from less-productive to more-productive uses, and from shrinking sectors to growing ones. This flexibility is encouraged through appropriate labour market policies, education, and training. I won't say more about this—recent research by the International Monetary Fund and the Organisa-

tion for Economic Co-operation and Development explores this issue thoroughly.

The third critical element is a financial system that operates efficiently, helping to allocate scarce economic resources to the most productive uses, in the most effective way. In previous speeches, I spoke about the importance of a well-functioning financial system and about the need to support the efficiency of our financial institutions. I also spoke about the need to promote efficiency in the regulation of securities markets and about the role that Canada's pension system can play.

Building the Right Infrastructure

The fourth key element is the construction and operation of the physical infrastructure that we need for economic growth and development. I will focus the remainder of my remarks on this area. This critical infrastructure includes public assets, such as highways, public transit and transportation facilities, power, waterworks and waste water, schools, hospitals, and other facilities. It also includes private infrastructure, such as pipelines, rail, and telecommunications networks.

To illustrate why infrastructure is an important means of encouraging more efficient resource allocation, let me offer a few examples. Canada is envied around the world for its wealth of natural resources. But getting these natural resources to market has always relied on railways, pipelines, ports, and other transportation infrastructure. Similarly, Canada's world-renowned telecommunications sector has grown out of huge investments in this country's land-based and satellite infrastructure.

Clearly, infrastructure plays a key role in creating an efficient, productive economy. But, today, there are clear signs of a public infrastructure deficit in Canada.

The clusters of industrial, manufacturing, and technology companies located in our major centres are there because our cities function well, with quality water, sewer, transportation, and municipal and social services. These companies employ Canadians who were educated and trained by our public schools, colleges, and universities. And these companies are funded by individuals who are willing to invest their savings through a financial system that they trust.

Clearly, infrastructure plays a key role in creating an efficient, productive economy. But, today, there are clear signs of a public infrastructure deficit in Canada. And there is a growing concern that this deficit could harm Canada's productivity growth and standard of living, unless we take steps to correct it.

Estimates of the magnitude of this deficit vary considerably.[1] But it is generally acknowledged that the gap will not be reduced solely through government financing. No single means of development always creates the right infrastructure, so it will take a number of different solutions. Through our history, we have used various methods.

We have seen private infrastructure development, encouraged by governments through land grants, monopoly rights, subsidies, and so on. In these examples, the private sector takes on the risk of financing the infrastructure, with the promise of profits down the road. Perhaps the most well-known example of this type of infrastructure development is the Canadian Pacific Railway.

We have also seen purely public infrastructure building, in which the government or its agencies build and operate the infrastructure. An obvious example is Canada's network of highways and roads.

Some infrastructure has been built and operated entirely by private companies, under the umbrella of a legal framework that helps to protect their investment and of a regulatory structure that helps to protect the consumer. Cable television is an example of this type.

Finally, there are public-private partnerships (PPPs). These take different forms. Many employ a mix of public and private funding, with the operation and maintenance of the infrastructure performed by a private enterprise on behalf of the government. The most familiar example of a PPP is the Confederation Bridge between New Brunswick and Prince Edward Island. But there are still relatively few existing PPPs in Canada. Other countries, such as the United Kingdom and Australia, offer many examples of successful PPP

1. This is partly owing to varying definitions of infrastructure and the high level of subjectivity involved in assessing "need." The Government of Ontario, for example, estimates that the cost of correcting past underinvestment and of building the public facilities that the province needs to accommodate future growth may exceed $100 billion.

infrastructure. Unlike most jurisdictions in Canada, these other countries already have a well-developed legal and regulatory framework for PPP investments.

Each of these methods has advantages, but also problems. In the final analysis, it is all a question of incentives. For example, when infrastructure projects are solely publicly funded, the usual incentives to build and operate efficiently—the incentives to avoid bankruptcy and to make a profit—are not the driving motive behind the investment.

The most efficient and timely allocation of resources for infrastructure occurs when the incentives are right. And that framework of incentives usually includes some expectation of profit. This applies equally to decisions on what to build and to decisions regarding how to operate the infrastructure once it is in place.

The hardest incentive to get right is that of proper pricing. A lack of pricing that appropriately reflects demand and supply conditions may be one reason why there have been relatively few PPP infrastructure projects in Canada. It is particularly important to improve pricing mechanisms for services that are provided through public infrastructure. Governments have often been unwilling to price-to-market infrastructure-based services. As a result, shortages are managed through non-price rationing, such as rolling electricity blackouts, highway congestion, or waiting lists for government documents or services. And, occasionally, we get the opposite problem—an over-build of infrastructure that cannot be justified by demand. New technologies, such as transponders on vehicles to monitor road use, and meters that allow peak-hour pricing of electricity, provide new opportunities to gauge demand for these services, and to price them accordingly.

Another key incentive with respect to infrastructure investment is the incentive to manage risk. Private financing of infrastructure through the markets tends to lead to better assessment of the risks of the investment, because financial markets are better able to measure and price risk. This is not to say that we should expect the private sector to shoulder all the inherent risks of major infrastructure investments without any public sharing of those risks. But financing through markets provides a mechanism by which we can better assess the economic merits of an investment.

The Infrastructure Investment Climate

These are some of the complex issues facing us as we try to eliminate Canada's infrastructure deficit. The timing is right to make these investments. During the early 1990s, governments had to deal with large fiscal deficits, and they simply did not have the cash to invest in building infrastructure. That is not the case today. Further, over the next couple of decades, as our population ages, more Canadians will be saving for their retirement. This added saving will boost an already growing demand for long-term financial assets.

Pension and endowment funds are now allocating an increasing share of their portfolio assets to infrastructure investments, in an attempt to increase returns and better manage risk through portfolio diversification. These funds are increasingly looking for longer-term assets that provide a better match to their liabilities. So far, much of this investment has gone to projects in other countries. This is partly because the domestic markets for PPP in these other countries are more developed than ours.

In Canada, we currently see three conditions that present us with a vital opportunity. We have governments that are committed to investing in infrastructure, a private market with an appetite for longer-term financial assets, and a pent-up need for those investments in Canada. If we get this right, we can enhance Canada's productivity in two ways. First, the improved infrastructure can help to boost the productive capacity of the private sector and help to achieve more efficient resource allocation. Second, better infrastructure is a key component in attracting the companies and the people who spearhead continuous innovation.

Conclusion

The Bank of Canada's mandate is to promote the economic and financial well-being of this country. We know that an efficient and innovative economy is critical if we are to achieve sustainable growth and prosperity for Canadians.

Finding innovative and reliable ways to fund this country's current and future infrastructure requirements is a key element of any effort to improve Canada's productivity and raise living standards for Canadians.

That is why, in past speeches, I have focused on the need to have efficient financial institutions and markets. The right infrastructure is also key to promoting efficiency. And PPP is a practical way to match the demand of savers for long-term assets with the economy's need to build critical infrastructure. It is also a way to promote the efficient operation of that infrastructure. That is why I have chosen to focus on this issue today.

I know that over the course of this conference, we'll hear some innovative ideas on how to achieve these goals. Your deliberations are important. The right infrastructure can support and encourage initiatives to increase productivity. Finding innovative and reliable ways to fund this country's current and future infrastructure requirements is a key element of any effort to improve Canada's productivity and raise living standards for Canadians.

Economic and Financial Efficiency: The Importance of Pension Plans

Remarks by David Dodge
Governor of the Bank of Canada
to l'Association des MBA du Québec (AMBAQ)
Montréal, Quebec
9 November 2005

Over the past year, I have spoken a number of times on the topic of efficiency, and why it is so important for Canadian policy-makers to keep in mind the goal of an efficient financial system. Today, I want to talk about Canada's system of pension plans and how they contribute to the efficiency of financial markets and of the economy as a whole.

Before I talk specifically about pensions, let me begin with a few words about financial system efficiency in general. What exactly do I mean by efficiency? An efficient financial system is one that helps to allocate scarce economic resources to the most productive uses, in the most effective way. An efficient financial system reduces the misallocation or waste of economic resources. This is important because, by making our financial system as efficient as possible, we maximize our chances of generating sustained economic growth and prosperity.

At the Bank of Canada, we contribute to the goal of an efficient financial system in various ways. Our monetary policy aims to keep inflation low, stable, and predictable. By doing so, we enhance the confidence of Canadians in the value of their money, thus reducing their need to spend resources either anticipating or coping with inflation. We also contribute to efficiency through our role as overseer of major payments, securities, and foreign exchange clearing and settlement systems, and by providing liquidity in times of financial stress. By reducing risks to the safety and stability of the financial system, we increase certainty about the robustness of the system, which also supports efficiency. Our semi-annual *Financial System Review* promotes awareness of financial system issues. As well, the Bank works actively with financial market participants and regulators to develop and promote efficiency. And we conduct research that helps inform the decisions of policy-makers in terms of promoting this goal.

In previous speeches, I've spoken about the need to support the efficiency of our financial institutions. Canadian policy-makers need to develop a framework that continues to provide incentives for innovation and efficiency by encouraging competition. At the same time, Canadian financial institutions may be able to find efficiency gains through economies of scale, which could flow across the economy in the form of lower-cost business and retail lending. However, other relevant public policy questions include foreign ownership and concerns about the concentration of market power among very few players. Striking a balance between all these interests is not a simple task. But we should keep in mind that the level of competition can be maintained or enhanced by new entrants into the marketplace or by the threat of new entrants.

I've also spoken about the need to promote efficiency in the regulation of securities markets. Efficiency dictates that Canada should have uniform securities laws and regulations based on principles that apply to everyone. The question is how to apply these laws and regulations in a tiered way to take into account the differing needs of issuers. All major provincial jurisdictions deal with issuers that vary greatly in terms of size and complexity—whether issuers are large, complex firms that want access to international capital markets, "mid-cap" firms that choose to access only Canadian capital markets, or small speculative resource firms that have historically relied on Canadian equity markets for financing. And the needs of investors are similar from one jurisdiction to another. So while the application of rules needs to take into account the size and complexity of firms, there is no need for

different rules based solely on the province or territory of the issuer or investor.

Today, I want to bring Canada's pension system into the picture. Obviously, the health of the pension system is extremely important from the perspective of the people who rely on it for their retirement income. It is also important from the perspective of economic and financial market efficiency. A report to G–10 deputies published in September emphasized that pension funds have already become the largest institutional investor class among G–10 countries. It also noted that retirement savings and the related capital flows will have an increasingly important influence on financial markets.

We must allow these pools to be accumulated and invested so that they not only maximize returns to support future pensioners, but also maximize the future growth of the economy's production capacity.

Here in Canada, policy-makers need to think about how our pension system can contribute to efficiency. There is a need for long-term investment in critical infrastructure to support Canada's future production capacity. And there are pools of pension capital that, given their very long-term investment horizon, can be invested in this manner. I will come back to this issue in a future speech. But in the balance of my remarks today, I want to look at the pension system itself and discuss the incentives under which these large pools of capital operate. We must allow these pools to be accumulated and invested so that they not only maximize returns to support future pensioners, but also maximize the future growth of the economy's production capacity.

Canada's Pension System and Risk

There are essentially three pillars that make up Canada's pension system. The first is government income support: the Old Age Security (OAS) and Guaranteed Income Supplement (GIS) program. The second pillar is public pensions: the Canada and Quebec Pension Plans (CPP / QPP). The third pillar is private pensions, consisting of tax-deferred retirement savings plans (RRSPs) run by individuals, and employer-sponsored pension plans. Statistics Canada data show that through the 1990s, income from the third pillar grew in importance, rising from 18 per cent to close to 30 per cent of retirement income. By comparison, income from the first pillar—the OAS / GIS—edged down from 30 per cent to 27 per cent during that decade, while income from the CPP / QPP rose from about 16 per cent to about 20 per cent. Returns on other personal investments made up most of the balance of retirement income.

Of these sources of pension income, the OAS / GIS is not relevant to this discussion, since it is funded out of current federal government revenues and is not backed by a pool of dedicated assets. The other pillars are composed of three pools of capital with combined assets of more than $1 trillion at the end of 2003. Expressed in very rough percentages, the CPP / QPP pool was the smallest, with less than 10 per cent of the total, while assets held in RRSPs accounted for about 35 per cent. By far the largest pool was employer-sponsored pension plans, at about 55 per cent of the total.

In virtually all cases, employer-sponsored pensions take the form of either defined-benefit or defined-contribution plans. A defined-benefit pension plan promises a guaranteed, fixed stream of retirement income. The pension is based on the employee's work history and is often expressed as a percentage of the employee's salary. In contrast, pension benefits from a defined-contribution plan are not predetermined. They depend on the actual amount of contributions made on behalf of the individual employee and on the actual rate of return realized on those contributions.

An efficient financial system distributes various risks to those who are best able to bear them. And the efficiency of these three pools of capital largely boils down to how they handle two principal types of risk. The first of these is return risk. This refers to the fact that the value of the pension that can be purchased at the time of a person's retirement depends largely on the conditions that exist just at the point of retirement. This risk is handled in different ways by different types of pension plans. For example, a defined-benefit pension plan mitigates this risk by pooling the assets of all contributors. This pooling helps to protect the ability of a sponsor of a defined-benefit plan to pay the pensions of all plan members, even those who retire one day after a stock market crash, or at a time when the return on long-term bonds is particularly low.

The other type of risk is longevity risk. In a defined-benefit pension plan, this risk is transferred to the sponsor of the plan—usually the employer—who is responsible for making up any shortfall that could arise from pensioners living longer on average than expected.

By pooling these risks, pension funds generate important benefits in terms of economic efficiency. By transferring risk from individuals to collectives, pension funds help achieve a more efficient allocation of savings. Pension funds—particularly the very large ones—tend to have sophisticated asset managers. These large funds have the incentive and the ability to invest pools of contributions across appropriately varied asset classes. Further, they invest over very long time horizons, so they can finance large investment projects at competitive rates of return. All of this contributes significantly to economic efficiency by transferring risk to those investors that are best able to bear it.

By pooling these risks, pension funds generate important benefits in terms of economic efficiency.

Let's now turn to the three large pools of capital in Canada's pension system, and consider their implications for the efficiency of financial markets and for the economy as a whole.

First, let me talk about the CPP and the QPP. While these plans are not fully funded, as private pension plans must be, many of the principles of the CPP and QPP are the same as those used by well-structured defined-benefit pensions. The benefits are linked to the earnings history of each member. The assets of the plans are managed by the Canada Pension Plan Investment Board and the Caisse de dépôt et placement du Québec, with the aim of maximizing their long-run returns. Contributions are invested broadly, thus supporting the efficiency of financial markets and of the economy as a whole.

Now let's turn to private pension plans and look first at individual and group tax-deferred RRSPs. This component of Canadians' retirement income has many of the same characteristics as a defined-contribution pension. By deferring taxes, RRSPs provide an appropriate incentive for saving. In recent years, just under one-third of taxpayers have contributed to their RRSP in any given year, and close to two-thirds of Canadians who filed a tax return contributed to a plan between 1993 and 2001. The increasing use of RRSPs has encouraged the development of financial products that allow individuals to diversify their risk. Of course, this source of income is subject to return risk, since an individual's portfolio could fall sharply in value just before planned retirement.[1]

Research in the United States[2] has shown that individuals tend to be risk averse in terms of the assets they hold in individual retirement accounts, and in terms of how they allocate assets in defined-contribution pension plans when they have the opportunity to do so. Individuals tend to invest too much in investment-grade bonds, money market instruments, and large-cap equities relative to the portfolio that would maximize their expected pension. And, understandably, the older they get, the more risk averse they become. So the proportion of the pool of savings from individual and group RRSPs and from other defined-contribution plans that is allocated to riskier, less-liquid, and longer-dated assets is likely to be quite small compared with that of defined-benefit plans. This difference in the risk appetite of individual savers with RRSPs and that of the sponsors of defined-benefit plans has an important effect on the functioning of Canadian capital markets. I'll come back to that point in a moment.

Now let's look at the third pool of capital—employer-sponsored pensions. I want to spend a bit more time discussing these plans because there are policy concerns here that need to be addressed with some urgency.

For decades, the vast majority of this pool—in terms of assets—has been held in defined-benefit plans. These plans can be attractive to individuals because they mitigate longevity risk and return risk.[3] Defined-benefit plans also have important positive attributes for efficiency. I mentioned earlier the way in which defined-benefit plans support economic efficiency by allowing for a better allocation of savings. But there are also efficiency gains for financial markets. The managers of defined-benefit pension plans have both

1. The ability of individuals with RRSPs to use a Registered Retirement Income Fund rather than a life annuity does allow more sophisticated retirees to mitigate this risk somewhat.

2. I am not aware of any Canadian research on this topic. But it is a reasonable assumption that these results would apply to Canada.

3. But many defined-benefit plans lack portability, which lessens their attractiveness.

the ability and desire to invest in the kinds of assets that the average individual investor might not normally consider. Pension managers have superior knowledge of financial markets and of the associated risks that makes them willing to invest in alternative asset classes and to engage in arbitrage between markets.[4] All of these activities make financial markets more complete and, so, enhance their efficiency. The size and sophistication of pension plans also lead them to be actively interested in good corporate governance, thus contributing to market discipline, which supports overall market efficiency.

The managers of defined-benefit pension plans have both the ability and desire to invest in the kinds of assets that the average individual investor might not normally consider.

The Decline in Defined-Benefit Pensions

In recent years, defined-benefit pension plans have been in decline. The number of Canadians covered by defined-benefit plans has fallen by roughly 5 per cent since 1992. While the large majority of employer-sponsored plans are still of the defined-benefit variety, defined-contribution plans have grown significantly. We have seen many employers either collapse their defined-benefit plans or restrict new entrants into the plans. We have also seen increasing deficits in many defined-benefit pension plans.

While part of the decline in defined benefit plans comes from developments in the economy and the labour force, part is also due to the incentives under which these plans operate. Let me elaborate. Defined-benefit plans should operate so that the *expected* value of all benefits to be paid out equals the *expected* value of all contributions plus the *expected* returns on investments. But when the actual value of one of these variables differs from the expected value, the sponsor of the plan takes on responsibility for making up any difference.

What would make a sponsor accept this responsibility? One reason would be if sponsors could mitigate the risk of worse-than-expected outcomes by being allowed to benefit from better-than-expected outcomes. But while there is no question that the sponsor is responsible for any deficit in the plan, it is not at all clear that the sponsor benefits from any surplus that may be generated. The question of who "owns" a surplus in a defined-benefit plan has been before many different courts at different levels and in different jurisdictions in recent years. While the precise answer depends on the specific wording of the rules of any given pension plan, in general, provincial and federal pension law has evolved so that employees have increasingly been given rights to pension surpluses, even though employees typically bear none of the responsibility for any deficit.

A further distortion of incentives arises in those cases where the pension plan contributions are held in trust and administered by a trustee. Currently, most pension plan trusts are set up so that the employees are beneficiaries of the trust. Beginning in the 1980s, successive court decisions have established that sponsoring firms may gain exclusive access to a surplus in a pension plan trust only if the trust is set up in such a way as to permit the sponsoring firm to gain exclusive access.

It is important that Canadian policy-makers consider taking steps to rebalance the incentives for sponsors to operate defined-benefit plans.

If defined-benefit plans are to survive, grow, and provide a source of funding for long-term, riskier assets, it is important that Canadian policy-makers consider taking steps to rebalance the incentives for sponsors to operate defined-benefit plans. Let me mention a few of the things that could be done.

First, the provincial and federal governments need to make appropriate adjustments to their pension laws so that the sponsors of defined-benefit pension plans are responsible for *all* residual risks to the pension plan—both outcomes that lead to deficits and out-

4. Arbitrage refers to a trading strategy that tries to take advantage of differences in prices for the same asset trading on different exchanges.

comes that lead to surpluses. Let me be clear. I am not saying that *firms* should be given unambiguous sole ownership of pension surpluses, but rather that *sponsors* should have that ownership. There are a handful of pension funds—such as the Ontario Teachers' Pension Plan—where both the employer and employees are joint sponsors, and share ownership of any surpluses, as well as responsibility for any deficits.

The second step would be to consider rebalancing the tax treatment of employer contributions. Currently, in most circumstances, employers are not allowed to deduct contributions to a defined-benefit pension plan if the going-concern valuation of the plan is more than 110 per cent of expected future liabilities. This has certainly added to the bias against sponsors allowing surpluses to build up in their pension plans.

Third, there are issues with Canadian accounting standards for pensions in terms of valuation that have been posing challenges since they were adopted in 1999. For one thing, changes in the annual discount rate used to value pension liabilities can result in large swings in the amount reported as pension expenses. For another thing, periodic actuarial valuations of defined-benefit plans also flow through firms' income statements. Both of these issues lead to volatility in reported earnings, which investors do not like. So, accounting standards have become another reason for employers to avoid defined-benefit pension plans.

I have just listed three of the most serious problems facing sponsors of defined-benefit pension plans. Of course, there are other issues as well. Nevertheless, addressing these three issues would be helpful in getting the incentives right, so that defined-benefit plans can remain actuarially sound. This would significantly reduce the risk that pension contributions would be insufficient to cover future liabilities should sponsor firms go bankrupt. That said, sponsor bankruptcy remains a risk for members of private sector plans, and some form of risk-sharing arrangement is desirable. There are a number of options as to how to pool this risk, including encouraging the creation of plans sponsored by multiple employers. However, I would argue against the use of pension benefit guarantee funds, since they significantly raise the risk of "moral hazard," and further increase the bias against employers sponsoring defined-benefit plans.

Conclusion

Let me conclude. Canada's pension plan system is crucial to our future, not only because it will sustain us in our retirement, but also because it supports the efficiency of our financial markets and our overall economy in important ways. Defined-contribution and defined-benefit pension plans, RRSPs, and the CPP and QPP all have a role to play.

Canada's pension plan system is crucial to our future, not only because it will sustain us in our retirement, but also because it supports the efficiency of our financial markets and our overall economy in important ways.

But as we have seen, one important part of our pension system—defined-benefit plans—has been in relative decline. This relative decline represents a transfer of return risk and longevity risk to individuals, who are less able to bear or manage them. This transfer has a negative impact on overall economic efficiency and could ultimately represent a significant threat to the ability of pension funds to finance the long-term investments that will maximize our economy's future potential growth.

The task of establishing proper incentives is a difficult one, and I have touched on only some of the issues today. But policy-makers cannot avoid these difficult issues, and the stakes are too high for us to get it wrong. For the sake of efficiency and for the future health of our economy, we must get the analysis right, and then we must act.

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Summary Tables

A1 Summary of Key Monetary Policy Variables

Monthly		Inflation-control target (12-month rate)			Policy instrument			Monetary conditions			Monetary aggregates (12-month growth rate)			Inflation indicators					
		Target range	CPI	Core CPI*	Operating band for overnight rate (end of month)		Overnight money market rate	Monetary conditions index (January 1987=0)	90-day commercial paper rate	C-6 trade-weighted exchange rate (1992=100)	Gross M1	M1++	M2++	Yield spread between conventional and Real Return Bonds	Total CPI excluding food, energy, and the effect of changes in indirect taxes	CPIW	Unit labour costs	IPPI (finished products)	Average hourly earnings of permanent workers
					Low	High													
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
2002	J	1-3	1.3	1.8	1.75	2.25	1.9923	-10.82	2.07	78.63	14.4	15.6	8.0	1.95	1.4	1.8	1.9	2.0	3.4
	F	1-3	1.5	2.2	1.75	2.25	1.9926	-11.07	2.16	77.84	12.6	15.7	7.6	1.96	1.4	2.1	1.0	1.5	3.4
	M	1-3	1.8	2.1	1.75	2.25	1.9933	-10.61	2.36	78.45	12.4	15.7	7.1	2.30	1.8	2.1	0.8	1.1	3.3
	A	1-3	1.7	2.2	2.00	2.50	2.2440	-10.07	2.46	79.48	11.6	15.3	7.0	2.29	1.9	2.1	-	0.6	2.7
	M	1-3	1.0	2.2	2.00	2.50	2.2471	-9.31	2.68	80.79	11.8	14.3	6.7	2.24	2.0	1.9	1.0	-0.3	2.1
	J	1-3	1.3	2.1	2.25	2.75	2.4964	-9.12	2.78	80.99	12.9	15.6	6.8	2.32	2.1	1.9	0.5	0.6	2.5
	J	1-3	2.1	2.1	2.50	3.00	2.7418	-10.40	2.88	77.71	13.3	14.7	6.7	2.28	2.1	2.0	0.1	0.5	2.5
	A	1-3	2.6	2.5	2.50	3.00	2.7448	-9.68	3.09	78.90	13.8	15.1	6.7	2.18	2.2	2.4	1.1	1.3	2.7
	S	1-3	2.3	2.5	2.50	3.00	2.7447	-10.27	2.90	77.97	10.8	12.6	6.1	2.18	2.3	2.3	0.6	0.9	2.6
	O	1-3	3.2	2.5	2.50	3.00	2.7449	-10.06	2.83	78.63	11.5	12.6	5.6	2.18	2.5	2.4	1.0	2.1	2.6
	N	1-3	4.3	3.1	2.50	3.00	2.7431	-10.21	2.85	78.24	9.5	10.3	4.8	2.15	3.1	3.0	1.9	1.8	2.3
	D	1-3	3.9	2.7	2.50	3.00	2.7439	-9.80	2.83	79.24	7.0	8.2	3.9	2.09	3.3	2.4	1.2	2.1	1.7
2003	J	1-3	4.5	3.3	2.50	3.00	2.7439	-9.34	2.91	80.15	7.4	7.3	3.7	2.27	3.3	2.9	1.7	1.1	1.8
	F	1-3	4.6	3.1	2.50	3.00	2.7469	-8.61	2.97	81.78	6.9	6.5	3.4	2.40	3.3	2.9	2.1	1.1	1.8
	M	1-3	4.3	2.9	2.75	3.25	2.9920	-7.72	3.28	83.22	6.2	5.5	3.3	2.50	3.1	2.7	2.1	0.1	1.4
	A	1-3	3.0	2.1	3.00	3.50	3.2373	-6.92	3.35	85.07	6.6	5.2	3.1	2.28	2.8	2.1	3.0	-1.5	1.1
	M	1-3	2.9	2.3	3.00	3.50	3.2416	-6.02	3.27	87.60	7.2	5.3	3.5	2.12	2.5	2.2	2.2	-2.7	1.8
	J	1-3	2.6	2.1	3.00	3.50	3.2449	-5.11	3.11	90.45	7.7	5.3	3.3	2.04	2.1	2.0	2.1	-3.7	1.2
	J	1-3	2.2	1.8	2.75	3.25	2.9947	-6.60	2.89	87.07	10.0	6.6	3.5	2.25	1.7	1.9	2.3	-2.1	2.0
	A	1-3	2.0	1.5	2.75	3.25	2.9972	-6.68	2.80	87.11	9.5	6.6	3.5	2.29	1.7	1.7	2.4	-2.6	2.2
	S	1-3	2.2	1.7	2.50	3.00	2.7490	-5.93	2.64	89.52	8.5	6.5	3.4	2.15	1.8	1.9	1.6	-3.8	2.7
	O	1-3	1.6	1.8	2.50	3.00	2.7492	-4.85	2.71	92.25	6.9	6.1	3.0	2.38	1.8	1.8	1.5	-5.5	2.6
	N	1-3	1.6	1.8	2.50	3.00	2.7481	-4.73	2.73	92.54	8.4	6.8	3.1	2.38	1.8	1.7	0.7	-6.0	2.2
	D	1-3	2.0	2.2	2.50	3.00	2.7481	-4.68	2.66	92.87	9.6	7.6	3.9	2.41	1.5	2.1	0.7	-5.4	2.7
2004	J	1-3	1.2	1.5	2.25	2.75	2.4951	-5.77	2.37	90.68	10.4	8.3	3.8	2.66	1.5	1.5	1.1	-5.3	2.8
	F	1-3	0.7	1.1	2.25	2.75	2.4953	-6.21	2.25	89.82	13.0	9.8	4.4	2.53	1.0	1.2	1.4	-4.3	2.6
	M	1-3	0.7	1.3	2.00	2.50	2.2482	-5.72	2.10	91.55	14.0	10.4	4.7	2.65	1.1	1.2	0.7	-3.5	2.7
	A	1-3	1.6	1.8	1.75	2.25	1.9959	-6.98	2.05	88.28	15.3	12.0	5.1	2.85	1.2	1.7	1.0	-1.3	3.0
	M	1-3	2.5	1.5	1.75	2.25	1.9985	-7.08	2.07	87.98	15.9	13.1	5.1	3.00	1.2	1.8	1.0	2.8	2.8
	J	1-3	2.5	1.7	1.75	2.25	2.0005	-6.36	2.10	89.81	14.2	13.0	5.7	2.96	1.4	1.8	1.3	3.1	3.3
	J	1-3	2.3	1.9	1.75	2.25	1.9973	-6.03	2.12	90.65	10.8	11.6	5.4	2.98	1.4	1.9	1.1	0.6	2.4
	A	1-3	1.9	1.5	1.75	2.25	1.9979	-5.28	2.22	92.43	10.3	10.6	5.1	2.93	1.0	1.7	-	0.3	2.1
	S	1-3	1.8	1.5	2.00	2.50	2.2496	-4.22	2.50	94.63	10.0	10.4	5.1	2.72	1.0	1.6	1.1	-	1.9
	O	1-3	2.3	1.4	2.25	2.75	2.4960	-3.03	2.60	97.77	11.4	10.6	5.7	2.72	0.8	1.7	0.9	0.7	2.1
	N	1-3	2.4	1.6	2.25	2.75	2.4977	-1.82	2.74	100.95	10.5	9.9	5.3	2.73	1.1	1.8	1.1	-0.6	3.1
	D	1-3	2.1	1.7	2.25	2.75	2.4999	-3.02	2.57	97.89	11.5	10.8	5.6	2.81	1.3	1.7	2.0	-0.7	2.7
2005	J	1-3	2.0	1.6	2.25	2.75	2.4980	-3.35	2.56	96.96	11.0	10.4	5.8	2.71	1.2	1.6	0.8	-	3.0
	F	1-3	2.1	1.8	2.25	2.75	2.4971	-3.54	2.57	96.37	10.1	9.9	5.8	2.69	1.4	1.7	1.0	-0.5	2.5
	M	1-3	2.3	1.9	2.25	2.75	2.4794	-2.74	2.68	98.39	9.9	9.3	5.6	2.69	1.4	1.9	2.7	-0.7	3.2
	A	1-3	2.4	1.7	2.25	2.75	2.4954	-3.69	2.58	95.92	9.9	8.6	5.7	2.67	1.2	1.8	2.2	-0.5	3.1
	M	1-3	1.6	1.6	2.25	2.75	2.4866	-4.02	2.59	94.93	8.9	7.7	5.4	2.60	1.2	1.6	1.6	-2.2	2.3
	J	1-3	1.7	1.5	2.25	2.75	2.4936	-2.88	2.58	98.28	9.6	7.3	5.0	2.42	1.3	1.7	2.1	-1.5	2.9
	J	1-3	2.0	1.4	2.25	2.75	2.4922	-2.95	2.64	97.88	9.6	7.0	4.7	2.38	1.1	1.7	2.6	-0.7	3.1
	A	1-3	2.6	1.7	2.25	2.75	2.4882	-1.63	2.83	101.27	9.3	6.8	4.9	2.39	1.5	1.9	2.6	-0.3	3.5
	S	1-3	3.4	1.7	2.50	3.00	2.7421	-1.07	2.98	102.51	11.3	8.0	5.6	2.57	1.6	2.1	2.8	0.7	3.5
	O	1-3	2.6	1.7	2.75	3.25	2.9873	-0.66	3.14	103.30	11.3	8.7	5.5	2.67	1.5	1.8		0.6	3.8
	N	1-3	2.0	1.6	2.75	3.25	2.9883	-0.21	3.37	103.96	11.3	8.9		2.53	1.4	1.7		1.4	3.5
	D				3.00	3.50	3.2437	-	3.52	104.14				2.58					3.6

* New definition for core CPI as announced on 18 May 2001: CPI excluding the eight most volatile components: fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs, as well as the effect of changes in indirect taxes on the remaining CPI components

A2 Major Financial and Economic Indicators

Rates of change based on seasonally adjusted data, percentage rates unless otherwise indicated

	Year, quarter, and month	Money and credit									Output and employment				
		Monetary aggregates					Business credit		Household credit		GDP in current prices	GDP volume (millions of chained 1997 dollars, quarterly)	GDP by industry (millions of 1997 dollars, monthly)	Employment (*Labour Force Information*)	Un-employment rate
		Gross M1	M1+	M1++	M2+	M2++	Short-term business credit	Total business credit	Consumer credit	Residential mortgages					
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	1993	9.4	5.1	-0.7	4.2	6.6	-6.3	0.7	2.3	7.6	3.8	2.3		0.5	11.4
	1994	13.2	8.4	1.4	1.9	6.8	1.6	4.7	7.9	6.4	6.0	4.8		2.1	10.4
	1995	6.6	0.8	-2.6	3.8	4.1	5.5	5.1	7.5	3.7	5.1	2.8		1.7	9.6
	1996	12.2	8.2	3.3	4.4	6.8	1.5	5.5	6.5	4.2	3.3	1.6		0.9	9.7
	1997	16.9	11.2	7.2	0.9	7.2	7.7	10.0	10.0	5.6	5.5	4.2		2.1	9.2
	1998	10.3	7.0	3.1	-1.1	5.5	11.5	11.6	10.1	4.9	3.7	4.1	3.8	2.5	8.4
	1999	7.6	6.0	4.3	3.6	5.3	2.4	6.3	7.1	4.3	7.4	5.5	5.6	2.6	7.6
	2000	14.7	10.6	8.8	5.9	7.0	6.5	7.4	12.6	4.8	9.6	5.2	5.5	2.6	6.8
	2001	12.1	10.3	9.6	6.6	7.6	-1.5	5.7	6.8	4.0	2.9	1.8	1.6	1.3	7.2
	2002	11.7	10.9	13.7	7.4	6.4	-6.0	3.8	6.5	7.4	4.2	3.1	3.2	2.4	7.7
	2003	7.9	5.0	6.3	4.7	3.4	-3.1	1.3	9.1	8.1	5.4	2.0	2.1	2.3	7.6
	2004	12.2	9.0	10.9	4.7	5.1	-0.5	3.9	10.3	9.6	6.1	2.9	3.1	1.8	7.2
	2005													1.4	6.7
Annual rates	2001 IV	23.7	17.6	22.8	13.9	10.5	-0.2	6.5	2.0	7.2	-1.4	3.5	1.7	0.4	7.7
	2002 I	11.9	14.5	18.6	8.5	6.9	-11.0	3.5	6.3	7.4	7.7	4.9	5.9	2.9	7.9
	II	5.1	5.5	8.2	3.5	4.4	-6.4	1.8	9.7	8.8	11.0	3.4	4.8	4.3	7.7
	III	10.5	7.7	7.8	5.7	4.3	-3.5	2.5	9.6	8.2	5.7	3.8	3.0	4.2	7.6
	IV	9.9	7.0	7.1	4.9	3.4	0.9	2.4	9.6	7.5	7.4	2.3	1.9	2.5	7.5
	2003 I	2.1	0.6	2.7	4.7	1.8	-1.7	0.4	6.4	7.8	9.6	3.1	2.2	2.5	7.4
	II	6.4	2.6	3.5	5.2	3.7	-2.9	-0.1	10.7	7.8	-3.3	-1.2	-0.1	0.5	7.7
	III	19.5	12.3	13.2	4.7	5.0	-7.6	1.2	11.5	9.0	4.9	1.3	2.0	1.1	7.8
	IV	5.9	5.4	8.2	1.3	3.0	-8.2	2.6	8.2	9.7	5.2	3.6	4.8	3.5	7.5
	2004 I	18.7	11.4	13.2	5.4	5.5	-2.4	3.7	10.2	9.0	6.7	2.6	2.5	1.2	7.3
	II	16.9	14.3	16.3	8.1	7.8	10.0	6.3	11.4	10.5	10.6	5.0	4.0	2.4	7.2
	III	1.1	3.4	5.9	4.0	4.5	6.9	6.5	11.5	10.6	6.8	3.5	4.0	1.3	7.1
	IV	8.8	6.9	6.6	2.9	4.3	3.9	5.3	9.2	10.4	4.1	2.1	1.8	1.7	7.1
	2005 I	15.4	11.3	10.9	6.8	6.3	6.6	7.0	10.5	8.4	3.4	2.0	2.4	0.6	7.0
	II	13.3	9.5	8.1	5.9	6.4	4.0	4.6	15.7	9.2	5.7	3.4	3.1	1.7	6.8
	III	3.1	1.1	3.5	-0.2	3.2	6.5	6.2	14.2	10.5	11.6	3.6	4.4	1.1	6.8
	IV													2.4	6.5
Last three months		9.9	8.5	9.9	1.9	4.7	4.0	5.7	12.8	10.8			4.0	2.4	6.5
Monthly rates	2004 D	2.1	1.6	1.4	0.9	0.8	1.4	1.0	0.7	0.9			0.2	0.1	7.0
	2005 J	0.9	1.0	0.9	0.8	0.5	0.1	0.3	0.8	0.5			0.3	-	7.0
	F	1.3	0.5	0.9	0.5	0.7	-	0.4	1.1	0.7			0.1	0.2	7.0
	M	0.8	0.8	0.4	0.1	0.2	0.7	0.4	1.0	0.6			-0.1	-	6.9
	A	1.6	0.9	0.8	1.0	0.8	0.3	0.3	1.3	0.7			0.4	0.2	6.8
	M	0.6	0.7	0.7	0.1	0.3	-0.1	0.3	1.5	0.8			0.4	0.2	6.8
	J	0.7	0.5	0.5	0.4	0.5	0.6	0.6	1.1	0.9			0.4	0.1	6.7
	J	-0.2	-0.5	-0.1	-0.7	-0.2	1.2	0.6	1.1	0.8			0.3	-	6.8
	A	-0.4	-0.6	-0.2	-	0.3	-0.3	0.3	1.0	0.8			0.6	0.2	6.8
	S	1.8	1.5	1.4	1.0	1.0	0.7	0.6	1.1	0.9			-	-	6.7
	O	1.1	1.3	1.4	0.4	0.5	0.4	0.4	0.6	0.9			0.2	0.4	6.6
	N	0.6	0.6	0.5			-0.3	0.3						0.2	6.4
	D													-	6.5

A2 (Continued)

Capacity utilization rate		Prices and costs				Wage settlements		Bank of Canada commodity price index (unadjusted)		Securities mid-market yield			Year, quarter, and month
Total industrial	Manufacturing industries	CPI	Core CPI*	GDP chain price index	Unit labour costs	Public sector	Private sector	Total	Non-energy	Treasury bills 3-month	Canada 10-year benchmark bonds	Canada 30-year Real Return Bonds	
(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	
80.6	79.9	1.8	2.1	1.4		0.6	0.8	0.5	3.0	3.87	6.57	3.78	1993
83.0	83.5	0.2	1.8	1.1		-	1.2	3.3	7.5	7.14	9.07	4.92	1994
82.1	83.9	2.2	2.3	2.3		0.7	1.4	8.3	11.1	5.54	7.11	4.42	1995
82.0	82.8	1.6	1.7	1.6		0.5	1.8	3.8	-1.2	2.85	6.37	4.09	1996
83.6	83.6	1.6	1.9	1.2		1.1	1.9	-3.7	-4.3	3.99	5.61	4.14	1997
84.6	84.3	0.9	1.3	-0.5	1.0	1.6	1.7	-15.3	-12.6	4.66	4.89	4.11	1998
86.0	85.8	1.7	1.4	1.7	0.1	1.9	2.7	6.7	1.5	4.85	6.18	4.01	1999
87.1	86.1	2.7	1.3	4.2	3.0	2.5	2.4	18.4	3.5	5.49	5.35	3.42	2000
84.4	81.7	2.6	2.1	1.1	3.1	3.3	3.0	-5.2	-6.9	1.95	5.44	3.76	2001
84.8	82.5	2.2	2.3	1.1	0.9	2.9	2.6	-5.9	-6.6	2.63	4.88	3.33	2002
84.3	81.4	2.8	2.2	3.3	1.9	2.9	1.3	20.1	8.8	2.57	4.66	2.79	2003
86.4	84.7	1.9	1.5	3.0	1.1	1.4	2.2	20.5	21.4	2.47	4.39	2.11	2004
								23.0	3.8	3.37	3.93	1.44	2005
82.7	79.5	-2.1	0.6	-4.8	1.4	3.0	2.6	-41.3	-30.8	1.95	5.44	3.76	2001 IV
83.7	81.2	3.0	2.5	2.7	-0.8	3.1	2.1	15.9	12.3	2.30	5.79	3.68	2002 I
85.2	83.1	4.3	3.5	7.4	-0.8	2.7	2.3	40.0	-1.8	2.70	5.37	3.42	II
85.4	83.3	4.6	3.0	1.9	2.7	3.2	2.5	2.8	-1.5	2.83	4.92	3.25	III
84.8	82.4	3.5	2.0	4.9	4.6	3.2	3.6	20.4	-4.0	2.63	4.88	3.33	IV
85.4	82.7	5.2	3.9	6.4	1.4	2.9	2.4	82.0	14.1	3.14	5.13	3.08	2003 I
83.5	80.6	-1.8	-0.3	-2.1	1.1	3.1	0.3	-17.4	14.8	3.07	4.37	2.99	II
83.4	79.9	1.9	1.3	3.7	1.3	3.2	2.4	0.6	20.8	2.58	4.64	3.08	III
85.0	82.3	1.6	2.9	1.4	0.2	2.3	1.6	17.6	19.5	2.57	4.66	2.79	IV
85.0	82.1	2.0	1.1	4.0	1.7	2.8	2.7	45.3	38.9	1.98	4.33	2.39	2004 I
86.1	84.1	3.3	1.6	5.0	1.2	-0.3	2.5	36.7	34.4	2.01	4.83	2.37	II
87.3	86.3	1.2	1.0	3.2	-0.2	1.8	1.0	5.4	1.5	2.45	4.58	2.32	III
87.2	86.2	2.7	2.5	1.7	2.6	2.1	2.7	13.7	-15.7	2.47	4.39	2.11	IV
86.9	86.6	1.2	1.7	1.4	2.4	2.6	2.4	16.3	25.6	2.56	4.39	2.08	2005 I
86.5	85.8	2.6	1.2	2.4	3.2	2.6	2.6	23.7	-1.2	2.48	3.81	1.87	II
86.9	86.1	4.2	1.4	7.7	2.5	2.9	2.7	62.5	-10.2	2.86	3.94	1.64	III
								27.7	14.0	3.37	3.93	1.44	IV
		3.5	1.9		2.5			27.7	14.0	3.37	3.93	1.44	
		0.1	0.2		0.9			-0.2	2.0	2.47	4.39	2.11	2004 D
		-0.1	-		-0.8			1.0	1.1	2.43	4.21	2.03	2005 J
		0.2	0.2		0.6			2.5	3.8	2.46	4.28	2.07	F
		0.4	0.1		1.0			7.2	2.3	2.56	4.39	2.08	M
		0.3	0.1		-			1.6	-1.0	2.45	4.14	1.92	A
		-0.2	0.1		-0.4			-5.2	-3.0	2.46	4.02	1.86	M
		0.3	0.2		0.5			5.5	0.1	2.48	3.81	1.87	J
		0.3	-		0.5			1.5	-2.1	2.59	3.91	1.93	J
		0.5	0.2		-0.3			8.6	-0.1	2.72	3.78	1.73	A
		0.7	0.2		0.7			9.7	1.3	2.86	3.94	1.64	S
		-0.3	0.2					1.1	0.2	3.06	4.16	1.70	O
		-0.2	0.2					-9.3	1.7	3.31	4.06	1.65	N
								8.8	3.3	3.37	3.93	1.44	D

* New definition for core CPI as announced on 18 May 2001: CPI excluding the eight most volatile components: fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs, as well as the effect of changes in indirect taxes on the remaining CPI components

A2 (Continued)

	Year, quarter, and month	Government surplus or deficit (-) on a national accounts basis (as a percentage of GDP)		Balance of payments (as a percentage of GDP)		U.S. dollar, in Canadian dollars, average noon spot rate
		Government of Canada	Total, all levels of government	Merchandise trade	Current account	
		(28)	(29)	(30)	(31)	(32)
	1993	-5.5	-8.7	1.8	-3.9	1.2898
	1994	-4.6	-6.7	2.6	-2.3	1.3659
	1995	-3.9	-5.3	4.4	-0.8	1.3726
	1996	-2.0	-2.8	5.1	0.5	1.3636
	1997	0.7	0.2	2.9	-1.3	1.3844
	1998	0.8	0.1	2.6	-1.2	1.4831
	1999	0.9	1.6	4.3	0.3	1.4858
	2000	1.9	2.9	6.2	2.7	1.4852
	2001	1.1	0.7	6.4	2.3	1.5484
	2002	0.8	-0.1	5.0	1.8	1.5704
	2003	0.1	-	4.7	1.5	1.4015
	2004	0.6	0.7	5.1	2.2	1.3015
	2005					1.2116
Annual rates	2001 IV	0.2	-0.8	5.4	1.1	1.5803
	2002 I	0.6	-0.5	5.5	2.7	1.5946
	II	0.7	-0.2	4.8	2.0	1.5549
	III	0.7	-0.2	4.9	1.5	1.5628
	IV	1.1	0.5	4.7	1.2	1.5698
	2003 I	0.7	0.5	5.2	1.5	1.5102
	II	-1.1	-0.6	4.0	0.8	1.3984
	III	0.3	-	4.9	1.8	1.3799
	IV	0.3	0.1	4.7	1.9	1.3160
	2004 I	0.2	0.1	5.1	2.1	1.3179
	II	0.2	0.5	5.9	3.0	1.3592
	III	0.9	0.8	5.1	2.2	1.3072
	IV	1.1	1.3	4.4	1.6	1.2203
	2005 I	-1.2	1.3	3.9	1.4	1.2267
	II	0.8	1.4	4.0	1.4	1.2439
	III	0.3	1.3	5.4	2.7	1.2012
	IV					1.1733
Last three months						1.1733
Monthly rates	2004 D					1.2191
	2005 J					1.2253
	F					1.2397
	M					1.2161
	A					1.2360
	M					1.2555
	J					1.2402
	J					1.2227
	A					1.2040
	S					1.1776
	O					1.1776
	N					1.1811
	D					1.1610

Notes to the Tables

Symbols used in the tables

R Revised

– Value is zero or rounded to zero.

Note:

Blank spaces in columns indicate that data are either not available or not applicable.

A horizontal rule in the body of the table indicates either a break in the series or that the earlier figures are available only at a more aggregated level.

A1

(1) In February 1991, the federal government and the Bank of Canada jointly announced a series of targets for reducing inflation to the midpoint of a range of 1 to 3 per cent by the end of 1995. In December 1993, this target range was extended to the end of 1998. In February 1998, it was extended again to the end of 2001. In May 2001, it was extended to the end of 2006.

(2-3) Year-to-year percentage change in consumer price index (Table H8). The core CPI is the CPI excluding the eight most volatile components: fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs, as well as the effect of changes in indirect taxes on the other CPI components

(4–5) The *operating band* is the Bank of Canada's 50-basis-point target range for the average overnight rate paid by investment dealers to finance their money market inventory.

(6) The *overnight money market financing rate* is an estimate compiled by the Bank of Canada. This measure includes overnight funding of the major money market dealers through general collateral buyback arrangements (repo) including special purchase and resale agreements with the Bank of Canada. Prior to 1996, data exclude all repo activity with the exception of those arranged directly with the Bank of Canada. These latter have been included in the calculation since 1995.

(7) The *monetary conditions index* is a weighted sum of the changes in the 90-day commercial paper rate and the C–6 trade-weighted exchange rate (see technical note in the Winter 1998–1999 issue of the *Bank of Canada Review*, pages 125 and 126). The index is calculated as the change in the interest rate plus one-third of the percentage change in the exchange rate. The Bank does not try to maintain a precise MCI level in the short run. See *Monetary Policy Report*, May 1995, p.14.

(8) *90-day commercial paper rate*. The rate shown is the Bank of Canada's estimate of operative market trading levels on the date indicated for major borrowers' paper.

(9) The C–6 exchange rate is an index of the weighted-average foreign exchange value of the Canadian dollar against major foreign currencies. (See technical note in the Winter 1998–1999 issue of the *Bank of Canada Review*, pages 125 and 126.) Weights for each country are derived from Canadian merchandise trade flows with other countries over the three years from 1994 through 1996. The index has been based to 1992 (i.e., C–6 = 100 in 1992). The C–6 index broadens the coverage of the old G–10 index to include all the countries in the EMU.

(10) Gross M1: Currency outside banks plus personal chequing accounts plus current accounts plus adjustments to M1 described in the notes to Table E1 *(Bank of Canada Banking and Financial Statistics)*.

(11) M1++: M1+ plus non-chequable notice deposits held at chartered banks plus all non-chequable deposits at trust and mortgage loan companies, credit unions, and caisses populaires less interbank non-chequable notice deposits plus continuity adjustments.

(12) M2++: M2+ plus Canada Savings Bonds and other retail instruments plus cumulative net contributions to mutual funds other than Canadian-dollar money market mutual funds (which are already included in M2+).

(13) Yield spreads between *conventional* and *Real Return Bonds* are based on actual mid-market closing yields of the selected long-term bond issue. At times, some of the change in the yield that occurs over a reporting period may reflect switching to a more current issue. Yields for *Real Return Bonds* are mid-market closing yields for the last Wednesday of the month and are for the 4.00% bond maturing 1 December 2031. Prior to 24 September 2001, the benchmark bond was 4.25% maturing 1 December 2026. Prior to 7 December 1995, the benchmark bond was 4.25% maturing 1 December 2021.

(14–15) CPI excluding food, energy, and the effect of changes in indirect taxes. CPIW adjusts each of the CPI basket weights by a factor that is inversely proportional to the component's variability. For more details, see "Statistical measures of the trend rate of inflation." *Bank of Canada Review,* Autumn 1997, 29–47

(16) *Unit labour costs* are defined as aggregate labour income per unit of output (real GDP at basic prices).

(17) IPPI: Industrial product price index for finished products comprises the prices of finished goods that are most commonly used for immediate consumption or for capital investment.

(18) Data for average hourly earnings of permanent workers are from Statistics Canada's *Labour Force Information* (Catalogue 71-001).

A2

The majority of data in this table are based on, or derived from, series published in statistical tables in the *Bank of Canada Banking and Financial Statistics.* For each column in Table A2, a more detailed description is given below, as well as the source table in the *Banking and Financial Statistics,* where relevant.

(1) Gross M1: Currency outside banks plus personal chequing accounts plus current accounts plus adjustments to M1 described in the notes to Table E1.

(2) M1+: Gross M1 plus chequable notice deposits held at chartered banks plus all chequable deposits at trust and mortgage loan companies, credit unions, and caisses populaires (excluding deposits of these institutions) plus continuity adjustments.

(3) M1++: M1+ plus non-chequable notice deposits held at chartered banks plus all non-chequable despoits at trust and mortgage loan companies, credit unions, and caisses populaires less interbank non-chequable notice deposits plus continuity adjustments.

(4) M2+: M2 plus deposits at trust and mortgage loan companies and government savings institutions, deposits and shares at credit unions and caisses populaires, and life insurance company individual annuities and money market mutual funds plus adjustments to M2+ described in notes to Table E1.

(5) M2++: M2+ plus Canada Savings Bonds and other retail instruments plus cumulative net contributions to mutual funds other than Canadian-dollar money market mutual funds (which are already included in M2+).

(6) Short-term business credit (Table E2)

(7) Total business credit (Table E2)

(8) Consumer credit (Table E2)

(9) Residential mortgage credit (Table E2)

(10) Gross domestic product in current prices (Table H1)

(11) Gross domestic product in chained 1997 dollars (Table H2)

(12) Gross domestic product by industry (Table H4)

(13) Civilian employment as per labour force survey (Table H5)

(14) Unemployment as a percentage of the labour force (Table H5)

(15-16) Data for capacity utilization rates are obtained from the Statistics Canada quarterly publication *Industrial Capacity Utilization Rates in Canada* (Catalogue 31-003), which provides an overview of the methodology. *Non-farm goods-producing industries* include logging and forestry; mines, quarries and oil wells; manufacturing; electric power and gas utilities; and construction.

(17) Consumer price index (Table H8)

(18) Consumer price index excluding the eight most volatile components: fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs, as well as the effect of changes in indirect taxes on the other CPI components. (Table H8)

(19) Gross domestic product chain price index (Table H3)

(20) Unit labour costs are defined as aggregate labour income per unit of output (real GDP at basic prices).

(21–22) The data on wage settlements are published by Human Resources and Skills Development Canada and represent the effective annual increase in base wage rates for newly negotiated settlements. These data cover bargaining units with 500 or more employees. Contracts both with and without cost-of-living-allowance clauses are included.

(23–24) Bank of Canada commodity price indexes: Total and total excluding energy (Table H9)

(25) *Treasury bills* are mid-market rates for typical quotes on the Wednesday shown.

(26–27) *Selected Government of Canada benchmark bond yields* are based on actual mid-market closing yields of selected Canada bond issues that mature approximately in the indicated term areas. At times, some of the change in the yield occurring over a reporting period may reflect a switch to a more current issue. Yields for *Real Return Bonds* are mid-market closing yields for the last Wednesday of the month and are for the 4.00% bond maturing 1 December 2031. Prior to 24 September 2001, the benchmark bond was 4.25% maturing 1 December 2026. Prior to 7 December 1995, the benchmark bond was 4.25% maturing 1 December 2021.

(28-29) The data on the government surplus or deficit on a national accounts basis are taken from Statistics Canada's *National Income and Expenditure Accounts* (Catalogue 13-001), where the government surplus or deficit is referred to as "net lending."

(30) Merchandise trade balance, balance of payments basis (Table J1)

(31) Current account balance, balance of payments basis (Table J1)

(32) U.S. dollar in Canadian dollars, average noon spot rate (Table I1)