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Promissory Notes

Canadians settle their debts today using methods that range from cash to electronic payments. Apart from the new electronic credit and debit cards, payment methods have remained relatively unchanged since the nineteenth century, when cash and cheques were in general use. One notable exception is the promissory note, a written promise from one individual to another to pay a sum of money at a given place and time. Although promissory notes resemble cheques, their function is quite different. A promissory note is a simple promise to pay, made between two individuals or businesses. Cheques, which are orders issued by a debtor to an agent—typically a bank—to pay a creditor, require the participation of a third party.

Promissory notes had two functions. They were used to acknowledge an existing debt and as instruments that the creditor could convert into money. The creditor accomplished this by selling the note to a bank for a sum slightly below that indicated on the face of the note. The difference became the bank's profit.

Promissory notes also differed from cheques in the method of their supply. Then, as now, cheques were supplied by the financial institutions, which typically placed orders for all of their customers with a single printer. Promissory notes such as those used in mid-nineteenth-century Montréal, some of which are illustrated on the cover, were purchased from local stationers, who obtained them from a variety of local or foreign printers. This led to a plethora of styles and images, ranging from traditional symbols of industry and commerce, such as ships and trains, to idealized personifications of agriculture and virtues rendered in an array of colours. The type and quality of printing also varied, depending on the printer. Lithographed, engraved, and typographed notes bearing the name of the printer and, often, the name of the stationer who had placed the order, were all available. Details of each transaction were recorded in the blank spaces on the note. The printed notes were purchased by merchants, who used the notes for their own transactions and also made them available to their customers.

The practice of using store-supplied promissory notes declined in the twentieth century for many reasons. The main reason was likely the advent of credit cards in the 1950s. With their promise of (temporarily) free money and simplified payment procedures, the cards ushered in a more efficient, if less elegant, means for parties to settle their debts.

The notes featured on the cover measure approximately 21 cm x 8 cm and form part of the National Currency Collection, Bank of Canada.

Photography by Gord Carter, Ottawa.

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The Bank of Canada as Lender of Last Resort

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- *The Bank of Canada's lender-of-last-resort role includes the routine provision of liquidity to facilitate settlement in the payments system as well as the provision of liquidity in more exceptional situations.*
- *Following an internal review, the Bank published the policies governing its lender-of-last-resort activities in the* Financial System Review *(December 2004).*
- *The publication of its lender-of-last-resort policies promotes greater transparency and accountability for the Bank in this area.*
- *This article provides an overview of the Bank's lender-of-last-resort role.*

The role of lender of last resort (LLR) is common to central banks around the world; nevertheless, central banks operate under different frameworks in conducting their LLR activities. These differences reflect various country-specific factors, such as historical experience, public policy objectives, the structure of the domestic financial system and the payments system, the prudential supervisory framework, and the laws that govern the central bank and various domestic financial institutions.

In Canada, the Bank of Canada is the ultimate provider of Canadian-dollar liquidity to the financial system. The ability to undertake this function derives from the Bank of Canada Act (BoC Act), which gives the Bank the unique capacity to create Canadian-dollar claims on the central bank and the power to make secured loans or advances to chartered banks and other members of the Canadian Payments Association (CPA).

The Bank of Canada has distinct roles as lender of last resort.

- In its day-to-day operations, the Bank supplies overnight credit on a routine basis through the Standing Liquidity Facility (SLF) to direct participants in the Large Value Transfer System (LVTS). This virtually automatic provision of liquidity provides assurance to all participants in the system that they will be able to cover temporary shortfalls in settlement balances that can arise in the daily settlement of payments. The Bank's SLF arrangement contributes to the safe and efficient operation of the LVTS, which is Canada's systemically important payments system.
- The Bank can provide Emergency Lending Assistance (ELA) to deposit-taking institu-

1. Substantive contributions to this article were made by Jason Andreou, Clyde Goodlet, David Longworth, Carol-Ann Northcott, Sean O'Connor, and Robert Turnbull.

tions (DTIs) that are judged to be solvent and which require more substantial and prolonged credit. ELA is intended to overcome a particular type of market failure associated with DTIs that have a significant share of their liabilities as deposits (fixed-value promises to pay, redeemable at very short notice) and hold assets that are generally illiquid (e.g., commercial loans). DTIs can be vulnerable to sudden, large-scale redemptions of deposits that can lead to insolvency because a DTI's illiquid assets can be sold quickly only at substantial discounts. The purpose of the Bank's ELA is to prevent the failure of a DTI that is illiquid but solvent.

While the Bank's SLF and ELA arrangements are traditional LLR functions, the Bank can also provide liquidity in the following circumstance:

- In the rare situation where the Governor of the Bank of Canada is of the opinion that there is a severe and unusual stress on a financial market or financial system, the BoC Act allows the Bank to be a supplier of liquidity by purchasing a wide variety of securities issued by Canadian or foreign entities, including non-financial firms. The Bank would undertake such transactions for the purpose of promoting the stability of the Canadian financial system.[2]

The Bank of Canada has recently completed a comprehensive review of its LLR activities. Several developments over the past few years motivated this review. These developments include the expansion in 2002 of the types of institutions eligible to become members of the CPA and, thus, able to participate directly in the payments system; new international linkages, in particular, the entry of foreign bank branches into Canada in 1999; greater sensitivity to the potential need by Canadian institutions for foreign currency liquidity (this concern was particularly evident in the lead-up to the year 2000); changes in the supervisory framework for federally regulated financial institutions; and, more generally, the view that it would be timely to examine the Bank's LLR regime in the context of the Bank's role of promoting financial stability.

In this article, the policy framework that guides the Bank of Canada's LLR function is discussed, as are the key issues associated with the Bank's SLF and ELA activities.[3] These include the terms and conditions of both arrangements, access and eligibility provisions, and the Bank's management of ELA lending. This is followed by a discussion of foreign currency ELA. We also consider the relationship between SLF and ELA, and discuss systemic risk and Bank of Canada intervention. We conclude by discussing the potential provision of liquidity to major clearing and settlement systems.

The Bank of Canada's Standing Liquidity Facility

The Bank of Canada provides services to certain payment, clearing, and settlement systems and their participants.[4] As part of its activities as lender of last resort, the Bank supplies liquidity via its SLF to direct participants in the LVTS, which is a real-time, electronic funds-transfer system that processes large-value and time-sensitive payments with finality throughout the day. The LVTS is a systemically important payments system, i.e., a system that because of the size or nature of the payments it processes can trigger or transmit serious shocks across domestic financial systems or markets.[5] The LVTS is owned and operated by the CPA.

Under its SLF arrangements, the Bank provides collateralized overnight loans to direct participants in the LVTS that experience temporary shortfalls in their settlement balances. These routine loans provide participants with a reliable source of liquidity should they need to fund their end-of-day payment obligations. In the absence of the Bank's SLF, it is not clear that alternative arrangements could provide a reliable source of liquidity in all circumstances. And, in those circumstances where alternative arrangements might work, they would be more expensive requiring, for example, that participants hold larger precautionary balances at the central bank. Thus, the Bank's SLF contributes to a payments system that is safe and efficient. In turn, the

2. The Bank of Canada considers LLR activities to be limited to those discussed in the body of this article. However, there are other ways that the Bank can provide liquidity, such as lowering its target for the overnight interest rate, which is the instrument for the implementation of monetary policy.

3. The Bank's specific LLR policies have been posted on its website at <http://www.bankofcanada.ca/en/payments/llr.html>.

4. For descriptions of Canada's two payments systems (the Large Value Transfer System and the Automated Clearing Settlement System), see Dingle (1998) and Northcott (2002).

5. The Payment Clearing and Settlement Act refers to systemic risk as domino or spillover effects where the inability of one financial institution to fulfill its payment obligations in a timely fashion in a clearing and settlement system results in the inability of other financial institutions to fulfill their obligations in that clearing and settlement system or in other systems, or results in the failure of that clearing house or other clearing houses.

LVTS is used by other parts of the Canadian financial system and the economy more generally to make large-value or time-sensitive payments in a safe and efficient manner.

Under its SLF arrangements, the Bank provides collateralized overnight loans to direct participants in the LVTS that experience temporary shortfalls in their settlement balances.

Canada's other payments system is the Automated Clearing Settlement System (ACSS). The ACSS is also owned and operated by the CPA and is used for payments not handled by the LVTS, such as paper cheques, automated bill payments, and debit-card transactions. With the introduction of next-day settlement in the ACSS in November 2003, the Bank's SLF is no longer required for the normal operation of the ACSS. Under the new system, direct clearers in the ACSS know the amount of their net ACSS settlement positions in the morning after items are entered into the clearing process. Those participants with negative clearing balances make an LVTS payment to their ACSS subaccount at the Bank of Canada; previously, those participants would have taken an ACSS overdraft loan from the Bank.[6]

Terms and conditions of the SLF

The terms and conditions associated with the Bank's SLF are set out in "Bank of Canada Rules Governing Advances to Financial Institutions."[7] The terms and conditions for borrowing under SLF are set so as to encourage LVTS participants to use the interbank market to fund end-of-day payment obligations. The interest rate charged by the Bank on overnight loans (called the Bank Rate) is set at 25 basis points above the Bank's target for the overnight rate, which is the average interest rate that the Bank wants to see in the marketplace for overnight (one-day) loans between financial institutions.[8] This encourages direct participants in the LVTS to reduce any net deficit payment positions by undertaking interbank transactions in the "pre-settlement period" at the end of the LVTS day; in effect, there is a cost incentive for participants to obtain the liquidity that they need from the market, rather than from the central bank. In practice, end-of-day advances extended by the Bank to participants in the LVTS tend to be relatively small.[9]

All loans provided under the Bank's SLF are made on a secured basis. The collateral eligible to secure credit from the SLF is the same as that eligible for intraday credit in the LVTS. These securities are valued at market value less an appropriate margin, or "haircut," to protect the Bank from market risk. This is the risk that the collateral may decline in market value and result in insufficient proceeds to cover the amount loaned in the extremely unlikely event of the borrower failing. The framework that the Bank uses to determine the appropriate margins focuses on broad categories or classes of issuers. These categories are securities issued by the Government of Canada, securities guaranteed by the federal government, provincial bonds, provincial-guaranteed bonds, and private sector debt obligations (further segregated by credit rating). Margins are larger for less-creditworthy categories and longer maturities.[10]

Access to Bank of Canada settlement accounts and the SLF

The CPA's bylaws require direct participants in the LVTS and the ACSS to be members of the CPA and to maintain settlement accounts at the Bank of Canada. Prior to the coming into force of the Canadian Payments Act in 2001,[11] membership in the CPA included all banks operating in Canada, trust and loan companies, credit union centrals and federations of caisses populaires, and other DTIs. At that time, it was the Bank of Canada's practice to provide settlement accounts and, concurrently, access to its SLF arrange-

6. SLF is still available to direct clearers in the ACSS but this would be required only if the LVTS system were unavailable or if a participant were unable to connect to the system. For more information on the introduction of next-day settlement in the ACSS, see Tuer (2003).

7. This document is available on the Bank's website at <http://wwwbankofcanada.ca/en/payments/rules.htm#rules>.

8. The target for the overnight rate, which is at the centre of the Bank's operating band for the overnight rate, is the main instrument used by the Bank to implement monetary policy. For more information, see Howard (1998).

9. In 2004, the Bank provided 72 overnight LVTS advances with an average value of $30 million per advance. Forty-seven of these advances were under $10 million.

10. Currently, margins range from 1 per cent to 15 per cent. The list of eligible collateral and the applicable margins is set out in "Securities Eligible as Collateral under the Bank of Canada Standing Liquidity Facility," which is available on the Bank's website at <http://www.bankofcanada.ca/en/payments/rules.htm#collateral>.

11. The Canadian Payments Act replaced the Canadian Payments Association Act.

ments, to any deposit-taking financial institution that met the CPA's criteria for direct participation in the LVTS or the ACSS.[12] Subsequently, the Canadian Payments Act expanded the types of financial institutions eligible to join the CPA to include life insurance companies, securities dealers, and money market mutual funds. With more diverse types of institutions now eligible for CPA membership, the Bank has re-examined the conditions for providing access to settlement accounts and its SLF arrangements to institutions. (To date, no firm from any class of institution that is newly eligible for CPA membership has applied to become a member of the CPA and, consequently, none has applied to become a direct participant in the LVTS or ACSS.)

The various classes of financial institutions eligible for CPA membership, and therefore able to hold settlement accounts at the Bank, are subject to different bankruptcy laws and regulatory regimes. Accordingly, for some classes of institutions, the Bank probably would not be able to recover funds from any unsecured portion of a loan in the event of default. To reduce this risk, the Bank may therefore use haircuts on collateral that vary for different classes of borrowing institution, or may set different restrictions on the quantities of corporate securities that can be pledged by different classes of institutions.

The Bank decides on a case-by-case basis whether to provide a particular institution access to a settlement account and access to its SLF arrangements. In general, access would be given to an institution that is a member in the CPA on condition that the institution:

- participates directly in the LVTS or the ACSS;
- in the case of ACSS direct clearers, settles all net ACSS positions with LVTS payments credited to its ACSS settlement account at the Bank of Canada;
- provides the Bank with valid and enforceable first-priority security in collateral of a type that is acceptable to the Bank;
- provides acceptable legal documentation to support the Bank's security interest in pledged collateral; and
- accepts the collateral terms and conditions that may be set by the Bank, which take

12. In addition to the need to be a member of the CPA and to maintain a settlement account at the Bank of Canada, other criteria for a financial institution wishing to become a direct participant in the LVTS include having access to the Society for Worldwide Interbank Financial Telecommunication (SWIFT) in Canada, and having the technical capability for its LVTS operations.

Box 1: The Financial Institutions Supervisory Committee

The Financial Institutions Supervisory Committee (FISC) was established in 1987 pursuant to the Office of the Superintendent of Financial Institutions Act (OSFI). Its membership consists of the Superintendent of Financial Institutions (who acts as chair), the Deputy Minister of Finance, the Governor of the Bank of Canada, the chairperson of the Canada Deposit Insurance Corporation (CDIC), and (since 2001) the Commissioner of the Financial Consumer Agency of Canada. The FISC meets regularly to discuss matters related to the supervision of financial institutions. It is also a forum for consultation and information exchange on supervisory matters that have implications for solvency, last-resort lending, and the risk of deposit-insurance payout. The FISC is intended to give the Superintendent, who is responsible for judgments pertaining to the viability and solvency of federal financial institutions, the full benefit of views of the deposit insurer and the lender of last resort when making supervisory decisions.

The FISC also serves as a forum to coordinate strategies of its member agencies when dealing with troubled institutions. According to its terms of reference, the functions of the FISC include:

- exchanging information with regard to the health of financial institutions and to the identification of potential problem situations and assisting the represented agencies to develop and implement strategies for dealing with such matters;
- assessing the impact of unexpected developments in financial markets on the financial conditions of financial institutions; and
- discussing strategies to deal with financial institutions facing serious difficulties, assessing the adequacy of action plans designed to resolve their problems, and exchanging information relevant to progress or lack thereof in handling the situation.

into account varying exposures to credit risk across different types of institutions.

In the case of a foreign bank branch, the Bank would also seek favourable legal opinions regarding the applicability of the laws of its home country to the Bank's ability to establish a valid security interest in collateral that is pledged.

Upon receiving an application for a settlement facility, the Bank would notify the institution's regulator that the institution intends to open a settlement account. For a federally regulated financial institution, it is expected that such notification would be provided as a matter of course through the Financial Institutions Supervisory Committee (FISC). (See Box 1 for a discussion of the FISC.)

The Bank of Canada's Emergency Lending Assistance

The purpose and objectives of ELA

The classical lender-of-last resort doctrine was developed during the nineteenth century. The original concept of LLR concerns the actions taken, often by the central bank, in a period of financial stress in order to preserve the liquidity of the financial system. The most common application of LLR theory involves sudden, unexpected withdrawals by a large number of depositors (i.e., a run) at an individual bank or, more generally, at a deposit-taking institution (DTI). Currently, measures taken by the central bank to address such circumstances are associated with its ELA role.

The rationale for the central bank to supply ELA in such situations is based on the idea that a DTI, because of the nature of its activities, is vulnerable to a sudden loss of depositor confidence. A DTI uses liquid, fixed-value deposits (liabilities) to fund illiquid, longer-term loans (assets). The liquidity and maturity mismatch between the assets and liabilities on its balance sheet is a significant source of the valuable role played by DTIs. In undertaking this activity, a DTI relies on depositors in aggregate to not withdraw more than a fraction of their funds at any given time. However, an institution that loses market confidence can be faced with a run and might be unable to raise replacement funds at or near their usual rates of interest, even though the institution is solvent. This can lead to the insolvency of the institution because a DTI's illiquid assets can be sold quickly only if they are subject to substantial discounts. It is this market failure—a sudden, large-scale withdrawal of liquidity from a solvent DTI—that is addressed by the provision of ELA by the central bank.

It is this market failure—a sudden, large-scale withdrawal of liquidity from a solvent DTI—that is addressed by the provision of ELA by the central bank.

The interbank market, in such situations, may not always function efficiently because interbank participants might have access to incomplete information, with the possibility that doubts could arise about the solvency of an institution that is in fact sound. Additionally, in times of stress, the interbank market may become more cautious. Lenders might be reluctant to take on risks that they would normally accept, as incomplete information leaves them uncertain about the nature of the risks involved in interbank lending. Another situation that can lead to the inefficient functioning of the interbank market occurs when lending institutions become concerned that their own sources of liquidity may be less reliable than usual. In these circumstances, banks may reduce the volume of funds that they lend in the interbank market, setting up a situation of self-fulfilling expectations.

Some classes of financial institutions that are not DTIs issue deposit-like instruments and other claims. As a practical matter, the challenge is judging the point at which these instruments are a sufficiently important source of funding, and assets are sufficiently illiquid, such that these classes of institutions would be considered vulnerable to the kind of market failure described above. More generally, for a number of reasons, it is also increasingly unlikely that DTIs will experience this kind of market failure. (The Bank has used ELA only rarely—it has not provided ELA to any institution since the mid-1980s; see Box 2.) For example, assets of DTIs are becoming more liquid with increased opportunities for securitizing or selling loans on secondary markets. Changes in the regulatory environment at the federal level have also decreased the probability of a run occurring. These changes include the establishment of a clear mandate for the Office of the Superintendent of Financial Institutions (OSFI) that focuses on

Box 2: Some Episodes of Bank of Canada ELA

Historically, very few chartered banks in Canada have experienced liquidity crises. The first case in recent times of a bank receiving liquidity support from the central bank occurred in 1977, when the Bank of Canada advanced funds to the Unity Bank of Canada (UB), a relatively small chartered bank. The UB had experienced problem loans, and large creditors withdrew funds when they became aware of the bank's financial problems. The Bank of Canada provided ELA over a three-month period and, in the event, the UB amalgamated with the Provincial Bank of Canada. (In 1979, the Provincial Bank merged with the Bank Canadian National to become the National Bank of Canada.)

Another episode involving more prolonged ELA from the Bank of Canada occurred in 1985 and involved the Canadian Commercial Bank (CCB) and the Northland Bank (NB), two small regional banks whose financial condition had been deteriorating.[1] The Bank provided ELA for approximately six months, until September 1985, when the Inspector General of Banks (the bank supervisor at that time) advised that in his opinion the banks could no longer be considered viable operations, and the Department of Finance announced that both the CCB and the NB were to be wound-up and liquidated. The amount of the Bank's loans reached a peak of more than $1.3 billion to the CCB and more than $500 million to the NB.

In the aftermath of the CCB and NB failures, there was a loss of confidence in some other small banks, in particular, the Bank of British Columbia, the Continental Bank of Canada, and the Mercantile Bank of Canada. The Bank of Canada acted as lender of last resort and provided ELA of more than $5 billion to these institutions. The liquidity support from the central bank provided time for various market solutions and alternative arrangements to be explored, with the result that the Mercantile Bank merged with the National Bank of Canada, the Hong Kong Bank of Canada purchased most of the assets and assumed the bulk of the liabilities of the Bank of British Columbia, and Lloyd's Bank of Canada bought a substantial portion of the assets and assumed most of the liabilities of the Continental Bank.

1. The Bank's involvement with the CCB initially began in January 1983, when a security agreement between the Bank and the CCB was arranged for the possible provision of liquidity support. In the event, the CCB did not borrow from the Bank under the terms of that agreement, which was terminated in October 1983.

protecting the interests of depositors and other creditors, and giving OSFI and the CDIC the authority and obligation to act promptly with regard to troubled institutions.

Terms and conditions of ELA

The terms and conditions attached to ELA serve a dual function: they provide the Bank with protection against credit and legal risks in situations where such risks may be greater than normal; and they promote the view that the Bank is the lender of last resort, rather than the lender of preferred resort, thus dealing in part with concerns about moral hazard. (See Box 3 for a discussion of moral hazard.) In other words, institutions should not draw on ELA for routine liquidity management. While specific terms and conditions attached to ELA would be contained in the individual loan agreement established between the Bank and the borrowing institution, the following describes the general considerations that would apply.

The terms and conditions attached to ELA . . . promote the view that the Bank is the lender of last resort, rather than the lender of preferred resort.

Term to maturity: Under the BoC Act, the Bank is permitted to provide loans with a term to maturity not exceeding six months. The loans can be renewed for further periods, up to six months each. In practice, it would be expected that an ELA loan agreement between the Bank and the borrowing institution would provide for a one-day revolving facility in which the Bank would have the discretion to decline to make any further one-day loans.

Rate of interest: Under the BoC Act, the minimum interest rate that the Bank can charge on ELA is the Bank Rate. While the Bank has discretion to charge a higher interest rate if it sees fit, in its limited experience with ELA situations, the Bank has charged the Bank Rate.

Collateral: Under its statutes, the Bank is required to lend on a secured basis. The Bank is willing to take a broader range of collateral for ELA than it accepts for credit under the SLF. In practice, it would be expected that the borrowing institution would use its holdings of marketable securities to obtain liquidity from the private sector before approaching the Bank for ELA. If appropriate, the Bank could provide ELA loans on the pledge or hypothecation of assets that are not subject to as precise a valuation as are readily marketable securities. For example, the Bank may provide loans against the security of the Canadian-dollar non-mortgage loan portfolio of the institution, which can make up a significant portion of the institution's assets.[13] Because the composition of a loan portfolio changes over time and the valuation of individual loans is subject to fluctuation, the Bank would likely take as security a floating charge against the institution's loan portfolio. The provision of ELA loans initially would likely constitute only a small fraction of the assessed value of the institution's loan portfolio but could rise over

13. Under the law, mortgages are considered to be a conveyance of "real property," which the Bank cannot take as collateral. In cases where the primary assets available to an institution to secure Bank lending are mortgages, the security interest would have to be structured as an assignment of the mortgage receivables only, and not as an assignment of the mortgages themselves.

Box 3: Moral Hazard

Moral hazard with regard to LLR occurs when an act or public policy reduces market discipline and provides incentives to DTIs to take excessive risks. In the case of the provision of ELA, moral hazard arises because such policies can encourage institutions that potentially have access to such advances from the central bank to be less cautious in managing their liquidity positions. Market discipline is reduced because unsecured creditors may also expect the central bank to provide these institutions with sufficient liquidity to pay their liabilities as they come due. Because unsecured creditors may be confident that they will be able to withdraw their funds from these institutions without incurring any losses, they will not monitor these institutions as closely as they might otherwise.

Moral hazard can be controlled by promoting market discipline through the creation of appropriate incentives for institutions and investors, and establishing a strong prudential supervisory framework, including provisions for the management of liquidity risk. As well, policy-makers need to be careful not to extend the scope of their actions beyond what is necessary to achieve clear public policy objectives. The terms and conditions associated with the Bank of Canada's ELA are intended to reinforce the fact that the Bank is the lender of last resort, rather than the lender of preferred resort. Also, institutions have an incentive to avoid using ELA because they would be subject to heightened supervisory attention, and there could also be negative reputational effects from such borrowing.

One particular concern is that an insolvent institution might try to obtain ELA to buy time to develop a high-risk strategy ("a gamble for resurrection"). Thus, it is the Bank's policy to provide ELA only to those institutions that are judged to be solvent. The Bank relies primarily on OSFI to provide a judgment on solvency.

The regulatory and supervisory framework administered by OSFI is important in controlling moral hazard. The supervisory process focuses on having financial institutions implement policies and procedures that prudently manage risks. In addition, OSFI's mandate emphasizes the importance of early intervention in the affairs of troubled institutions. In this regard, OSFI and the CDIC have developed the "Guide to Intervention for Federal Financial Institutions."[1] The guide provides a framework for responding effectively to circumstances that could threaten the solvency of a financial institution. With a formal process for early intervention and early resolution, there is greater likelihood of averting costly failures by discouraging institutions from taking excessive risks and by promptly dealing with troubled financial institutions.

1. The guide is available on the OSFI website at <http://www.osfi-bsif.gc.ca/eng/documents/practices/pages/index.asp?id=1995>, and on the CDIC website at <http://www.cdic.ca/?id=26>.

time, subject to an upper limit that the Bank would set, which would depend on the nature of the portfolio.

Eligibility criteria for ELA

The Bank's ELA and SLF have different objectives, and it therefore follows that different types of financial institutions would be eligible for each of these arrangements. In addition, the risks faced by the Bank are greater under ELA than under SLF. In the case of SLF, access is a routine part of an institution's operations in the payments system; there is no presumption of a protracted liquidity problem or solvency risk; and the loans are secured by high-quality, liquid assets. In contrast, ELA situations are complex; they are typically characterized by protracted liquidity problems; there are solvency concerns evidenced by the inability of the financial institution to raise the needed funds from the private sector; and the collateral used to secure ELA is typically illiquid and difficult to value.

As a result of the significant risk inherent in ELA situations, the following considerations are important for the Bank:

- ELA is used to address a particular market failure, described above, that can occur because of the liquidity and maturity differences between the assets and liabilities held by certain types of financial institutions in their normal course of business. The Bank provides ELA only to classes of institutions that are vulnerable to this market failure.
- The availability of ELA should not encourage excessive risk-taking by financial institutions. To minimize moral-hazard concerns and to avoid impairing the interests of unsecured creditors of the institution, it is the Bank's policy to provide ELA only to those institutions that are judged to be solvent. ELA does not—and could not—correct the capital problems of an insolvent institution: while ELA enables an institution to pay its liabilities as they come due, it does not create new capital for an insolvent institution, and thus it does not remedy the negative net worth of an institution. Any decision to make a capital injection in an insolvent firm would be a matter for private investors or, in extremely rare circumstances, public authorities. Therefore, as part of the Bank's due diligence, it is important for the Bank to have timely and accurate judgments on solvency for any institution requesting or using ELA. The Bank relies primarily on the institution's prudential supervisor to provide judgments on solvency.
- Since the Bank relies primarily on prudential supervisors for judgments on solvency and, if necessary, for remedial measures and collaboration on work-out strategies, a sound supervisory framework is critical for ELA decisions and ELA management. Such a framework would include a clear supervisory mandate, adequate supervisory authority, and a program of early intervention in troubled institutions. In the absence of such a framework, and without information-sharing protocols and a close working relationship between the Bank and the supervisory agency, it would be difficult for the Bank to obtain timely and accurate judgments on solvency. Finally, a strong supervisory framework mitigates incentives for supervisors to delay dealing with a problem institution; such forbearance could shift risks to the Bank.
- The BoC Act requires the Bank to lend on a secured basis, and the Bank endeavours to minimize its exposure to loss in the event of default by the borrowing financial institution. Thus, it is important for the Bank to have a valid first-priority security interest in any collateral pledged to support ELA.

Implications regarding eligibility for ELA

The above considerations have the following implications for the eligibility of various classes of institutions for ELA:

- Federally incorporated banks (including foreign bank subsidiaries) and federally incorporated trust and loan corporations would be eligible for ELA.[14] These firms are susceptible to the relevant market failure referred to above. The Bank can be confident of receiving timely and accurate information regarding the solvency of these institutions from the federal supervisor. And the federal supervisory regime provides a reliable means to establish remedial

14. In the case of trust companies, the "in-trust" nature of the assets held by such a firm means that ELA could be provided only through a loan secured by company assets, or through an outright purchase of assets associated with provisions to sell the assets back to the trust company at predetermined prices.

measures and to implement work-out strategies. The CDIC can also act as a provider of liquidity to its member institutions (both federal and provincial) through purchases of assets, and loans or advances (with or without security).[15]

- Insurance companies, mutual funds, and investment dealers would not be eligible for ELA, since they do not issue deposits and hold a significant share of their assets in illiquid, hard-to-value claims. However, see the section on "Systemic Risk and Bank of Canada Intervention."
- Credit union locals and caisses populaires would not generally be eligible for ELA. In most cases, these institutions have access to provincial centrals, the Corporation de Fonds de Sécurité de la Confédération Desjardins (CFSCD), or the Credit Union Central of Canada (CUCC) for liquidity assistance. As well, very few credit union locals or caisses populaires are members of the CPA.
- In the case of an extraordinary, widespread event that would have significant, adverse consequences for a provincial credit union / caisse populaire system, the Bank would consider providing ELA through the CUCC, a provincial central, the Caisse centrale Desjardins, or the Fédération des caisses Desjardins, as appropriate, provided that legal arrangements satisfactory to the Bank were established by these entities.[16]
- With regard to foreign bank branches, in a prospective ELA situation, it could be difficult to receive timely and accurate information on solvency from foreign supervisors, and to successfully manage the conflicts in incentives faced by the relevant supervisors when interacting with the Bank in such cases. There can also be legal complications and risks with regard to establishing a security interest for the Bank in some of the assets of these institutions in an ELA situation. Accordingly, foreign bank branches would not normally be eligible for ELA. Nevertheless, in very exceptional circumstances where the home central bank was unable to lend for a day or two for operational reasons (e.g., if it was a statutory holiday in the country of the home central bank), the Bank of Canada could provide interim lending for a very brief period, typically against collateral that would be eligible for credit through the SLF.

The above discussion sets out various conditions for the provision of Bank of Canada ELA. Other central banks, for a variety of reasons, operate under different frameworks in conducting their lender-of-last-resort function. For a brief discussion of some of these differences, see Box 4.

The management of ELA with respect to financial institutions subject to federal regulation would be in close collaboration with OSFI and other members of the Financial Institutions Supervisory Committee.

Managing ELA

The management of ELA with respect to financial institutions subject to federal regulation would be in close collaboration with OSFI and other members of the FISC. In the event that ELA is provided to an institution, the Bank would immediately confirm such lending with the FISC. The FISC would serve as the primary forum for the exchange of information and coordination of strategies of member agencies regarding an institution receiving ELA. When providing ELA, the Bank would request the FISC, or a subcommittee of the FISC, to meet at least weekly to consider the situation. An institution using ELA would be required to provide a business plan to OSFI that outlined remedial measures to rectify its liquidity problems, and to provide increased reporting (data and other information) on its evolving situation. In addition, the FISC would coordinate con-

15. CDIC's capacity to provide liquidity support is limited by its own funds and its borrowing. CDIC has authority to borrow funds from the capital markets or from the Consolidated Revenue Fund, subject to ministerial approval. The total amount of such borrowings cannot exceed $6 billion.

16. Such lending could require the establishment of particular legal mechanisms to allow the Bank to take a security interest in the assets of a credit union or caisse populaire. (See, for example, footnote 13.) It could also require a process of rehypothecation of the collateral to the provincial central, the CUCC, or Caisse centrale Desjardins. These arrangements can be complex and costly to set up. The Bank is prepared to work with relevant institutions to prepare the legal groundwork for such arrangements.

Box 4: Some Differences in the Frameworks That Govern Lender-of-Last-Resort Activities

As mentioned in the introduction to this article, central banks, for a variety of reasons, operate under different frameworks in conducting their lender-of-last-resort functions. One difference concerns the context in which the central bank will provide ELA. For example, the Bank of Canada will provide liquidity support to an institution if it is judged to be solvent, if it meets the criteria for eligibility for ELA, and if it complies with the terms and conditions for ELA (e.g., supplies sufficient collateral of an acceptable type). The rationale for providing ELA in such situations is to prevent the failure of a deposit-taking institution that is illiquid but solvent. Some other central banks condition ELA on different factors, such as the existence of systemic risk.[1]

Another aspect of the LLR framework that can differ among central banks is the degree of transparency and accountability that surrounds ELA. In this regard, the Bank of Canada has chosen to publish its ELA policies,[2] whereas some other central banks have chosen not to publish their policies so as to create some uncertainty as to when or whether the central bank might undertake ELA interventions. Central banks also differ on the use of risk-capital support: it is the Bank of Canada's view that capital injections in an insolvent firm are not a matter for LLR.[3]

Ultimately, it is the responsibility of the authorities to choose a framework that governs the central bank's LLR function so as to best achieve clear public policy objectives.

1. For instance, when acting as lender of last resort, the Swiss National Bank can provide emergency liquidity assistance for one or more domestic banks on the basis of the following conditions: the bank or group of banks requiring credit must be of systemic importance for the stability of the financial system; the bank requiring credit must be solvent; and sufficient collateral must be provided at all times to cover liquidity assistance. A bank or group of banks is of systemic importance if its inability to pay would seriously impair the functioning of the Swiss financial system or major parts thereof and have a negative impact on the economy. (See "Guidelines of the Swiss National Bank (SNB) on Monetary Policy Instruments," Swiss National Bank, 30 April 2004, p. 9, available on the Swiss National Bank website at http://129.35.233.49/d/download/geldpol_instr_e.pdf.)

2. Sweden's central bank is an example of another central bank that has made public its policies regarding LLR. (See "The Riksbank's Role as Lender of Last Resort," *Financial Stability Report* 2/2003, Sveriges Riksbank.)

3. Several of' these types of issues are discussed in "Lender of Last Resort: A Review of the Literature," by X. Freixas et al., *Financial Stability Review,* November 1999, Bank of England.

tingency planning, including possible private sector solutions, as well as alternative work-out arrangements. While the repayment of SLF loans is routine, terminating ELA is likely to be more complicated. If all goes well, the management of ELA would focus on normalizing the institution's position in the market, or facilitating a merger of the institution, such that ELA could be expeditiously withdrawn.

The Bank has established internal procedures to manage ELA to promote accountability for decision-making and good governance. The following are the main features of the Bank's ELA management procedures:

- The Bank's Financial System Committee (FSC)[17] would meet immediately and then at least weekly to review any ongoing ELA, formally reconsider the borrowing institution's solvency and the appropriateness of continuing to provide ELA, as well as the limits on lending to the institution.
- If it was felt necessary, the Bank could hire a third-party agent to perform an examination of the financial condition of the institution.
- The ELA loan agreements between the Bank and the borrowing institution would create a one-day, revolving facility in which the Bank would have discretion to decline to make any further one-day loans. This would allow the Bank to readily cease ELA if it judged that the borrowing institution was insolvent, or that the available collateral to support ELA was at a higher risk of being inadequate.
- The Bank would cease ELA when this was judged by the Bank to be appropriate, most

17. The FSC comprises the members of the Bank's Governing Council, the General Counsel/Corporate Secretary, the Regulatory Policy Adviser, and the Chief of the Communications Department.

notably, when the institution was judged by the Bank to be insolvent, on the basis of information received from OSFI and possibly from third-party agents, or when available collateral was inadequate to support further ELA.

- If the Bank became aware of a borrowing institution's insolvency or pending insolvency, it would refrain from taking any new collateral as security for outstanding advances made when the institution was still solvent. At the same time, the FISC would be working to implement an orderly work-out.

Foreign currency ELA

For some Canadian financial institutions, foreign currency liquidity is important. This is illustrated by the fact that assets and liabilities denominated in foreign currency represent about 40 per cent, respectively, of Canadian banks' aggregate assets and liabilities on their balance sheet, with a very large proportion of this denominated in U.S. dollars. This reflects the importance of Canada's trade activities, and the presence of Canadian banks in the global economy. Canadian banks have often sought growth opportunities outside the country, particularly in the United States, and some Canadian banks have adopted business strategies that focus on North America.

For the Bank, providing liquidity support in a foreign currency is considerably more difficult than providing Canadian-dollar ELA: while the Bank can create liquidity in Canadian dollars, it cannot do so in foreign currencies. This reinforces the importance for Canadian financial institutions to have in place a sound framework for the management of foreign currency liquidity risks, and to establish reliable arrangements for private sector liquidity support in foreign currencies relevant to their business. Such liquidity arrangements should provide adequate diversification in the potential sources of foreign currency liquidity funding as well as contingency planning. In addition, where possible, Canadian financial institutions should arrange access through foreign central banks to liquidity facilities in those currencies important to their business.

Provided that the institution qualified for ELA, the Bank could lend Canadian dollars on a collateralized basis to the illiquid institution which, in turn, could purchase the needed foreign currency in the market with those Canadian dollars.

The Relationship Between SLF and ELA

The Bank's SLF is used to address a temporary maldistribution of liquidity among direct participants in the payments system. In contrast, the Bank's ELA deals with fundamental and potentially persistent liquidity problems where the institution is denied liquidity by market participants, typically because of credit concerns. In practice, it might not always be immediately known to the central bank whether an institution requesting SLF loans needs the liquidity for its payment activities or whether the institution is experiencing liquidity problems of a more persistent nature. Indeed, for reputational reasons, it might be expected that a troubled institution would initially use SLF on a frequent or repeated basis, rather than request ELA from the central bank. Thus, it is important for the Bank, as well as the supervisory authority, to know whether an institution is using SLF as a substitute for ELA, and whether the institution is being denied access to market liquidity for reasons related to solvency concerns, for example.

The Bank would rely on various signs to indicate whether an institution is using SLF as a substitute for ELA:

- The Bank's market intelligence might detect that the institution is being forced to pay higher interest rate spreads to raise funds in the money market.
- There might be a steady increase in the amount of the institution's SLF borrowing, indicating that the institution could be experiencing a net outflow of deposits and the withdrawal of funds by creditors. The amount borrowed under the SLF by the institution could also increase significantly relative to the size of its balance sheet.
- There could be a noticeable reduction in the bilateral credit lines granted to the institution in the LVTS. This could indicate that market participants are reducing their potential exposure to the institution because of credit concerns.
- The institution could have difficulty providing sufficient collateral that is eligible for the Bank's SLF. If the institution ran out of eligible collateral for SLF, it would be forced to request ELA, which can be secured by a broader range of assets.

OSFI is also an important source of information in determining whether an institution is using SLF as a substitute for ELA. In the course of monitoring and examining the institution, OSFI could discover that the financial health of the institution has deteriorated and that the risk of protracted liquidity problems has increased. OSFI is responsible for sharing this type of information with the FISC.

In the event that the Bank identifies a situation where a financial institution is making use of SLF for ELA-type borrowing, the following would apply:

- If the institution were considered to be eligible for ELA, the Bank would initiate internal processes for managing ELA activity, would require the institution to sign additional ELA legal documentation, and would request that appropriate actions be conducted at the FISC.
- For other LVTS participants that are not considered to be eligible for ELA, upon identifying ELA-type borrowing, the Bank would indicate to the financial institution that additional borrowing based on a broader range of collateral would not be granted, and the Bank would contact the institution's regulator. The Bank would deny access to additional liquidity once the institution had exhausted its SLF-eligible collateral.

Systemic Risk and Bank of Canada Intervention

In 1997, an amendment was made to the BoC Act (paragraph 18 (g.1)) such that "if the Governor is of the opinion that there is a severe or unusual stress on a financial market or financial system," the Bank can purchase a wide variety of securities issued by Canadian or foreign entities, including non-financial firms. The BoC Act specifies that such transactions are "for the purpose of promoting the stability of the

Box 5: Bank of Canada Liquidity Operations

Some authors consider all means of liquidity provision by central banks at times of stress to be part of the role of lender of last resort. The Bank of Canada considers LLR activities to be limited to those discussed in the body of this article. However, there are several other ways in which the Bank can provide liquidity, including in situations of stress. The following are the typical ways these operations are implemented:

- Most importantly, the Bank can lower its target rate for the overnight interest rate, which is the instrument for the implementation of monetary policy decisions.
- If the overnight rate is generally trading above the target rate, the Bank can intervene with Special Purchase and Resale Agreements (SPRAs), commonly referred to as "repos," which add funds to the system, and so encourage the overnight rate towards the target rate.[1]
- The Bank can increase the level of excess settlement balances on deposit in the LVTS to support the smooth operation of the system. (For example, this is typically done at, and near, month-ends.) Adjustments to the level of excess settlement balances were undertaken following the terrorist attacks on the United States on 11 September 2001, in response to a temporary increase in the demand for settlement-balance holdings. The Bank increased the level of excess settlement balances in the LVTS to $1 billion from the typical $50 million. This reassured financial institutions that even if they did not receive their expected payment inflows, they would still have access to needed funds. As part of this action, the Bank also offered to carry out SPRAs with primary dealers at the overnight rate.
- In times of heightened financial stress, the Bank can also reinforce its actions through public statements that indicate that the Bank stands ready to ensure the availability of sufficient liquidity in the financial system to meet fully any increase in demand and to support the smooth functioning of the Canadian financial system.

1. If the overnight rate is generally trading below the target rate, the Bank can intervene with Sale and Repurchase Agreements (SRAs), commonly referred to as "reverses," which withdraw funds from the system, and so encourage the overnight rate towards the target rate.

Canadian financial system." In effect, the Bank can use this authority to provide liquidity to a broad range of financial and non-financial institutions when the Governor of the Bank judges that such transactions are justified to safeguard the safety and soundness of Canada's financial system. This does not include more general liquidity provided through the Bank's monetary policy actions or at times of stress in the financial system (see Box 5).

To promote transparency and accountability, if the Bank undertakes such transactions, Section 19 of the BoC Act requires the Bank to publish a notice in the *Canada Gazette* stating that "the Governor has formed an opinion that there is a severe and unusual stress on a financial market or financial system. The notice is to be published as soon as the Governor is of the opinion that its publication will not materially contribute to the stress to which the notice relates." In addition, the Bank would be expected to fully disclose and justify these transactions in its public statements, including its *Annual Report*.

If problems in a financial institution not eligible for ELA under the above policy (but a CPA member) could, in the Bank's judgment, lead to severe and unusual stress on a financial market or financial system, then the Bank may choose to make a liquidity loan instead of making purchases or undertaking repos under paragraph 18 (g.1).

The powers given to the Bank under paragraph 18 (g.1) of the BoC Act are intended to be used only in very exceptional circumstances. The Bank has never entered into any transactions under this provision of the BoC Act.

Clearing and Settlement Systems

In the event that an LVTS participant defaults, the Bank of Canada could be obliged (under LVTS bylaws) to knowingly lend to an insolvent institution, on the basis of collateral pledged earlier.[18] More specifically, the Bank would be obliged to lend to the defaulting institution on the day of failure against previously pledged collateral to settle that member's obligations to other participants in the LVTS, and so protect against systemic risk.

In the extremely unlikely event of the failure of more than one LVTS participant on the same day during LVTS operating hours, where the sum of the exposures of the failed participants exceeds the value of all the collateral pledged in the system, the Bank of Canada guarantees settlement of the LVTS.[19] In this event, the Bank could be obliged to lend to a failed institution, on a partially unsecured basis, to ensure settlement of the LVTS and so protect against systemic risk.

As noted, the likelihood of this scenario is extremely remote, and the fact that participants pledge collateral sufficient to cover the single largest possible default provides a large element of co-insurance (a deductible) that provides strong incentives for LVTS participants to manage their risks prudently in the system.

Finally, under the provisions of the Payment Clearing and Settlement Act, the Bank of Canada has the power to make liquidity loans to the clearinghouse or central counterparty of a clearing and settlement system designated for oversight by the Bank.

18. To secure potential payment obligations, LVTS participants pledge in advance sufficient collateral to cover the single largest possible settlement obligation.

19. The Bank provides such a guarantee to ensure certainty of settlement of the LVTS in all possible circumstances. For more on these and related points, see Goodlet (1997, 2001).

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Government of Canada Yield-Curve Dynamics, 1986–2003

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- *In this article, the author introduces a historical database of daily constant-maturity Government of Canada zero-coupon yield curves. The behaviour and evolution of these yield curves is examined both over the full period of 1986 to 2003 and two subperiods, 1986 to 1996, and 1997 to 2003.*
- *The differences between the actual market prices of government bonds and the price generated by the model used to build the yield curves decreased materially over the term of the database, indicating more consistent pricing of the individual cash flows over time.*
- *The behaviour of government bond yields was found to be significantly different in the second subperiod. By almost any measure, the government bond market appears to have become a "safer" market during this period, exhibiting sharply lower levels of volatility. While the level of excess returns earned was slightly lower in the second subperiod, the volatility of those returns fell much more sharply, resulting in superior risk-adjusted returns.*
- *Variations in the yield curve over time could be almost completely explained by three independent factors—*level, slope, *and* curvature. *The relative importance of these factors changed significantly between subperiods.*
- *Contrary to the assumptions implicit in a number of pricing and risk-management models, none of the yield-curve measures exhibited daily changes that fit a normal distribution. For all measures, the distribution had both a larger number of observations close to the mean and a larger number of extreme outliers than would occur under the assumption of normality.*

This article[1] introduces a database of historical Government of Canada zero-coupon yield curves that has been developed at the Bank of Canada. Zero-coupon interest rates (or spot rates) represent the fundamental building blocks of fixed-income markets. Defined as the interest rate on a single cash flow maturing at a given time (with no interest payments prior to maturity), these rates are used extensively to price, structure, and hedge a variety of financial products. For most of these applications, it is appropriate to use spot interest rates that have been derived from the interest rates on bank-deposit contracts and the fixed leg of interest rate swap contracts (referred to as the swap curve). The generation of spot rates from this yield curve is fairly straightforward, as each maturity point on the curve has a specific and unique yield associated with it.[2] The resulting spot rates, however, represent a chartered bank credit, and as such are not truly free of credit risk. There are a large number of applications that require a spot rate that is free of credit risk as an input, making the use of spot rates derived from the swap yield-to-maturity curve unsuitable. For these applications, a term structure of zero-coupon interest rates needs to be generated from an underlying yield curve that is based on government bonds.

Generating a spot-rate curve from an underlying government bond yield-to-maturity curve is more problematic than generating it from the interest rate swap curve. The Canadian government bond market contains a large number of issues of varying coupon rates, maturities, and yields. Only a small proportion

1. This article is a summary of Bolder, Johnson, and Metzler (2004), which provides a much more technical discussion of the results.

2. For a detailed description of the construction of swap yield curves see Ron (2000)

of these issues are actively traded in the secondary market, and it has not been unusual for cash flows that fall on the same date to have different yields.[3] As a result, there is no single government bond yield for a specific date. This necessitates the use of numerical curve-fitting techniques. Essentially, these techniques use mathematical models to estimate a yield curve that minimizes the difference between the bond prices predicted by the model and those observed in the market. The specific estimation algorithm used to generate the historical government zero-coupon curves used in this article is based on the Merrill Lynch exponential spline model introduced in Li et al. (2001). In this model, a numerical curve-fitting technique is used to estimate a discount-function curve. The discount-function curve is then used to price all of the government bonds in the sample, and the final curve is the one that generates the smallest differences between the model prices and the observed market prices. The final step is to transform the discount-function curve into a zero-coupon yield curve. The parameters of the curve are re-estimated each business day. Full details can be found in Bolder and Gusba (2002) and Bolder, Johnson, and Metzler (2004).

This curve-fitting algorithm was used to build a database of historical constant-maturity zero-coupon yield curves.

This curve-fitting algorithm was used to build a database of historical constant-maturity zero-coupon yield curves using daily closing prices for Government of Canada bonds over the period January 1986 to May 2003. While historical term-structure databases (such as McCulloch and Kwon)[4] exist for the U.S. Treasury market, to the best of our knowledge, this represents the first such database for Canadian zero-coupon rates in the public domain. The database will be updated on a regular basis and is available to the public on the Bank of Canada website.

The purpose of this article is both to highlight the availability of these data and to perform some initial statistical analysis, examining the behaviour and evolution of the spot rates over the full period and two distinct subperiods. The article will specifically address the following areas:

- the evolution of the levels of key interest rates and yield-curve measures over the sample
- the daily changes in these key interest rates and yield-curve measures
- the identification of a relatively small number of factors that drove the evolution of the yield curve, and
- the total returns that would have been realized by holding bonds of different maturities for a given holding period.

The Sample Period

The full data sample used for the analysis in this article covers the period between January 1986 and May 2003, and comprises over 4,300 daily yield curves. Both the Canadian economy and the Canadian fixed-income markets underwent significant changes over the period covered by the database, however; and the full sample of over seventeen years can be thought of as being composed of at least two distinct subperiods. The first subperiod, covering the time from January 1986 to December 1996, can be characterized as follows:

- relatively high and volatile inflation, particularly for the first half of the subperiod; longer-term inflation expectations were also high and volatile, adjusting to the reduction in measured inflation with only a lag
- large government borrowing requirements
- a fragmented bond market, characterized by a large number of relatively small and illiquid issues, and
- restrictions on the stripping and reconstituting of individual cash flows from the underlying bonds.

The second subperiod, from January 1997 to the end of May 2003, had very different conditions. Specifically:

3. Cash flows often have different yields, depending on whether they represent an interest payment (the coupon) or the principal repayment (the residual).

4. The database on term structures for U.S. Treasury bonds is available on J.J. McCulloch's website at <http://www.econ.ohio-state.edu/jhm/jhm.html>.

- Inflation and inflation expectations were low and stable.
- Beginning in 1996, the Government of Canada began to run a sequence of budgetary surpluses, sharply reducing net government borrowing requirements.
- Numerous steps were taken by the Department of Finance and the Bank of Canada to help make the government bond market more efficient. These included the introduction of an official benchmark-bond program with explicit issuance targets and regular issuance patterns, regular and formal consultations with market participants to discuss potential changes to the debt program, and the implementation of a bond buyback program.
- The Canadian Depository for Securities (CDS) implemented several initiatives that helped to increase the efficiency of the bond market. In 1993, reconstituted, packaged, and generic CUSIPS[5] were introduced for book-entry strip bonds. This enabled individual coupon payments with the same maturity date to be fully fungible, allowing for increased arbitrage between rich and cheap bond issues. In 1999, any cash flow of similar type[6] that shared a maturity date became fully fungible, and in 2001 it became possible to reconstitute a bond beyond its original issue size. These developments ensured that cash flows having the same issuer and maturity were valued identically, regardless of the underlying issue from which they originated.
- Computerized trading strategies and quantitative valuation approaches gained increased popularity in financial markets. Hedge funds, many of which specialize in fixed-income relative-value arbitrage, also became much more significant factors in the fixed-income market.

5. CUSIP stands for Committee on Uniform Securities Identification Procedures. The CUSIP reference is a combination of nine characters, both letters and numbers, that represent a unique identifier for a given security. The first six characters identify the issuer, the next two identify the type of security, and the final digit is a check.

6. Fungible cash flows have to be either interest payments or principal payments. Interest and principal payments are not yet fungible with each other.

This article will effectively account for two different regime shifts. The first is a fiscal and macroeconomic shift, highlighted by the achievement of low inflation and a balanced fiscal position. The second is a shift in the operation of the actual fixed-income markets themselves, including changes in the issuance pattern, changes made by CDS, and the growing importance of quantitative trading strategies. No specific date marks a perfect break between these two regime shifts. The selection of January 1997 as the date for the break between the two regimes is somewhat arbitrary, and all of the changes highlighted above actually took place either before or after that date. The main point, however, is that the period between the late 1980s and the early 1990s had very different characteristics from the late 1990s and early 2000s, and by the beginning of 1997, most of those changes were evident.

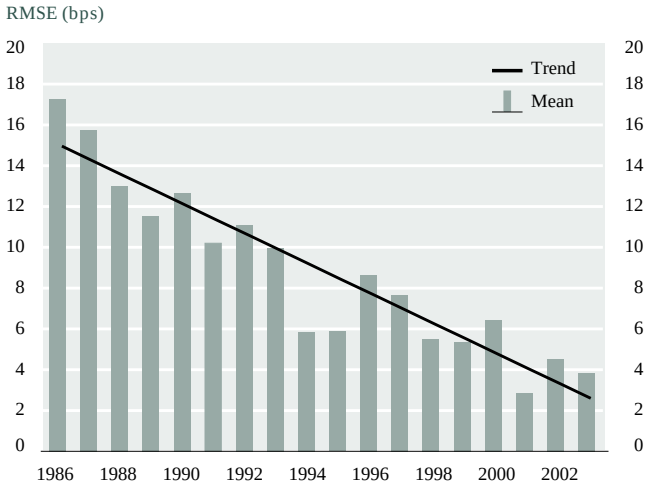
This article will effectively account for two different regime shifts.

The Yield-Curve Model

The database of historical yield curves was built using a mathematical curve-fitting model that finds a specific zero-coupon yield curve on a given day that minimizes the difference between bond prices predicted by the model and those actually observed in the market. An examination of the size of the pricing errors generated by these "best-fit" curves offers some insight into how consistent the pricing of government bonds was at a given time. If the full universe of government securities were priced on a consistent basis, with cash flows of a similar term to maturity trading at similar yields (regardless of which specific bond issue those cash flows were associated with), then the model should produce a very accurate fit, with little pricing error. If, on the other hand, individual bond issues exhibited idiosyncratic pricing, with cash flows of similar maturities trading at significantly different yields, then the pricing errors produced by the model should be relatively large. Furthermore, given the evolution of market conditions outlined in the previous section, it would be reasonable to expect a reduction in the pricing error over time, since a

Chart 1

Average Pricing Error



number of changes were introduced to make the government bond market more efficient.

Chart 1 shows the evolution of the goodness-of-fit of the model.[7] The root mean-square error for each year is shown, along with a time trend.

Individual cash flows of similar maturity are now valued in a more consistent fashion.

The goodness-of-fit of the model has clearly increased substantially over time. The average error over the first subperiod was 11.1 basis points, while it fell to 5.2 basis points for the second subperiod. Bond yields for the full universe of Government of Canada securities are now far more consistent with the prices predicted by a theoretical yield curve. This indicates that individual cash flows of similar maturity are now valued in a more consistent fashion, regardless of the specific bond from which the cash flow originated, or whether the cash flow represents an interest payment or a return of principal. While it is difficult to assign causality, changes of this nature are consistent with both the initiatives undertaken by the CDS to make similar cash flows fully interchangeable and the increasing prevalence of quantitative valuation methods and computerized trading strategies in fixed-income markets.

General Attributes of the Yield Curves

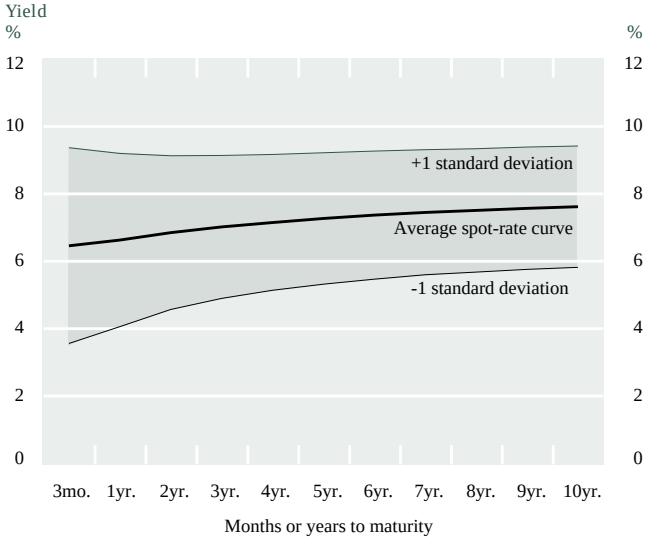
A first step in the analysis of the evolution of the yield curve is to examine what the "average" yield curve looked like, both over the full time period covered by the data set, and over each of the two subperiods. Charts 2 and 3 depict these yield curves (surrounded by confidence bands of plus and minus one standard deviation).

As Chart 2 shows, the average spot-yield curve over the entire period was upward sloping, with a 3-month interest rate of approximately 6.5 per cent and a 10-year interest rate of approximately 7.5 per cent. The variation around these averages, however, was extremely large. The one standard-deviation confidence band covers a range for the 3-month yield of approximately 3.5 per cent to 9.5 per cent, while for the 10-year rate, the band is between 5.5 per cent and 9.5 per cent.

Chart 3, which shows the average yield curves for the two subperiods, gives some indication of the magnitude of the changes in the shape, slope, and level of the yield curve over the two samples.

Chart 2

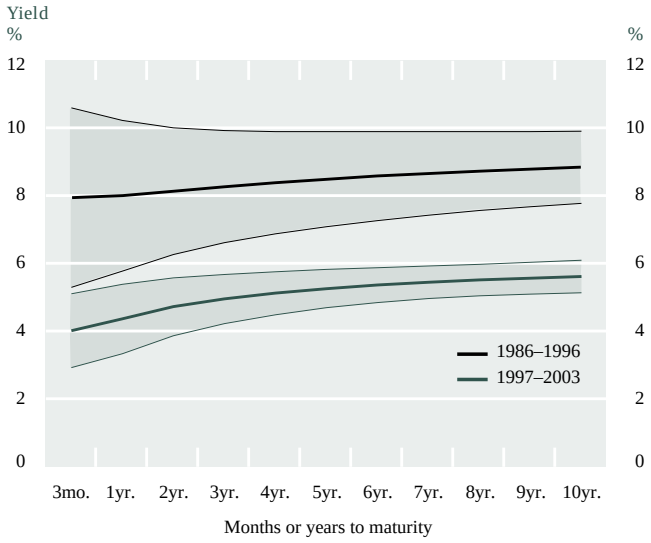
Average Spot-Rate Curve, January 1986 to May 2003



7. The graph plots the average daily root mean-square error for each year covered by the sample. The root mean-square error is equal to the square root of the sum of the squared yield differentials.

Chart 3

Average Spot-Rate Curve



As Chart 3 shows, the two yield curves are significantly different. The pre-1997 yield curve is upward sloping, with an average 3-month rate of approximately 8 per cent and an average 10-year rate of about 9 per cent. The dispersion of yields over the period is very high, with the standard-deviation confidence band ranging from 5.5 per cent to 10.5 per cent for the 3-month rate and from 7.5 per cent to 10 per cent for the 10-year rate.

While the general shape of the post-1996 yield curve is similar to that of the curve from the first subperiod (both are upward sloping), there are two obvious differences. First, the general level of yields in the second subperiod was materially lower. So much lower, in fact, that the upper confidence band of the later subperiod is well below the lower confidence band of the first. Second, it appears that the dispersion of yields around the average curve is much narrower in the second subperiod.

While the average yield curves shown above graphically depict the differences in the term structure between the two periods, statistical tests were also conducted on a number of representative yield-curve measures to quantify the observed differences between subperiods. The specific measures examined were the 3-month yield, the 10-year yield, the slope of the yield curve, and the degree of curvature of the yield curve. The slope measure was defined as the difference between the 10-year yield and the 3-month yield, while curvature

Table 1

Summary Yield-Curve Statistics[a]

Yield-curve measure	Full sample			1986–96			1997–2003		
	Mean[b]	Min.	Max.	Mean[b]	Min.	Max.	Mean[b]	Min.	Max.
3-month yield	6.46 (2.9)	1.78	13.57	7.94 (2.8)	2.76	13.57	4.01 (1.1)	1.78	5.76
10-year yield	7.62 (1.8)	4.53	11.32	8.84 (1.1)	6.21	11.32	5.61 (0.5)	4.53	7.03
Slope	1.16 (1.7)	-3.21	4.08	0.90 (1.8)	-3.21	3.93	1.60 (1.2)	-35.37	407.47
Curvature	0.13 (0.20)	-0.47	0.82	0.09 (0.19)	-0.47	0.82	0.20 (0.1)	-0.20	0.73

a. All values are expressed as percentages.
b. Standard deviations of the measures appear in brackets below the means.

was defined as the difference between the 6-year yield and the average of the 2-year and 10-year yields. The statistical tests confirmed what is shown in Charts 2 and 3. The level of yields, both 3-month and 10-year, were not only significantly lower in the post-1996 period, but they were also much less variable. The slope of the yield curve was found to be materially steeper in the second period, while the degree of curvature showed relatively little change. The full details are presented in Table 1.

Daily Yield Changes and Distributions

The previous section examined the appearance of average yield curves over the period, presenting some detail about the average values and variances of the levels for four different yield-curve measures. Of potentially more interest than the levels of these measures, however, is the behaviour of the daily changes in these levels, since it is these changes in yield that drive the short-term risk and return behaviour for government bonds. Almost all derivative-pricing algorithms, portfolio-management tools, and risk-measurement models make some assumptions about the distribution of returns over a given time horizon, the most common being that returns are normally distributed. Since, for a zero-coupon bond, short-term returns are almost entirely driven by yield changes, it follows that an assumption that returns are normally distributed is equivalent to assuming that, over short time horizons, yield changes also have a normal distribution. If this is, in fact, not the case, then any model that makes the assumption of normality

could be producing results that provide inaccurate prices or risk measures.

Table 2 presents the statistical details of the daily changes. Two key observations can be made from Table 2. Specifically:

- While the mean change for all measures was very close to zero, the uncertainty surrounding the changes for all measures was very large. As was evident in Table 1 (summary table of yield levels), however, this variance was significantly lower in the post-1996 period.
- All of the yield-curve measures had some extreme outliers, with every measure having several observations that were up to 12 to 13 standard deviations away from the mean. While the absolute magnitude of the outliers was much smaller in the second subsample, their distance from the mean as measured by standard deviations was very similar.

It is this presence of extreme outliers that suggests that the distribution of daily yield changes may not be normal. These extreme outliers were not one-time occurrences, but happened with some degree of regularity. Over the full sample period, each of the various measures saw between 30 and 50 observations fall outside of four standard deviations from the mean. Observations as extreme as those highlighted in Table 2 are practically statistical impossibilities under the normal distribution.[8]

Table 2

Summary Yield-Curve Measures: Daily Changes[a]

Yield-curve measure	Full sample			1986–96			1997–2003		
	Mean[b]	Min.	Max.	Mean[b]	Min.	Max.	Mean[b]	Min.	Max.
3-month yield	-0.15 (14.5)	-120.6	188.3	-0.25 (17.3)	-120.7	188.3	0.03 (7.9)	-51.5	70.8
10-year yield	-0.12 (7.3)	-92.1	62.1	-0.11 (8.3)	-92.1	62.1	-0.13 (5.2)	-22.4	23.5
Slope	0.03 (15.0)	-176.3	93.1	0.14 (17.7)	-176.3	93.1	-0.16 (8.9)	-76.8	53.4
Curvature	0.00 (4.8)	-50.8	66.7	0.01 (5.8)	-50.8	66.7	-0.01 (2.4)	-33.3	32.7

a. All values are in basis points (one-hundredth of a per cent).
b. Standard deviations for the measures appear in brackets below the means.

8. For example, an observation that is 12 standard deviations from the mean would only be expected to happen once every 10^{20} years under the normal distribution.

Chart 4 takes this analysis a step further, plotting the distribution graphs of the daily yield changes for each yield-curve measure compared with a theoretical normal distribution. This provides further evidence that the daily yield changes do not appear to be normally distributed.

For simplicity of presentation, the various yield-curve measures are not broken up into subperiods, and only the distributions for the full samples are plotted. The characteristics of the distributions in the subperiods are consistent, however, with the distribution of the period as a whole, with no material change between the first and second time periods. As Chart 4 shows, not only do the distributions contain some extreme outliers, they also have far more observations close to the mean than would be expected under the normal distribution. These two characteristics (the presence of a relatively large number of extreme outliers and observations that are heavily centred around the mean) represent clear evidence of non-normality, and formal statistical tests firmly reject the hypothesis that the distributions are normal.[9]

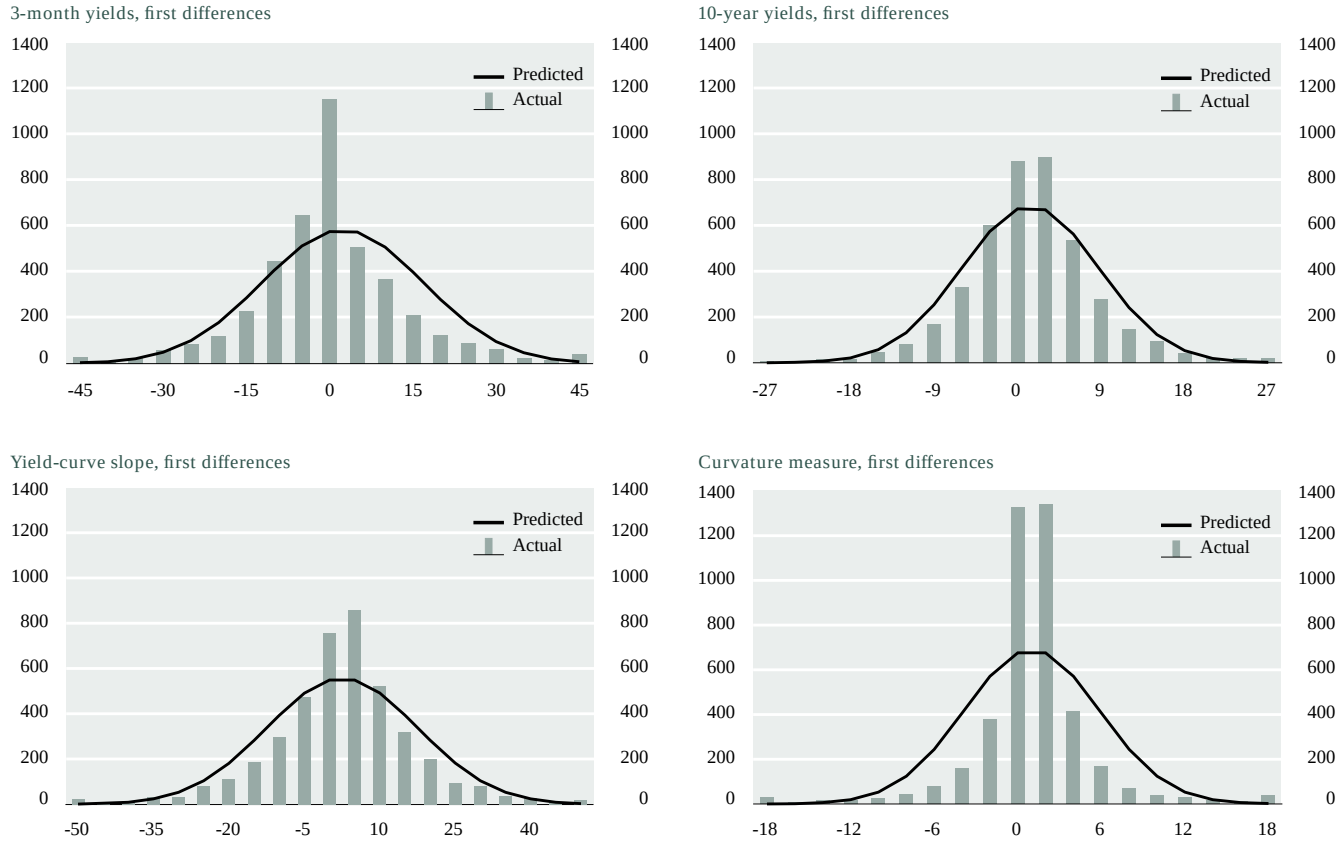
These two characteristics (the presence of a relatively large number of extreme outliers and observations that are heavily centred around the mean) represent clear evidence of non-normality.

The historical shapes of these distributions have some interesting repercussions for pricing algorithms, portfolio-management models, and risk measures that rely on the underlying assumption of normally distributed yield changes. These models would have systematically underpredicted the probability of a very small change in yields (or overstated the risk), while at the same time they would also have underpredicted the probability of a very large change in yields (or understated the risk). Options markets do, however, appear to compensate for at least part of this pattern by pricing options with various strike prices using different implied volatility levels. Options with strike prices that are further away from the current price trade with a higher

9. Jarque-Bera probabilities for all distributions are 0.0000.

Chart 4

Probability Distributions of Daily Yield Changes



implied volatility than do options with strike prices very close to the current price. This, in effect, compensates for the fact that the deep out-of-the-money options are more likely to be exercised than the standard normal-distribution assumptions of some option-pricing models would indicate. Nonetheless, it remains an interesting question as to whether specific trading strategies that were structured to benefit from the tendency of yields to move either very little or very much (relative to a normal distribution) would have been abnormally profitable.[10]

Principal-Component Analysis

Principal-component analysis attempts to describe the behaviour of a range of correlated random variables (in this case, the various spot yields for different times to maturity) in terms of a small number of uncorrelated principal components. This type of analysis makes it possible to identify a relatively small number of factors that have affected the behaviour of the entire zero-coupon curve over the period examined. While there are many practical applications for this analysis, the ability to construct more complete hedges for a bond portfolio is likely one of the most important. Once a small number of key factors that explain almost all of the risk faced by a given bond portfolio are determined, it is possible to create a replicating portfolio that immunizes the original against any shocks driven by those key factors. For anything other than a very simple bond portfolio, this would provide superior protection compared with more naive immunization approaches, such as simple duration matching.

This approach was first applied to bond yields by Litterman and Scheinkman (1991), who found three common factors that influenced the returns on all treasury bonds over the period they examined, explaining, on average, 98.4 per cent of the variance

10. An example of such a strategy would have been to maintain a short position in bond options with strike prices close to the current market price, while holding an offsetting long position in deep out-of-the-money options.

in yields. The first factor, which they called *level*, represented an approximately parallel shift higher or lower in the yield curve. A shock to this factor raised or lowered all yields by roughly the same amount. Level was by far the most important factor, accounting for 89.5 per cent of the total explained variance. The second factor was called *steepness*, since a positive shock to this factor lowered short-term spot rates, while raising longer-term rates. This factor was found to account for 8.5 per cent of total explained variance. A positive shock to the third factor, which they called *curvature*, lowered both short- and long-term yields, while raising mid-term yields. This had the effect of increasing the degree of curvature in the term structure. The curvature factor accounted for 2.0 per cent of the explained variance. This model has been applied to other interest rate markets with similar results,[11] and it has become standard practice in finance to refer to shifts in yield curves as being driven by three underlying factors: level, slope, and curvature.

Table 3 shows the results of a principal-component analysis of the Canadian zero-coupon curves, both over the full period and for each of the two subperiods. Similar to the results of Litterman and Scheinkman, the first three factors were found to explain essentially all of the variation in the spot rates over the period. The first factor, level, was by far the most important. The proportion of total variance explained by this factor fell fairly sharply, however, in the second subperiod. The second most important factor, slope, saw a corresponding increase in the proportion of total variance it explained, having over three times as much explanatory power in the second subperiod as it did in the first. This shift suggests an important change in the dynamics of the yield curve over the full sample. A change in the absolute level of interest rates became a significantly less important risk factor in the second subperiod than in the first, while changes in the slope of the curve became significantly more important. While outright changes in the level of yields still constituted the dominant risk factor, the risk associated with changes in the slope of the curve tripled in the second subperiod. Finally, the curvature factor explained a relatively small, but constant, degree of variation in both subperiods.

Table 3

Percentage Variation Explained

Period	Factor 1 Level	Factor 2 Slope	Factor 3 Curvature	Total
1986–96	89.8	8.4	1.3	99.6
1997–2003	72.6	25.8	1.4	99.7
Full sample	83.1	15.2	1.4	99.6

11. For example, Buhler and Zimmermann (1996) find similar results for the Swiss and German markets, while Knez, Litterman, and Scheinkman (1994) proposed a three- and four-factor model to explain U.S. money market returns.

The first three factors were found to explain essentially all of the variation in the spot rates over the period.

Chart 5, which shows the impact of a shock to one of the factors on a sample yield curve, helps to explain the interpretation of the various factors and demonstrates why they were named level, slope, and curvature.

All three factors behave very similarly to those described in Litterman and Scheinkman. The level factor corresponds to a roughly parallel shift in yields across the term structure; a positive shock to the slope factor lowers short-term rates, while increasing longer-term rates; while a positive shock to the curvature factor lowers very short- and long-term rates but increases mid-term yields.

Traditional interest rate risk management emphasizes duration matching, immunizing a portfolio against parallel shifts in yields. This type of hedging strategy effectively only immunizes the portfolio against shifts in the first factor (level). While this clearly represents the largest source of variation in yields, it ignores a substantial amount of risk (only about 73 per cent of the total variation in yields would have been immunized against in the second subperiod). A more complete hedging strategy would be to calculate the sensitivity of a bond portfolio to all three factors. Once these sensitivities are known, it is possible to construct a hedging portfolio that offsets the exposure to these factors. Properly constructed, a hedging strategy based on all three factors would protect against over 99 per cent of the variability in the term structure. This type of hedging strategy has been the subject of a relatively large amount of research, and additional information can be found in Barber and Copper

Chart 5

Effect of Shocks to Individual Factors

(1996), Golub and Tilman (1997), and Lardic, Priaulet, and Priaulet (2003).

Holding-Period Returns

The expectations hypothesis on the term structure of interest rates maintains that longer-term interest rates are simply the average of expected future short-term rates plus a risk premium. If the value of this risk premium is set to zero, it follows that the expected returns on zero-coupon bonds of all maturities will be equal over a given time horizon (e.g., purchasing a 10-year bond and selling it within one year provides the same expected return as holding a 1-year bond to maturity).[12] If the term premium is positive, longer-term bonds will have a higher expected return over a given horizon than shorter-term bonds. This extra expected return represents compensation for the additional risk associated with the longer-term bonds, since its actual realized return is uncertain.

The historical yield-curve series can be used to examine a number of questions related to this hypothesis.[13] First, the data series was evaluated to see if bonds of different maturities provided equivalent returns, on average, for a given holding period over the sample, or if certain maturity assets earned some measure of excess returns. Second, were the returns earned from holding longer-term instruments riskier (or more variable) than they were for shorter-term bonds? Third, if the risk level did vary across maturities, did some maturities consistently produce better risk-adjusted returns than others? Finally, results were compared across the subperiods to see if the risk-return profile across the yield curve changed.

Holding-period returns (HPRs) are defined as the total return earned by purchasing an asset at the beginning of the period, holding it for a given time horizon, and either redeeming it at maturity for a known amount, or selling it in the secondary market. HPRs were calculated using zero-coupon bonds with maturities of one, two, five, and 10 years for a holding period of 180 days. The difference between these returns and the risk-

12. The expected capital gain or loss from selling the longer-term instrument at the end of the horizon would exactly offset the interest differential between the two maturities.

13. Any conclusions would only represent the behaviour of the yield curve over the time period examined. The sample size may not be large enough to draw broad-based conclusions.

free return that could have been earned by simply purchasing a 180-day bond and holding it to maturity is referred to as the excess HPR, and it is this result that is of most interest. The use of excess HPRs allows for an adjustment for changes in the level of the reference risk-free rate over the period. This is an important point in a sample that saw short-term yields range from 2 per cent to 14 per cent, as an HPR of 10 per cent (for example) could represent either a good or bad outcome, depending on the prevailing level of the risk-free rate.

Table 4 shows the summary results for HPRs across both the full period and the subsamples. Two main conclusions emerge from the results:

- Excess HPRs get both larger and more volatile as the term to maturity of the underlying bond increases. Longer-term bonds had higher levels of risk, but also provided higher levels of return. This observation holds for both the first and second subsamples.
- While excess HPRs appeared to be lower in the 1997 to 2003 period, the difference was not statistically significant. Volatility of returns, however, was significantly lower in the second subsample, with the standard deviation of excess returns generally only half the level it was for the first subsample.

It appears, therefore, that longer-maturity bonds carried a risk premium to compensate for their higher levels of risk (or variability of return), and that both return and return variability fell in the second subsample.

This analysis cannot tell, however, whether the incremental returns earned on the longer-dated assets were sufficient to compensate for the additional variability of those returns. For this, it is necessary to examine the risk-adjusted returns for the various bond maturities.

One of the simplest methods for calculating risk-adjusted returns for different assets is to construct a ratio of the excess HPRs to the volatility of those returns, commonly known as a Sharpe ratio (Sharpe 1966, 1975). These ratios were calculated for both the full sample period and both subperiods, and the results appear in Table 5.

Table 4

Summary Statistics for 180-Day Excess Holding-Period Returns

Bond	Full sample (%)			1986–96 (%)			1997–2003 (%)		
	Mean[a]	Min.	Max.	Mean[a]	Min.	Max.	Mean[a]	Min.	Max.
1-year	0.61 (1.18)	-3.27	4.05	0.69 (1.40)	-3.27	4.05	0.51 (0.70)	-1.61	2.86
2-year	1.53 (3.57)	-11.10	12.53	1.69 (4.37)	-11.10	12.53	1.32 (2.20)	-3.57	8.13
5-year	3.17 (8.35)	-28.24	26.18	3.46 (10.17)	-28.24	26.18	2.79 (5.35)	-11.58	15.86
10-year	4.89 (14.48)	-49.66	38.18	5.24 (17.48)	-49.66	38.18	4.45 (9.82)	-21.92	31.79

a. Standard deviations for the measures appear in brackets below the means.

Table 5

Sharpe Ratios

Bond	Full sample			1986–96			1997–2003		
	Mean excess (%)	Std. dev. (%)	Sharpe ratio	Mean excess (%)	Std. dev. (%)	Sharpe ratio	Mean excess (%)	Std. dev. (%)	Sharpe ratio
1-year	0.61	1.18	0.52	0.69	1.40	0.49	0.51	0.70	0.73
2-year	1.53	3.57	0.43	1.69	4.37	0.39	1.32	2.20	0.60
5-year	3.17	8.35	0.38	3.46	10.17	0.34	2.79	5.35	0.52
10-year	4.89	14.48	0.34	5.24	17.48	0.30	4.45	9.82	0.45

Two main characteristics of the Sharpe ratios are apparent. First, the ratios decrease with the time to maturity of the bonds for all the sample periods. It would appear, therefore, that the incremental return earned by extending maturity did not compensate for the increase in risk. Second, Sharpe ratios for all maturities examined were significantly higher in the 1997 to 2003 sample, indicating a superior risk-reward trade-off in the second subperiod.

There is one overriding caveat to any conclusions that may be drawn from the analysis of excess HPRs, and that is that they are all based on *ex post* observations. The majority of the shocks that took place over the period resulted in yields falling further than could have been reasonably expected *ex ante* (as witnessed by the significantly lower yield levels in the second subperiod), resulting in large positive returns for longer-maturity fixed-income assets. As such, the *ex post* excess HPRs for the sample period are likely not indicative of what was expected *ex ante*, nor should they be seen as indicative of what should be expected in the future. In general, during periods of regime shifts, *ex post* observations are not good measures of what was (or should be) expected *ex ante*.

Conclusions

This article has presented a relatively high-level overview of the behaviour of the Government of Canada zero-coupon yield curve over a period of approximately 17.5 years. The analysis is based on what we believe to be the first historical constant-maturity Government of Canada zero-coupon yield-curve series to be publicly available. Four predominant conclusions can be drawn from the results presented here.

First, the differential between the actual market prices of government bonds and the price predicted by the yield-curve model decreased sharply over the period covered by the database. This is indicative of less idiosyncratic, more consistent pricing across different bond issues—that is, cash flows of similar maturity are priced at a similar yield, regardless of which specific bond they originated from.

Second, by almost any measure, the government bond market became a "safer" place during the latter part of the sample (1997 to 2003). While it is not possible to assign direct causality, the numerous changes in the fiscal and economic environment outlined earlier in this article coincided with a marked decrease in both the level and volatility of interest rates. Furthermore, while the level of excess returns earned for various bonds was slightly lower in the second subperiod, the volatility of those returns fell even more, resulting in superior risk-adjusted returns.

The third conclusion is that, similar to the other major bond markets, variations in the Government of Canada yield curve over the sample period could be almost totally explained by three factors—level, slope, and curvature. While the total proportion of variance explained remained very stable over the entire period (ranging from 99.0 per cent to 99.9 per cent), the breakdown of the three factors varied considerably.

Finally, none of the yield-curve measures examined had daily changes that fit a normal distribution. All of the distributions were characterized by both a much larger number of observations clustered around the mean and a much larger number of extreme outliers than would be expected under an assumption of normality. The behaviour of the yield curve over the period in question could be characterized as general stability punctuated by periods of extreme moves. This has implications for the large number of portfolio-management, risk-measurement, and derivative-pricing models that rely on an underlying assumption of normality in bond returns. That assumption has clearly not held up over time.

The database of historical daily constant-maturity Government of Canada zero-coupon yield curves is available on the Bank of Canda website at <http://www.bankofcanada.ca/en/yield_curve.html>.

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A Survey of the Price-Setting Behaviour of Canadian Companies

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- *From July 2002 to March 2003, the Bank of Canada's regional offices surveyed a representative sample of 170 Canadian firms to better understand price-setting behavior in the Canadian economy.*
- *Results suggest that half of Canadian firms changed prices at least once every three months. The survey also found evidence of increased price flexibility among Canadian firms over the past decade, owing to intensified competition and greater use of information technologies.*
- *The survey tested theories as to why firms allow prices to respond sluggishly to changes in market conditions—a key issue in determining the effects of monetary policy. Many firms indicated that their prices do not change until costs change, and that they often take measures to delay raising prices when costs go up. Firms also recognized that adjusting prices ahead of their competition is risky, which causes them to wait. Fixed nominal price contracts create rigidities, and the most commonly cited duration is 12 months. Finally, firms keep prices unchanged out of fear of antagonizing customers with frequent price changes.*
- *If prices are relatively flexible and have become more flexible over time, inflation may be more responsive to interest rate changes; thus, inflation targets may be achieved with shorter lags and fewer real side effects. Moreover, greater price flexibility may reduce the need for countercyclical policy.*

Setting prices correctly plays a critical role in determining the success of a product or service to a firm. The process of choosing and setting the "right" price is, however, costly in many ways. The time and effort expended by senior staff to set prices, and the cost of communicating the price changes to clients, are not trivial. As well, if customers are unhappy with the new price, the firm may incur negotiation costs, or may lose customers.[1]

Firms' attempts to minimize these costs by allowing their market prices to respond slowly to market conditions influence how monetary policy affects the economy. The extent to which prices are unchanged is referred to as price stickiness, rigidity, or inflexibility.

In this article, we summarize the results of a survey of pricing behaviour of Canadian companies. We begin by examining the motivation for surveying firms. The methodology used to set up the questionnaire and conduct the interviews is then described, followed by a presentation of the survey results. The first part of this section focuses on how often firms adjust prices and what motivates them to do so. The second part examines the reasons for price rigidity. The concluding section of the article highlights the main findings of the survey and discusses some potential implications for monetary policy.

1. The costs of printing new menus, catalogues, and price lists and of changing price tags are traditionally referred to as menu costs in the economic literature. Zbaracki et al. (2003) estimate that the managerial costs of adjusting prices, which include the costs of gathering information, making decisions, and communicating information internally, are more than six times larger than traditional menu costs for a typical firm in an industrial setting. They also estimate that customer costs, which include the costs of communicating and negotiating new prices with customers, are more than twenty times larger than menu costs.

Why the Issue Is Important

Why study how prices are determined?

The way firms set prices is of major importance to the design and implementation of monetary policy. Whether prices are sticky—that is, whether they respond slowly to changes in the economic environment—or whether they respond asymmetrically to excess demand and excess supply are key questions for central banks. The answers to these two questions have implications for the conduct of monetary policy, such as the speed with which the monetary authorities attempt to bring inflation back to the target after a shock. They also shape the process by which changes in monetary policy are transmitted to real activity (output and employment) and to inflation.

The way firms set prices is of major importance to the design and implementation of monetary policy.

Views on the importance of price stickiness as a central question in macroeconomics have varied over the years. In the 1960s and 1970s, economists generally accepted the presence of sticky prices and their ability to generate real-side disturbances in the face of monetary policy shocks. In the late 1970s and the 1980s, much of the academic research focused on the real side of the economy. Two economic paradigms at the time, the early rational-expectations and real-business-cycle models, dismissed the presence of sticky prices and therefore argued against a role for monetary policy in stimulating growth during periods of slack demand. This may have reflected, at least in part, the lack of conclusive evidence on the extent and importance of sticky prices.

In contrast, the macroeconomic literature of the 1990s and 2000s has shown a general acceptance of price stickiness and the important role that monetary policy can play in an economy running below potential. Consequently, economists have been devoting substantial resources to assessing the degree of price stickiness.[2] An approach that has become increasingly popular in trying to shed light on these issues is to survey firms directly on how they set prices. This article reports on the results of the first such survey for Canada.

Why do a survey?

There are several reasons why surveys of the price-setting behaviour of firms have been growing in popularity among researchers. Most important is the recognition of the central role played by the relative stickiness of prices in influencing how changes in monetary policy affect real economic variables such as output and employment. As well, conventional approaches to investigating price stickiness, based on econometric analysis of aggregate time-series data, have failed to resolve many of the outstanding issues. Moreover, new theories for sluggish price adjustment have appeared before older explanations have been satisfactorily rejected.[3] There is also a growing recognition that price stickiness can best be understood by examining pricing behaviours at the micro level, where pricing decisions are actually made. However, until the release of firm-based survey studies in recent years, the scope of earlier micro-level studies, which tended to focus on either a single firm or a single market, was too narrow to permit implications to be drawn for price stickiness in the broader economy.

An economy-wide survey of the price-setting process at firms has not previously been conducted in Canada, although surveys have been carried out by central banks in other countries.[4] It was thought that a similar firm-based survey for Canada would be beneficial, given the differences in economic structure between Canada and these other countries in terms of export exposure, industrial mix, and institutional and market arrangements.

In addition to assessing the relative flexibility of prices in Canada, a firm-based survey can be used to examine the various explanations for slow price adjustment and the prevalence of these explanations across firms. This information may be important for the conduct of monetary policy because different explanations of price rigidity may have different effects on the responsive-

2. Several studies have shown that certain wholesale and retail prices often remain unchanged for many months. For instance, price rigidity was found in industrial commodity prices (Carlton 1986), magazine prices (Cecchetti 1986), and mail-order catalogue prices (Kashyap 1995). Bils and Klenow (2002), using disaggregated Bureau of Labor Statistics price data for the United States, found price adjustment more flexible than was the case in these earlier studies.

3. For a fuller discussion, see Blinder et al. (1998, 8–12).

4. The use of surveys to analyze the price-setting behaviour of firms was pioneered in the United States by Blinder (1991, 1994) and Blinder et al. (1998). Subsequent price-setting surveys were conducted by researchers at the Bank of England (Hall, Walsh, and Yates 1997), the Bank of Japan (Nakagawa, Hattori, and Takagawa 2000), the Bank of Sweden (Apel, Friberg, and Hallsten 2001), and, more recently, the Bank of Italy (Fabiani, Gattulli, and Sabbatini 2004). Currently, eight other euro-area central banks are conducting price-setting surveys (Belgium, Germany, France, Spain, the Netherlands, Luxembourg, Portugal, and Austria), and the results are expected to be published in 2005.

ness of prices to changing demand conditions. Macroeconomic modelling may also benefit from more detailed information on firms' price-setting behaviour.

The Approach

How was the survey conducted?

The design and implementation of the survey for Canada drew upon the results and lessons learned from previous price-setting studies conducted in other countries. Structured interviews were conducted with 170 firms across Canada. The firms selected for the survey had to be free to set their prices autonomously in response to market conditions. Thus, the sample was designed to be representative of the private, for-profit, unregulated, and non-commodity-producing segment of the Canadian economy in terms of industry sector, firm size, and, to some extent, regional distribution (Table 1).

Table 1

Representativeness of the Survey Sample

	Industry sector[a]		Firm size[b]		Region[c]	
	Target	Actual	Target	Actual	Target	Actual
Construction	10	10	–	–	–	–
Manufacturing	25	26	–	–	–	–
Retail and wholesale trade	17	14	–	–	–	–
Transportation, information, and cultural industries	11	13	–	–	–	–
Finance, insurance, and real estate	19	16	–	–	–	–
Other commercial services[d]	18	20	–	–	–	–
Small	–	–	29	32	–	–
Medium	–	–	23	28	–	–
Large	–	–	48	40	–	–
Atlantic Canada	–	–	–	–	6	13
Quebec	–	–	–	–	21	22
Ontario	–	–	–	–	42	31
Prairies	–	–	–	–	18	18
British Columbia	–	–	–	–	13	16

a. The target is the percentage of real gross domestic product (GDP) in the private, non-regulated, and non-primary sector of the Canadian economy. It constituted 68 per cent of total real GDP in 2002. The real estate sector was adjusted down by about one-half to account for the effects of imputed rent in published GDP figures. "Actual" represents the percentage of firms in the survey sample. The classification by industry sector is based upon the North American Industry Classification System (NAICS).

b. The target is the percentage of employment in a particular firm-size category in 2002, based on Bank estimates generated from Statistics Canada's *Survey of Employment, Payroll and Hours*. "Actual" represents the percentage of firms in the price-survey sample. Small firms are defined as those with less than 101 employees; medium firms as those with 101–499 employees; and large firms as those with more than 499 employees.

c. The target is the percentage of real GDP in 2002. "Actual" represents the percentage of firms in the price-survey sample.

d. Includes professional, scientific, and technical services; management of companies and enterprises; administrative and support services; waste management and remediation services; arts, entertainment, and recreation services; and accommodation and food services.

Drawing upon the experience of the Bank of Canada's regional offices in conducting firm-based surveys, a non-random form of sampling, widely employed in business surveys and known as "quota sampling,"[5] was used to generate a representative sample of firms. All surveys were completed using face-to-face interviews rather than by telephone, mail, fax, or the Internet, in the belief that survey responses would be more reliable.[6] All interviewers were Bank of Canada staff economists who had training in clarifying concepts, ensuring that all questions were answered, and identifying and resolving any inconsistencies in responses. Company representatives who participated in the survey held senior positions, suggesting that they would know how their firm's products or services were priced.[7] Survey interviews were conducted from July 2002 to March 2003. However, about two-thirds of the surveys were completed between January and March 2003, a period when the Canadian dollar appreciated by about 7 per cent, and the rate of inflation, as measured by the 12-month rate of increase in the consumer price index (CPI), rose to an average of 4.4 per cent, from less than 3 per cent when surveying commenced in July 2002.[8]

What were firms asked?

The price-setting survey was based on a structured questionnaire rather than a free-form interview to allow for standard statistical analysis. The number, type, and phrasing of the questions, as well as the layout of the survey, were finalized in consultation with Bank of Canada senior management and Research Department staff. Consideration was given to striking

5. See Martin (2004) for a description of the Bank of Canada's regional offices' survey experience. The non-random sampling used in the regional offices and in the price survey is called quota sampling because, for each subgroup in a target universe, a quota of respondents is selected which, when aggregated, is intended to produce a sample that is representative of the target universe. Thus, in instances where an initial company contact chooses not to participate in the survey, another firm of similar size with comparable industry characteristics is selected from commercial business directories to achieve sample targets (see also OECD 2003).

6. Blinder et al. (1998) believed that personal interviews conducted by knowledgeable economic professionals would improve the quality of the survey results. Our experience with missing responses and errors with questionnaires sent in by fax suggests that their preference for personal interviews is well founded.

7. The percentage distribution of company contacts was as follows: president, CEO, or owner–22 per cent; vice-president, vice-president of finance, or CFO–41 per cent; manager or director–22 per cent; controller–9 per cent.

8. The rise in total CPI inflation resulted mainly from price increases for energy and auto insurance. Excluding these components, the year-over-year increase in consumer prices averaged 2.3 per cent from January to March 2003.

a reasonable balance between gathering pertinent information and not overburdening the respondents. Given that most firms sell a variety of products, firms were asked to refer to their main product when responding to the survey questions. If product offerings were too diverse to easily identify one main product (e.g., department store) respondents were asked to answer the questions with reference to some broad product category where items are priced similarly (e.g., electronic equipment).

The survey questionnaire consisted of three sections.[9] The first section contained questions on firm characteristics such as cost structure, industry, sales distribution by customer type and region, share of sales under contract, customer concentration, and the number of direct competitors. These questions were posed to allow for the analysis of differences in price-setting behaviour across firms. The second section included questions designed to improve the understanding of the price-setting process at firms. To examine the degree of price flexibility, companies were asked about the frequency of their price reviews and price changes. To better understand the motivation behind a firm's decision to alter prices, the survey probed into the reasons why a company would change prices. The third section asked questions about the relevance of various theories of, or explanations for, price stickiness. In the main part of this section, companies were asked to evaluate the importance of six theories of price rigidity. These theories had been considered important in other price-survey studies or in other empirical or theoretical research. Each theory was presented using a one-line statement capturing its essential features in non-technical language. If respondents recognized this one-line statement as an explanation for slow price adjustment at their firm, follow-up questions were asked on issues specific to that theory before moving on to the next theory. This section also included a single question on the relevance of five other explanations for delayed price adjustment, but was not followed by any supplementary questions, given the smaller role played by these explanations in the economic literature. At the end of the survey, firms were asked whether their responses applied to a broad range of their other products or services, and this was generally found to be the case.[10]

9. See Appendix A of Amirault, Kwan, and Wilkinson (forthcoming) for a copy of the survey.

10. More than three-quarters of firms indicated that the responses were applicable to other products or services or that the question was irrelevant because they offered only one product or service.

The Results

How, and how often, do firms adjust prices?

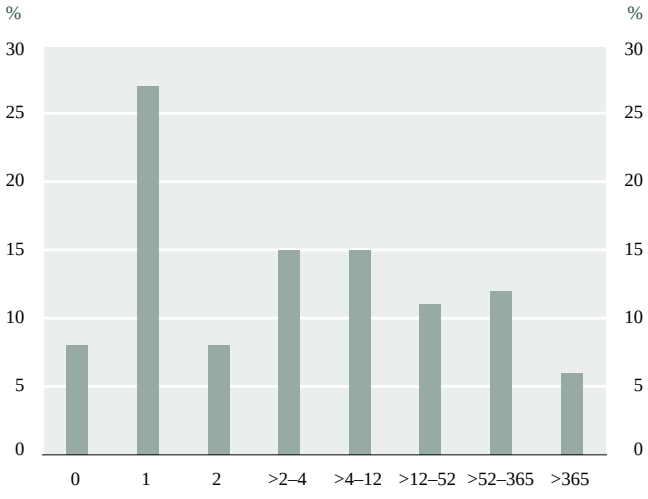
In order to generate estimates of price-setting frequencies among Canadian firms,[11] the respondents were asked, "In the past 12 months, how many times have you actually adjusted transactions prices?" The distribution of answers to this question was surprisingly wide. The most commonly cited answer, given by 27 per cent of the sample, was that prices are adjusted once a year and often at the same time every year.

Another 8 per cent cited no price changes at all in the past year (Chart 1). Taking these two results together, prices for about one-third of the measured Canadian economy are quite sticky. For these firms, the costs of changing prices[12] are burdensome relative to the benefits.

For 38 per cent of the sample, prices change 2 to 12 times per year. At the other end of the distribution, 29 per cent reported adjusting prices more than 12 times in the past year. At the extreme end, 6 per cent reported changing prices more than 365 times in the past year.

Chart 1

In the Past 12 Months How Many Times Have You Actually Adjusted Transactions Prices?



11. It should be noted that the number of price adjustments alone does not indicate price rigidity. Infrequent price adjustment at some firms may simply reflect stability in their demand and cost conditions over the 12-month period covered by the question.

12. Costs of price changes are defined broadly to include both explicit costs, such as the costs of posting new prices, and implicit costs, such as lost or antagonized customers, price wars, and loss of reputation and credibility.

This suggests that the classical paradigm of continuously clearing auction markets (continuous costless repricing) applies to only a very small segment of Canadian product markets. This high price flexibility is largely the result of many of these firms changing prices on a customer-by-customer basis.

Our estimates show that one-half of firms in Canada change their prices at least once every three months, the equivalent of a price change four or more times a year. This result suggests that prices in Canada are reasonably flexible, particularly when compared with the results of similar studies recently conducted in other countries[13] (Box 1).

Are prices more flexible than they used to be?

The Canadian economy has undergone considerable change over the past decade and a half. In addition to lower, more stable, and predictable inflation, which, on the surface, may have reduced the need for frequent price changes, firms have faced a steady stream of technological innovation, new trade arrangements, improvements in public sector finances, and other developments that may have altered their price-setting behaviour. To better understand the impact of these influences, firms were asked, "To the best of your knowledge, has the frequency of price adjustment changed in the past decade?" The evidence suggests that prices in Canada have become more flexible over the past decade. While slightly more than half of the sample had not changed the frequency with which they adjusted prices over the past decade, 45 per cent had adjusted it. Three-quarters of firms in this latter group now change prices more often than they did a decade ago.

The evidence suggests that prices in Canada have become more flexible over the past decade.

13. Survey results on price flexibility are consistent with the findings reported in Bils and Klenow (2002).

Box 1
A Comparison of Selected Price-Setting Surveys

Comparing the Bank of Canada Survey with Three Previous Surveys

Survey features	United States	United Kingdom	Sweden	Canada
Timing	April 1990–March 1992	September 1995	March–May 2000	July 2002–March 2003
Sample size	200	654	626	170
Representative by industry?	Yes	No, mainly manufacturing firms (68%)	No, manufacturing and service sectors only	Yes
Representative by firm size?	No, firms with <$10 million in sales excluded	No, dominated by large firms	Yes	Yes
Regional distribution?	16 states in U.S. Northeast	All regions	All regions	All regions
Random sample?	Yes	No	Yes	No

Key results	United States	United Kingdom	Sweden	Canada
Median frequency of price changes per year	1.4	2	1	4
Most frequently cited price-change frequency per year (i.e., mode)	1	1	1	1
Results: Highest ranked theories of price stickiness[b]	Coordination failure Non-price adjustment Cost-based pricing Implicit contracts Explicit contracts	Cost-based pricing Implicit contracts Explicit contracts Procyclical elasticity[a] Pricing thresholds[a]	Implicit contracts Explicit contracts Cost-based pricing Coordination failure Counter-cyclical cost of finance[a]	Cost-based pricing Customer relationships Explicit contracts Non-price adjustment Coordination failure

a. Not surveyed in the Bank of Canada study

b. Rankings for the United States, the United Kingdom, and Canadian studies are based upon the percentage of firms that recognized a particular theory, whereas rankings for the Swedish study are based on mean scores. Mean scores take into consideration the subjective responses of the firms to a particular theory. In the Canadian study, mean scores could only be calculated for the six main theories, and the rankings are identical to those based on percentage recognition.

Firms with increased price flexibility were asked why they had adjusted their pricing behaviour. Three factors were noted (in order of importance): increased competition, increased use of information technology, and increased volatility of input costs.

As many firms explained, more competition means that their price in the market is wrong or "offside" more often, and the costs of being offside increase dramatically as competition increases. Information technology, for its part, acts as a tool to facilitate price reviews and adjustments, in that it enhances the information flow, thereby reducing costs and lags associated with the price-setting process. The third factor, increased volatility in input costs, was related to volatility in foreign exchange rates and raw material and energy prices.

Why does pricing behaviour vary among firms?

Several firm characteristics were found to be statistically significant factors influencing firm-level price-setting behaviour (Table 2).[14]

Sectors: Price changes are most infrequent at firms in the "other commercial services" sector, where they are generally reviewed and set annually. Many of these service firms described the annual price change as synchronized to the annual wage settlement with staff.[15] Firms in retail and wholesale trade are at the other end of the distribution, with a median of seven price changes per year. Other sectors are clustered near the centre, with three to five price changes per year.[16]

Firm size: Large firms change prices about twice as often as medium firms and five times more frequently than small firms.[17] Many respondents explained that senior staff at small firms have numerous tasks in addition to reviewing and adjusting prices. The administrative and management costs associated with the price-setting process are therefore particularly onerous for small firms.

Number of competitors: A firm's market circumstances play a role in determining its price-setting behaviour.

Table 2

Characteristics That Influence Variations in the Frequency of a Firm's Price Adjustments

Factors leading to variations in the frequency of price adjustments[a]	Number of respondents (*n*)	Median number of price adjustments	Per cent of firms reporting:	
			< 1 price change per year	> 52 price changes per year
Total sample	170	4	34	18
Sectors**				
Construction	18	5	22	6
Manufacturing	44	4	36	16
Retail and wholesale trade	25	7	4	28
Transportation, information, and cultural industries	22	3	45	27
Finance, insurance, and real estate	27	4	30	15
Other commercial services[b]	34	1	50	15
Firm size (using # of employees)***				
Small (less than 101)	54	2	39	9
Medium (101– 499)	48	4	42	15
Large (more than 499)	68	10	25	26
Geographic distribution of sales*				
Export sales less than 50% of total sales	137	3	36	16
Export sales at or more than 50% of total sales	33	9	27	24
Number of competitors**				
0-5	68	2	49	16
greater than 5	102	4	25	19
Price-review type ***				
State-dependent	57	10	14	30
Time-dependent	113	2	44	12

a. A Kruskal-Wallis rank sum test of the equality of populations was conducted. For more information about the Kruskal-Wallis rank sum test, see Kvanli, Guynes, and Pavur (1992).
* indicates the rejection of the null hypothesis at the 80 per cent confidence level
** indicates 90 per cent confidence level
*** indicates 99 per cent confidence level
b. See footnote d in Table 1.

For example, firms with fewer competitors tend to be better able to resist more frequent price changes. As previously mentioned, firms themselves reported

14. To the extent that characteristics such as the breakdown of firms by sector and size are found to be significant, they highlight the importance of having a representative sample when drawing conclusions about economy-wide behaviour.
15. These firms conform to standard staggered contract models such as those proposed by Taylor (1979).
16. These results are similar to those found in Hall, Walsh, and Yates (1997). They show that construction and retail firms have the highest frequency of price adjustment, while firms in other service industries have the lowest frequency.
17. Buckle and Carlson (2000) also find that small firms change prices less frequently.

increased competition as a major source of increased price flexibility.

Sales distribution:[18] Firms with a significant export sales base have a higher number of median price changes. This suggests that exposure to international customers will tend to make firm-level pricing more flexible. Firms focused on sales in their home region have fewer price changes. This may help to explain why the Canadian economy, an economy very much open to trade, has flexible prices.

Price reviews: Firms generally review prices in one of two ways: time-dependent, using a fixed frequency (e.g., quarterly, weekly, annually) or state-dependent, when they perceive a change in the "state" of the market. The majority (about two-thirds)[19] of firms surveyed exhibit time-dependent price-reviewing behaviour.

Firms with time-dependent price reviews have far stickier prices than do state-dependent price reviewers. Many firms reporting state-dependent price reviews offer different prices to different customers for the same, or similar, products.

What causes firms to change prices?

Another important issue for the conduct of monetary policy is what causes firms to change prices. Whatever triggers a price change is the theoretical first step in a microeconomic process that will ultimately lead to a change in the rate of inflation.

Respondents ranked "price changes by competitors" as the most important factor leading firms to change prices.

Table 3 illustrates the dominant role competitive forces play in driving price changes. Respondents ranked "price changes by competitors" as the most important factor leading firms to change prices. Following competitor actions, "changes in domestic input costs" and "changes in demand" were cited as equally important factors, suggesting both supply-side and demand-side factors are at play.[20] Wage changes were next in the rankings, followed by several other factors of similar importance.

Depending on the industry, however, rankings do differ. For example, goods-producing industries consistently ranked domestic non-labour input costs higher in

Table 3

Rankings and Mean Score of Reasons for Price Adjustments

Triggers / Causes[a]	Total sample		CONS	MFG	R&WT	TIC	FIRE	OCS
	Mean score[b]	Rank[c]	Rankings based on mean score					
Price changes by competitors	3.16[d]	1	4	1	1	2	1	1
Change in domestic input costs (non-labour)	2.90	2	1	2	2	5	3	5
Change in demand for product/ service	2.89[d]	3	2	3	3	1	2	3
Change in wage costs	2.53[d]	4	3	5	7	3	6	2
Firm routinely changes prices	2.18	5	7	7	4	4	8	4
Change in taxes, fees, and other charges	2.09	6	6	6	8	8	5	6
Change in economic/ inflation forecast	2.01	7	5	9	9	6	4	7
Change in exchange rates	1.87	8	9	4	5	9	9	8
Sales campaigns	1.84	9	8	8	6	7	7	9

* CONS = Construction, MFG = Manufacturing, R&WT = Retail and Wholesale Trade, TIC = Transportation, Information, and Culture, FIRE = Finance, Insurance, and Real Estate, OCS = Other Commercial Services.

a Firms were also asked about directives from parent companies. The response was insignificant, scoring last in all industries, and so is excluded from this table.

b The mean score in column 2 is the weighted average of the firms' response to the importance of each trigger, where 4 is "very important," and 1 is "not important." The numbers in columns 3 to 9 are rankings for the importance of each trigger for a given industry.

c Ranking based on the total sample

d Mean score is statistically different at the 5 per cent level of significance from the mean score below it

18. Firms were asked to respond to the question using the currency of their main business activity. This implies that daily exchange rate fluctuations were not considered a source of price flexibility.

19. Results contained in Hall, Walsh, and Yates (1997) are similar.

20. These findings match results reported in Apel, Friberg, and Hallsten (2001).

importance than did firms in service-producing industries, where changes in demand ranked higher.

Wages were most important in the "other commercial services" sector—a point previously identified as leading to annual price-setting behaviour. Economic and inflation forecasts were of some importance to the finance, insurance, and real estate and construction sectors. Exchange rates were most important to manufacturers, wholesalers, and retailers.

Why might prices be rigid?

The study assessed 11 explanations for holding prices steady even though there are pressures for a change. These theories were proposed to firms as a series of short, plain-language statements and are listed in Table 4, along with the percentage of firms that recognized these various theories as reasons why prices may change infrequently.

The results indicate that cost-based pricing, customer relations, explicit contracts, and non-price adjustment were the theories most recognized by respondents.

Each theory attributes sticky price behaviour to specific causes. For example, sticky information describes firms as making the best decision with the information available at the time. However, that information is subject to lags and is updated infrequently. Other theories give institutional arrangements, such as contracts, both written and unwritten, an important role in price rigidities. These agreements between parties, whether they are explicit or implicit, often fix prices as a means of protecting one or both parties, but also reduce the opportunities to adjust prices. Cost-based pricing suggests that prices of final goods adjust to costs with a lag. This lag depends on how quickly individual firms revise prices to reflect changes in costs and the length of the multi-stage production process for a final good. Given the firm-specific focus of the survey, questions on cost centred on the firm-level responses to costs, not the chain-of-production process among firms. Coordination failure attributes price stickiness to the preferences of firms to hold back on a price change and wait for other firms to change their prices first. If all firms behave this way, a required price change may not go ahead for some time.

Menu and customer relations costs suggest that there are fixed costs associated with adjusting prices, and that these costs force firms to reduce the number of adjustments they undertake. Non-price adjustment proposes that firms change the characteristics of their product or service instead of changing prices. Low inflation may also make it difficult for firms to adjust prices because price changes are immediately viewed as real price changes as opposed to nominal price changes. Finally, we included a category based on results from pretesting that suggest that factors influencing prices do not change often enough to warrant changing prices more often.

The results indicate that cost-based pricing, customer relations, explicit contracts, and non-price adjustment were the theories most recognized by respondents. Sticky information and menu costs were the least recognized (Table 4). It should also be noted that theory recognition by firms is not mutually exclusive. For example, firms might indicate that they hold back on a price increase (i.e., coordination failure) because they fear antagonizing customers (i.e., customer relations).

Do costs matter?

As we noted in the section on what causes companies to change prices, input costs play an important role in the price-setting process. These results are confirmed here. Cost-based pricing was the most widely recognized theory among respondents, with 67 per cent of the sample accepting it as a reason for price inertia (Table 4). This theory suggests that there are lags between cost and price changes at firms and at different stages of production across firms.

Even though the lags between cost and price changes may be short, some researchers have suggested that, when multiplied by the various levels in the chain of production across firms, they may cause considerable price inertia in final consumer prices (Gordon 1981; Blanchard 1983). However, firms were asked questions about their own behaviour, so the survey provides information only on the lags in cost and price changes at the firm, not across firms.

The results of this survey indicate that a lag does indeed exist between changes in costs and changes in prices at the firm level. Even when these firms expect an increase in input costs, fully 61 per cent of the firms that accepted cost-based pricing indicated that they would delay price changes. In fact, many firms actively try to hold back price increases. For example, if they foresee a cost increase, 38 per cent report buying in advance and storing inventory, and 26 per cent report hedging against cost increases. Measures of this type

Table 4

Percentage of Firms That Recognized Each Theory as a Reason for Infrequent Price Changes

Theories	Description given to respondents	Percentage recognition
Cost-based pricing	Prices depend mainly on the costs of labour and raw materials used in producing goods and services. Therefore, prices don't change until costs change.	67.1
Customer relations	Prices could not change more often without disturbing customer relations.	55.3
Explicit contracts	Firms would like to adjust prices more often to reflect market conditions, but fixed-price contracts make it difficult to pass on price increases when a contract is active.	45.3
Non-price adjustment	Firms are more likely to amend product characteristics (e.g., warranty, delivery lag) than prices.	44.1
Coordination failure (rising prices)	Firms delay price increases because they do not want to be the first in the industry to raise prices.	41.2
Low inflation	Low inflation makes large price changes more noticeable.	33.5
Implicit contracts	Firms delay price increases because they have an implied understanding with customers that they will not raise prices in tight markets.	31.8
Coordination failure (falling prices)	Firms delay price cuts because they do not want to be the first in the industry to cut prices.	31.2
Factors do not change	Factors influencing prices do not change often enough to warrant changes.	31.2
Menu costs	It would be too costly to change prices more often (e.g., time, effort, out-of-pocket costs).	21.2
Sticky information	The information used to review (and ultimately change) prices is available infrequently. Therefore, prices may be slow to adjust to new conditions.	13.5

are more typical in goods-producing sectors, which can more effectively hedge or store their inputs. Beyond these sources of inertia, some firms report having to give customers advance notice—as much as six months—of a price increase. This creates another wedge between cost shocks and price responses.

Do contracts matter?

Explicit contracts fix prices over a specified period of time and have long been recognized as a source of price stickiness. Survey results show that 75 per cent of Canadian firms use contracts. Because some contracts include price escalator or de-escalator clauses or may not fix prices, only 45 per cent of the sample recognized explicit contracts as inhibiting price increases.[21] About 29 per cent of these firms reported that contracts did not prevent prices from decreasing when demand or costs fell. This result suggests that explicit contracts introduce somewhat more price inertia when prices are rising than when they are falling.

How long are prices fixed under explicit contracts? The most frequently cited contract length was 12 months, but owing to the existence of long-lived contracts, the average contract length was 23 months. Contract lengths have generally remained unchanged over the past 10 years, despite low rates of inflation over this period.

Implicit contracts, which are a verbal commitment not to raise prices in strong markets, were acknowledged as an explanation for price rigidity by about 32 per cent of firms. However, about two-thirds of these firms indicated that this commitment is not reciprocated by customers, who demand price concessions in weak markets. This suggests that implicit contracts also constrain prices more when market conditions strengthen than when they weaken. This asymmetric effect on price adjustment is more pronounced with implicit than with explicit contracts.

Does competition matter?

Coordination failure (not moving prices before one's competitors) on a price increase was recognized by 41 per cent of the sample. However, only 31 per cent recognized this as an explanation for price rigidity when prices are declining. This result suggests more price inertia when prices are rising than when they are falling. When firms were asked why prices were not increased until their competitors moved, the main response was a fear of losing or antagonizing customers.

Asymmetrical effects are present in another interesting way. Firms that identify themselves as price leaders in an industry should be the ones who identify least with this theory, since a price leader, by definition, would move prices without regard for its competitors. However, results show that even firms that identify themselves as the price leader in their industry have an asymmetrical reaction to coordination failure. The market leader shows little reluctance in initiating a price decrease. However, on a price increase, the price leader is just as worried as other firms about the negative consequences. This is a particularly interesting result because it shows that competitive forces are important.

21. The price rigidity implied by firms recognizing fixed-price contracts is lessened to the extent that slightly more than 10 per cent of these firms use contracts for fewer than 50 per cent of total sales.

Do customer relationships matter?

The fear of antagonizing customers is a key issue and underscored much of the firms' commentary about what makes changing prices difficult. Firms were explicitly asked if the costs of maintaining customer relations were a source of price inertia. This theory was ranked second highest as an explanation for price stickiness. Respondents felt that customers disliked frequent changes and "expected" stability.[22] Firms were concerned about being perceived as unprofessional if they changed their prices too often.

The fear of antagonizing customers is a key issue and underscored much of the firms' commentary about what makes changing prices difficult.

Perhaps the most compelling evidence on customer relations costs comes from Table 5, which shows the entire sample of firms divided into four groups based on the frequency with which the firms adjust prices. Here, the importance of customer relations truly stands out. Fully 76 per cent of firms with fewer than two adjustments recognized this factor as a source of price rigidity, compared with 37 per cent who adjust prices more than 52 times a year. Customer relations costs have played only a peripheral role in mainstream theoretical work. Recently, however, theorists (Rotemberg 2002, 2004) have begun to model price rigidity on the basis of customer relations costs.

Table 5 also points to other interesting patterns. For example, the firms with the most rigid prices have recognition rates for all theories that are similar to or higher than those of their counterparts with flexible prices. Furthermore, some theories with low recognition overall have significantly higher acceptance among the lowest frequency price setters. Menu costs were acknowledged by only 21 per cent of the respondents overall, but by 38 per cent of firms with fewer than 2 changes. Only 3 per cent of firms with more than 52 price changes per year accepted this explanation. Firms for which menu costs matter clearly set prices less frequently. On the question of whether low inflation makes large price changes more noticeable, firms with sticky prices were, again, significantly more sensitive to the possibility that price changes above the rate of inflation would attract negative attention from customers.

22. Okun (1981) suggested that firms limit price changes because frequent changes would increase customers' search and shopping costs and would therefore antagonize them.

Table 5

Percentage Recognition of Pricing Theory by Frequency of Price Adjustment

Theory	Whole sample	Frequency of price adjustment per year				F-test values[a]	Probability of no variation	Statistically significant differences between the column numbers[b]
		0–1 *n* = 58	2–4 *n* = 39	5–52 *n* = 43	>52 *n* = 30			
		Col. 1	Col. 2	Col. 3	Col. 4			
Cost-based pricing	67.1	69.0	74.4	62.8	60.0	0.7	0.565	none
Customer relations	55.3	75.9	59.0	37.2	36.7	7.4**	0.000	1&3,** 1&4**
Explicit contracts	45.3	34.5	43.6	53.5	50.0	0.9	0.438	none
Non-price adjustments	44.1	46.6	46.2	41.9	40.0	0.2	0.921	none
Coordination failure (rising prices)	41.2	48.3	41.0	39.5	30.0	0.9	0.429	none
Low inflation	33.5	48.3	25.6	25.6	26.7	2.9**	0.034	1&2,* 1&3*
Implicit contracts	31.8	37.9	33.3	27.9	23.3	0.8	0.511	none
Coordination failure (falling prices)	31.2	29.3	30.8	37.2	26.7	0.4	0.779	none
Factor stability	31.2	48.3	30.8	20.9	13.3	5.1**	0.002	1&3,** 1&4**
Menu costs	21.2	37.9	20.5	11.6	3.3	6.5**	0.000	1&3,* 1&4,** 2&4*
Sticky information	13.5	17.2	15.4	11.6	6.7	0.7	0.550	none

a. *indicates rejection of null hypothesis of equal means at the 10 per cent level
** indicates rejection of null hypothesis of equal means at the 5 per cent level

b. Two-sample *t*-test assuming unequal variances. Critical values of tests were corrected using a Bonferroni normalization, which corrects for the possibility of falsely accepting significant results.

Conclusions

This survey of the pricing behaviour of a representative sample of Canadian firms has several interesting findings. Firms show wide variation in the frequency with which they adjust prices, with half of Canadian firms changing prices at least once every three months. The survey also found evidence of increased price flexibility among Canadian firms over the past decade, owing to intensified competition and greater use of information technologies.

Several characteristics of firms influence price-setting behaviour. Small firms, service sector firms, and firms with a large proportion of domestic sales adjust prices relatively infrequently. As for what leads firms to adjust prices, price changes by a competitor were the most important trigger. In aggregate, firms ranked supply and demand factors as equally important triggers of a price change.

Beyond understanding how firms set prices, this study was equally concerned with understanding the reasons for price inertia. In particular, firms reacted favourably to the idea that prices do not change until a firm has seen its costs change. Firms were also concerned about adjusting prices ahead of their competition. In addition, some firms using sales contracts hold nominal prices fixed, regardless of market conditions that would otherwise call for a change in price.

These theories as to why profit-maximizing firms may keep prices unchanged, despite pressures to adjust them, seem to have a common genesis: firms' fears of antagonizing customers or disturbing the goodwill or reputation developed with them. The theory of customer relations was the second most popular choice overall and was accepted by three-quarters of firms with the stickiest prices.

Given that customers are more likely to be antagonized by a price hike than by a price cut, we would expect fewer rigidities in cutting prices than raising prices. Firms were queried about these possible asymmetries. Evidence suggests that firms may face more price inertia when experiencing upward price pressures than when experiencing downward price pressures.

Some implications of these results are worth considering despite the caveats that may be attached to this analysis. If, as we have found in this survey, prices in Canada are relatively flexible and have become more flexible over time, inflation may be more responsive to interest rate changes. Thus, inflation targets could be achieved with shorter lags and with less impact on activity in the real economy. Moreover, greater flexibility not only reduces the effects of monetary policy on the real economy, but also reduces the need for countercyclical policy.

The asymmetrical response of prices to changes in economic conditions (i.e., more flexibility downward than upward) also has implications for the conduct of monetary policy. For one, this result runs counter to recent concerns that prices are more sticky downwards than upwards. Similar asymmetries and implications were found by Blinder et al. (1998). While these results are compelling, they require further validation. They say nothing, for example, about wages, the area where downward rigidities are thought to be more important. While the survey offered some insights into price-setting asymmetries, more extensive questioning and further research would be invaluable in refining these results.

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Speeches

Introduction

The message delivered by the Governor of the Bank of Canada, David Dodge, in a December speech to the Empire Club of Canada and the Canadian Club of Toronto is that future economic growth and prosperity in Canada depend on improving the efficiency of Canada's financial system, including financial markets and financial institutions. In his speech, which is reproduced in full here, the Governor also spoke about the need for Canada to implement the appropriate securities regulation, given the country's large number of small-sized firms.

Also reproduced in this issue is a speech by Mark Carney, Senior Associate Deputy Minister of Finance, to the Toronto Society of Financial Analysts. In it, he evaluates the state of the international monetary system and its potential effects on the global economy and the investment outlook.

The full text of other speeches given by the Governor can be found on the Bank's website at: http://www.bankofcanada.ca, including:

24 November 2004	Opening statement to the Senate Committee on Banking, Trade and Commerce
22 November 2004	Speech delivered on behalf of Canada's Finance Minister, Ralph Goodale, to the German-Canadian Business Club of Berlin.
26 October 2004	Opening statement to the House of Commons Finance Committee
21 October 2004	Opening statement following the release of the *Monetary Policy Report*
13 October 2004	Remarks to the Nation Builders Dinner, Famous 5 Foundation, Calgary, Alberta
7 October 2004	Remarks to the Ontario Economic Summit, Niagara-on-the-Lake, Ontario
20 September 2004	Remarks to the Canadian Chamber of Commerce, Calgary, Alberta
22 July 2004	Opening statement following the release of the *Monetary Policy Report Update*
24 June 2004	Remarks to the European Economics and Financial Centre, Paris, France
16 June 2004	Remarks to the Hamilton Chamber of Commerce, Hamilton, Ontario
18 May 2004	Remarks to Bank staff at a Town Hall, Ottawa, Ontario
22 April 2004	Remarks to the Conference on Financial Services and Public Policy, Schulich School of Business at York University, Toronto, Ontario
21 April 2004	Opening statement to the House of Commons Finance Committee
20 April 2004	Opening statement to the Senate Banking, Trade and Commerce Committee
19 April 2004	Remarks to the Council of the Americas, New York City, NY

Financial System Efficiency: A Canadian Imperative

Remarks by David Dodge
Governor of the Bank of Canada
to the Empire Club of Canada
and the Canadian Club of Toronto
Toronto, Ontario
9 December 2004

Good afternoon. It is a privilege for me to address this joint meeting of the Empire and Canadian clubs, and I thank you for the opportunity to do so.

I am particularly pleased to speak to you today because this is a bit of a red-letter day on the Bank of Canada's calendar. Today, we released the latest edition of our semi-annual *Financial System Review (FSR)*. This publication, which is only a couple of years old, examines issues that relate to Canada's financial system. Each edition of the *FSR* takes a look at recent developments and trends in the financial system, as well as issues that have an impact on its efficiency, safety, and soundness. This is because the overall role of the Bank in the financial system area is to promote its safety, soundness, and efficiency. Today's edition contains a number of articles that focus on the promotion of financial system efficiency and stability. And it is the issue of financial system efficiency that I will talk about today.

I will begin with a brief discussion of how the Bank of Canada contributes to the efficiency of the financial system at the macroeconomic level. Then, I will spend most of my time discussing how we can improve efficiency in Canadian financial institutions and markets; that is, the microeconomic aspects of efficiency.

But before I do that, I should start by defining what I mean by "financial system" and "efficiency." Then I will explain why it is so critically important for Canada to improve in this area.

When I talk about the "financial system," I am referring to financial institutions and markets, the infrastructure, laws, and regulations that govern and support their operations, and the macroeconomic framework within which they operate. My message for you is that improving the efficiency of Canada's financial system is imperative.

But what is an efficient financial system? In economic terms, an efficient financial system is one that helps to allocate scarce economic resources to the most productive uses, in a cost-effective way. The ultimate goal is to have Canada's financial institutions and markets match investors and their savings with appropriate, productive investments. Put more directly, if Canadians want sustainable economic growth and prosperity, our financial system must function as efficiently as possible.

If Canadians want sustainable economic growth and prosperity, our financial system must function as efficiently as possible.

Let me explain why efficiency is so important. With an efficient system, investors can get the highest risk-adjusted returns on their investments, and borrowers can minimize the costs of raising capital. Inefficiencies can drive a wedge between what borrowers pay and what investors receive. I'll give you some examples of how inefficiencies can interfere with the saving and

investment process that is so crucial to economic growth. If adequate information isn't available, potential investors can't tell whether a particular investment fits with their tolerance for risk. If financing costs are too high because of inefficiencies, borrowers won't be able to secure the funds they need to expand. If competition isn't encouraged, the various players in the financial system won't have the right incentives to innovate. This is why it's so critical for the financial system to work efficiently.

Efficiency and the Bank of Canada

I would now like to spend a few minutes on the Bank of Canada's role in promoting an efficient financial system. In order to have such a system, we need above all a supportive framework of macroeconomic policies that minimize uncertainty and enhance confidence about the future value of money. This includes prudent fiscal policies, which are the responsibility of ministers of finance. It also includes effective monetary policy, which is the Bank of Canada's responsibility.

We achieve effective monetary policy through our system of inflation targeting. One of the key benefits of this regime is that inflation expectations have become well anchored on the 2 per cent target, not just in the short term, but also in the long term. As a result, borrowers now pay a much smaller premium to compensate investors for inflation risk. This is particularly important at the long end of the yield curve. Reduced uncertainty has led to lower costs for borrowers and to a more efficient allocation of resources.

The promotion of a safe and sound financial system that reduces uncertainties and systemic risk can also contribute to efficiency. We work in partnership with federal and provincial agencies, regulators, and market participants in this area, in order to actively foster the safety and soundness of the financial system. We also have a number of unique responsibilities. It is our role, for example, to oversee those payment, clearing, and settlement systems that could pose systemic risk. These systems have been designed to provide certainty that large-value payments or securities transactions will settle in real time. In addition, they have been designed to operate using a relatively small amount of liquidity compared with systems in other countries. This frees up resources that can be put to more productive use elsewhere. The Bank of Canada is also the "lender of last resort"—the ultimate provider of liquidity to the financial system. Indeed, we've just concluded a review of that role, and the details can be found in the *FSR* that we released today.

There is also an international element to our efforts. The Bank of Canada works with partners in other countries on initiatives to strengthen the international financial system. The goal is to minimize the risk of a financial crisis in one part of the world spreading across borders. But that's a topic for a whole other speech.

So to summarize, Canada's macroeconomic and prudential policies generally do the job they are supposed to do in supporting efficiency. But let me be clear—we are not complacent; we are always looking for ways to improve. Continuous improvement is essential.

We are not complacent; we are always looking for ways to improve. Continuous improvement is essential.

Efficiency in Financial Institutions and Markets

Now, I want to talk more specifically about the microeconomic aspects of efficiency in financial institutions and markets, including the promotion of competition and the provision of an appropriate legal and regulatory framework. Competition drives innovation and efficiency gains. And an appropriate legal and regulatory framework gives all investors fair access to necessary information, while minimizing the costs of raising capital.

The evidence shows that Canada's financial institutions and markets have generally been efficient when compared with those in other countries. But over the past decade, markets and financial institutions elsewhere have become—and are becoming—more efficient. To stay competitive in this environment, Canada's financial system must also constantly increase its efficiency. If we don't make this effort, the Canadian economy will suffer. The status quo won't cut it.

So what should our priorities be? I'll talk about financial institutions first and then about financial markets.

Efficiency and Financial Institutions

In terms of financial institutions, a quick look backward may show us the way forward. I want to go back 40 years, to 1964, and recall the Royal Commission on Banking and Finance, otherwise known as the Porter

Commission. The Porter Commission was well ahead of its time, with groundbreaking analysis and policy recommendations. In the post-World War II environment, where extensive government controls on the economy were still thought desirable, Porter came out strongly in favour of greater competition, freer markets, and effective regulation that served to enhance efficiency.

In the wake of the Porter Commission, Canada revised its financial legislation in some crucial ways. Canadian banks responded to the new competitive environment by innovating and enhancing efficiency. Canadian institutions became world leaders, as financial institutions in many other countries were still operating under more restrictive and less-efficient regulatory regimes. Over the next three decades, Canada continued to lead the world. Successive revisions of legislation covering financial institutions encouraged greater cross-pillar competition in some areas, leading to lower costs and improved efficiency. But over the past decade, other countries have caught up and are forging ahead.

During this time, two trends changed the global environment for financial institutions. First, with the expansion of world trade, national markets became truly global. Financial institutions had to find ways to provide enhanced services to customers worldwide. Second, other countries—particularly the United States and the United Kingdom—began to align their regulatory frameworks with the competitive philosophy of the Porter Commission. The regulatory barriers that had held back competition, both geographically and among different types of institutions, began to fall rapidly.

Out of this more open and competitive environment came consolidation—not just among institutions but across pillars and jurisdictions. As a result, foreign institutions were better placed to exploit new technologies in order to enhance efficiency, and to offer new instruments and combinations of services to their clients. These two trends have led to great benefits for consumers worldwide, and they are continuing.

In these circumstances, Canada faces a difficult policy challenge. How can we enhance our policy framework to provide greater incentives for innovation by encouraging competition while, at the same time, giving our institutions the scope to improve efficiency? This is the challenge for Canadians in considering mergers, both within and across pillars, and the removal of barriers to foreign competition.

How can we enhance our policy framework to provide greater incentives for innovation by encouraging competition while, at the same time, giving our institutions the scope to improve efficiency?

The questions about the best ways to enhance competition—to balance incentives for efficiency with other legitimate public policy concerns—are complex. And I don't have simple answers. But efficiency must be at the heart of the debate. Because, in the end, an efficient financial system is key for the future—not just of the institutions, but of the Canadian economy as a whole.

Financial Market Efficiency

Let me now turn to financial markets. When it comes to the competitiveness of global financial markets, size, depth, and liquidity do matter. So Canadian financial markets—whether equity, fixed-income, derivatives, or foreign-exchange—have an inherent disadvantage compared with those in New York or London. To compensate, Canadian financial markets have to be relatively even more efficient.

So what can Canada do to improve the efficiency of its markets? One area that has received a lot of attention, not just in Canada but in many other countries, is securities regulation. The key issue is to reduce what economists call "information asymmetries" by as much as is practical. What that means is that our regulatory framework should aim—in general—at having market prices reflect all relevant information, and that all parties to a transaction should have fair access to that information. We can enhance efficiency by reducing information asymmetries up to the point where the cost of additional compliance would outweigh the benefits.

Following events such as Enron, Parmalat, and Livent, it became clear that investors were not always receiving sufficient and accurate information. Corporate scandals prompted many an investor to say: "There oughta be a

law!"—a law to make publicly traded companies disclose all information. But in the rush to write laws and regulations, too much attention has been paid to detailed rules that govern how companies disclose information, rather than focusing on what they disclose. We have seen a large increase in the costs of providing information—particularly in the United States—without commensurate progress towards improving the relevance of the information being disclosed.

The concept of relevant disclosure is particularly important for a country like Canada, where public companies range in size from the very small to the large and multinational. The precise nature of what constitutes relevant information differs depending on the size and complexity of the firm. Corporate disclosure regulations should recognize this. For large, complex firms, more complex rules are required in order for investors to receive appropriate information. But for smaller firms, less-complex disclosure regulations—and lower costs of compliance—may result in the best cost-benefit balance. The Canadian Securities Administrators recognized this point in putting forward new proposals for guidelines for corporate governance that are based on a firm's size.

There is another consideration, and that is the need for some companies to have access to global capital markets. Firms that want to list on international exchanges will have to follow the disclosure rules that apply in those markets. And large Canadian firms that want to raise capital abroad need regulations here that are recognized as meeting international standards. But smaller, less-complex firms—which make up the vast majority of publicly listed companies in Canada—may not want to raise capital abroad. So it may not make sense for Canadian regulators to force these smaller firms to comply with the kinds of detailed rules that would be appropriate for large firms.

Our regulatory framework should take into account differing levels of size and complexity when establishing rules for disclosure.

Let me be clear. The *principles* at the heart of Canada's regulatory framework must be as good as, or better than, those of any other country. But keep in mind that companies considered to be mid-sized in terms of capitalization in Canada would be regarded as micro-capitalized by international standards. Historically, Canada's public markets have done very well in funding these smaller companies efficiently. This should continue in the future. So it is clear to me that our regulatory framework should take into account differing levels of size and complexity when establishing rules for disclosure.

The rule requiring CEOs to sign-off on their financial statements is a case in point. The principle behind the rule is to try to make sure that investors have sufficient and accurate information. Holding the CEO accountable is a good way to go about this. The principle can work equally well for large and small firms. But we need to be careful. For very large and complex organizations, setting out some detailed rules in terms of procedures may be helpful. However, we do not need a whole raft of complex rules that tell the CEOs of smaller firms what procedures they must follow before they can put their signatures on their financial statements. We need to be careful not to write rules that govern only the inputs that come before the CEO sign-off. Rather, we need to focus on getting the output right, so that the document that the CEO signs actually gives investors sufficient and accurate information.

Whatever the structure of the regulator, we must strive for efficiency in regulation—the best regulation, at the lowest cost.

Efficiency dictates that Canada should have uniform securities laws and regulations, based on principles that apply to everyone. Some have taken this idea further and advocated for a single, pan-Canadian securities regulator. I'm not here today to weigh in on that debate. But I do want to stress that, whatever the structure of the regulator, we must strive for efficiency in regulation—the best regulation, at the lowest cost.

Now let me talk briefly about another important information issue, and that is the issue of price transparency in markets. Here, I am referring to timely, public disclosure of transaction details, such as price and volume.

It is not difficult to see how this information leads to better resource allocation.

The appropriate level of transparency may vary from market to market. Generally, the more liquid the market, the higher the level of transparency it can support. However, the world is moving to greater transparency in all markets through the spread of technology. The Bank of Canada is conducting research and working with market participants and regulators on ways to increase transparency in Canadian markets, with due regard for liquidity, equitable access, and fair play. Together with price transparency, these are the ingredients that help to create efficient, well-functioning markets.

It is important that we get transparency and regulation right. But we also need to devote the appropriate time and effort to making the most of whatever rules we write, including existing ones. This means focusing on a range of smaller initiatives that can enhance efficiency. For example, provincial and territorial legislatures need to make the Uniform Securities Transfer Act a priority. Such an act would provide a sounder legal basis for the holding and transfer of rights in securities that are held in book-entry form, and would replace the current patchwork of legal rules in this area. Another initiative is the Canadian Capital Markets Association's focus on trade-matching to support progress towards straight-through processing.

There's one more area where it is absolutely critical for Canada to continue to improve, and that is enforcement. There is a widely held perception that Canadian authorities aren't tough enough in punishing fraud and enforcing insider-trading and other rules. That's why it is encouraging to see that steps to toughen enforcement are being taken, by provincial securities commissions, by the Investment Dealers Association, by law-enforcement agencies, and by the federal government. These kinds of steps to improve enforcement must continue.

Conclusion

Let me conclude. To improve the economic and financial welfare of Canadians, we need an efficient financial system. The Bank of Canada has been contributing to this goal by enhancing Canadians' confidence about the value of their money and by reducing risks to the safety and stability of the financial system. Our *Financial System Review* is part of this effort.

While Canada has been studying and analyzing, the rest of the world has been acting. It's time for us to act, too.

But the effort must extend far beyond the central bank. I've raised some issues today that I think are critical to enhancing the efficiency of our financial system. None of these issues are new. They have been studied and analyzed thoroughly. But while Canada has been studying and analyzing, the rest of the world has been acting. It's time for us to act, too. We have to get on with the job of improving efficiency. The future health of our economy and the prosperity of Canadians depend on it.

The New International Monetary Order

Mark Carney
Senior Associate Deputy Minister
Department of Finance
Speech to the Toronto Society of Financial Analysts[1]
23 November 2004

It is an honour to present my first speech as Senior Associate Deputy Minister of Finance to the TSFA. Of course, I recognize that I am here only due to my previous role as Deputy Governor of the Bank of Canada. I trust you will forgive the bait and switch. What follows are personal views which may not necessarily be shared by either the Bank or the government.

I would like to focus on an issue central to the prospects for global economy and to the investment outlook: the state of the international monetary system.

I would like to focus on an issue central to the prospects for global economy and to the investment outlook: the state of the international monetary system. At first blush, this choice may appear curious. While we all know changes in currency values can sometimes overwhelm even the best bottom-up stock-selection, the challenge is normally to identify (or to hedge) prospective currency fluctuations rather than to anticipate the consequences of new international monetary arrangements. Yet this is precisely what many serious commentators and some policy-makers would have you believe: namely, that the world has settled into a new international monetary paradigm, often referred to as the new Bretton Woods system.

Judging from the sophistication of this audience, I suspect that word "paradigm" has raised your antennae, and in fact, you are about to hear why, from an international macroeconomic perspective, "*This time it's different*," remain the four most expensive words in the English language.[2]

To help you draw your own conclusions about whether we are in a new quasi-gilded age, I will divide my remarks into four broad sections. I will start by briefly reviewing the challenge of global imbalances. Then, I will consider arguments why the current state of affairs may be sustainable, even desirable. Next, I will argue that, in effect, Templeton's dictum holds: We are not living in different times, the new "system" is destined to pull apart, and it will be extremely costly to think otherwise. I will conclude by considering the policy implications of this state of affairs. I shall leave the investment implications to you, the professionals.

The Challenge of Global Imbalances

Before proceeding, I would like to be clear what we mean by global imbalances. The Bank of Canada has discussed the prospects for global adjustment at length over the past eighteen months. While thus far the Canadian economy has reacted relatively well to global change, it is important to consider the scale of the task. At present, there are two major, related macro imbalances: a large current account deficit in the

1. Mark Carney, Deputy Governor at the Bank of Canada responsible for international issues from 5 August 2003 to 12 November 2004, was appointed Senior Associate Deputy Minister of Finance on 15 November 2004. This speech has been slightly abridged for purposes of publication.

2. Attributed to Sir John Templeton. See, for example, Chancellor (1999).

United States and substantial balance-of-payments surpluses in Asia.

At present, there are two major, related macro imbalances: a large current account deficit in the United States and substantial balance-of-payments surpluses in Asia.

The U.S. current account deficit

The U.S. current account deficit is without precedent. At 5.5 per cent of GDP, it is larger than that of any major industrial country since the break-up of the Bretton Woods system in 1971. Its scale is magnified when one considers that the United States is a relatively closed economy. For instance, the U.S. deficit represents more than 20 per cent of the U.S. traded-goods sector, which is roughly equivalent to the pre-crisis ratios in Mexico and Argentina.[3]

The U.S. current account deficit is likely to continue to rise over the next several years, for three reasons.

Uncomfortable arithmetic

First, the underlying arithmetic is particularly challenging. U.S. imports are presently about 50 per cent larger than U.S. exports. As a result, even if imports and exports grow at their historic norms (about 6 per cent) and the economy grows at its potential (about 3.5 per cent), today's deficit will top 6 per cent within three years.

However, exports are unlikely to track imports, as the U.S. propensity to import is at least 50 per cent greater than its propensity to export.[4] That is, if you assume that the U.S. and the rest of the world's (ROW) gross domestic product (GDP) each rise at an equivalent rate, U.S. imports will increase at a rate about 50 per cent faster than U.S. exports. Applying this relationship (which is not fully understood by economists but has held for more than 30 years) to the simple example above implies a U.S. deficit of 7.5 per cent of GDP within three years.[5]

Unbalanced global growth

The second reason why the U.S. current account deficit is likely to deteriorate is that changes in relative global growth are unlikely to come to the rescue. Simply put, the ROW is unlikely to grow at a rate faster than the United States. In recent years, the U.S. economy has accounted for about one-third of global growth and, amongst the major economies, only the United States, Canada, China, India, and Russia have contributed more than their weight of global GDP to global growth.

In part, this performance reflects potential growth rates that differ dramatically across major economic regions. For example, blessed with more favourable demographics, more flexible labour markets, and (partially as a consequence) stronger structural productivity growth, the American and Canadian economies have potential growth rates that are more than 50 per cent greater than those of our other G–7 partners.

As a result, absent other adjustments, U.S. imports will likely continue to be pulled in by domestic demand growth at a rate that exceeds the impact of foreign economic growth on U.S. exports.

Savings-investment gap

One potential adjustment would be an increase in U.S. relative savings. The current account deficit is equivalent to the savings-investment gap of an economy, so by definition, narrowing the difference between savings and investment will reduce the current account gap.

In recent years, the opposite has happened as declines in U.S. national savings have outweighed reductions in investment. The U.S. national savings rate has fallen over the past five years to its lowest level in history. At less than 1.5 per cent of GDP, the U.S. national savings rate is about half its level of ten years ago. The post-bubble increase in corporate savings (as balance-sheet repair was undertaken) has been swamped by a further decline in household savings and the sharp swing into government deficit financing.

Over the same period, investment growth rates have fallen, and investment spending has remained principally domestically focused. The combination of a low

3. The equivalent ratios for Mexico in 1994 and Argentina in 1998 were 12 per cent and 25 per cent, respectively.

4. This is a conservative assumption. Hooper, Johnson, and Marquez (2000) estimate a U.S. propensity to import of 1.8 per cent and to export of 0.8 per cent

5. Projections of Roubini and Setser (2004) and Mann (2004) yield similar results.

interest rate environment and heavy foreign competition has encouraged investment in the residential housing, commercial real estate, and retail sectors (what economists call the non-tradable sector of the economy). In other words, foreign savings are financing sectors of the economy which will not ultimately help generate exports and therefore narrow the current account deficit.

For most economies, this situation would probably already have spelled trouble as similar dynamics did in Mexico and Thailand in the 1990s. However, even if it has a net foreign liabilities / exports ratio of 280 per cent, comparable to that of single-B-rated Brazil, the United States substantially mitigates its repayment burden by borrowing overwhelmingly in its own currency (Roubini and Setser 2004). Unlike most economies, a U.S. depreciation unambiguously improves its debt-servicing ability.[6]

To summarize, the U.S. current account deficit is unprecedented; it will deteriorate even with balanced global growth, which itself is unlikely to be forthcoming absent substantial adjustments.

The U.S. current account deficit is unprecedented; it will deteriorate even with balanced global growth.

How then is the deficit being financed? And how long can the process continue? This brings us to the second major global imbalance: the large current account and balance-of-payments surpluses in Asia.

Asian balance-of-payments surpluses

These are the complements of the U.S. current account deficit. China is perhaps the best and certainly the most relevant example, and I will rely on it heavily to illustrate broader regional dynamics. The International Monetary Fund (IMF) projects that China's current account surplus this year will be 2.5 per cent of GDP.[7] While it is often remarked that Chinese imports are also growing rapidly, they are only keeping pace with exports in value terms.[8] Part of the story is the rapid development of a pan-Asian supply chain, centred on China, which exports most notably to the United States.

China's structural current account surplus is arguably even higher than current levels. The 2.5 per cent surplus exists despite an economy growing above its potential rate and a deterioration in its terms of trade owing to rapidly rising commodity prices. An emerging market with a bright future would normally be expected to run a current account deficit as it imports capital goods, principally financed from abroad, to speed its development. Our own experience at the turn of the last century is typical: from 1900 to 1913, Canada's current account deficit averaged 9 per cent as our major export industries were built.[9]

Instead, China is running both capital and current account surpluses, leading to a rapid accumulation of foreign exchange reserves. Chinese reserves have grown at 28 per cent compound annual growth rates (CAGRs) in the past five years, to a projected $562 billion at year-end. As a whole, Asian central banks hold about $2 trillion, or two-thirds of the world's official foreign exchange reserves.

By virtually every measure, these increases have been disproportionate. The growth in Asian reserves has easily outpaced the growth in the region's share of global GDP and global trade. More importantly, reserves in non-Japan Asia (NJA) are now well above prudential levels. For example, Chinese reserves cover 8.5 months of imports, compared with the prudential norm of three months.[10] Even given the dollar's acknowledged role as the reserve currency, Asian reserves are overweight the greenback. At year-end 2003, Bank for International Settlements (BIS) data revealed that dollar-denominated assets made up about 70 per cent of Asian reserves, or more than two times America's 30 per cent share of the world economy.

While there are some data discrepancies, it seems clear that Asian central bank intervention is financing a large portion of the U.S. current account deficit. For example, last year, official flows to the United States

6. Assuming of course that debt is of sufficient duration and that increases in future borrowing costs are not too severe. Both assumptions seem plausible at present. For example, in 2003, the U.S. net liability position increased by only 2 per cent, despite running a 5 per cent current account deficit.

7. Article IV, November 2004, pp. 31–32.

8. Ibid.

9. Urquhart (1986). Part of the explanation is low consumption in China. Chinese consumption currently represents only about 40 per cent of GDP, compared to two-thirds in Canada today.

10. They also represent six times short-term external debt. All figures are from IMF Article IV, November 2004.

represented over $400 billion, equivalent to roughly three-quarters of the U.S. current account deficit.[11]

How these developments are interpreted is crucial to the outlook for the international monetary system.

Why the Situation Might Work

There are two competing explanations for the emergence of large global imbalances and sizable shifts in global capital flows. That they are probably best categorized as increased flexibility and calculated inflexibility suggests that they cannot both be right.

Increased flexibility

Some commentators, most notably, Alan Greenspan, Chairman of the U.S. Federal Reserve, have suggested that the current situation arises from the combination of rational portfolio decisions and increased global flexibility.

From this perspective, a good starting point is to recognize that the U.S. current account deficit represents around 10 per cent of total ROW savings (of around $6 trillion).[12] Naturally, not all of these savings are invested domestically. Net capital flows to the United States depend on the relative attractiveness of American assets and the willingness of investors to diversify internationally. Advocates of increased flexibility assert that both current levels and future trends support continued financing of prospective U.S. current account deficits.[13]

There is clearly some support for the relative attractiveness of U.S. real and financial assets. On a macro level, the U.S. potential growth rate is the highest within the G–7. Chairman Greenspan notes that, "The pickup in U.S. productivity growth in the mid-1990s [was] the likely proximate cause of foreigners' perception of increased rates of return on capital in the United States."[14] Of course, higher productivity and potential growth rates do not necessarily translate into higher relative future returns if market participants such as yourselves have already discounted this prospective out-performance. Moreover, as all returns should be risk adjusted, there remains the question of whether the denominator in the "Sharpe ratio" for U.S. assets will rise.

That said, even lower risk-adjusted returns would not necessarily slow the growth of capital inflows to the United States. Portfolio diversification alone argues for increased flows to the world's largest and deepest capital market, especially considering the prospects for capital account liberalization in China. It is logical that, as capital controls are liberalized, a larger proportion of Chinese private savings will be invested in the U.S. economy, which still represents one-quarter of global GDP and almost half of its marketable financial assets. This intuition is supported by research by my former colleague at the Bank of Canada, John Helliwell. John's work suggests that home bias in developed economies has declined markedly over the course of the last decade.[15] The explosion in capital markets volume—of which the tenfold increase in daily Canadian-dollar foreign exchange volume over the past twenty years is but one measure—also suggests a more flexible financing environment.[16]

There are two consequences if the global economy maintains this momentum towards increased flexibility of goods and capital. First, we can expect greater dispersion of current account balances. In this regard, it is not necessarily surprising that the disparity between the world's current account deficits (mainly in the United States) and surpluses (mainly in Asia) has never been greater.[17] Second, a more flexible environment should help to ensure a smoother adjustment to global imbalances through appropriate moves in product and equity prices, interest rates, and exchange rates.[18]

Importantly, increased flexibility requires market players to predominate in order for it to be effective. At present, large official purchases of U.S. government

11. Higgins and Klitgaard (2004) argue that the BIS data provide a better measure of central bank financing of the U.S. current account deficit than the U.S. balance-of-payments data, since they capture central bank funds intermediated through private foreign intermediaries.

12. Cooper (2004). As opposed to the two-thirds of net foreign savings I quoted earlier.

13. Note that, to pull this off, you need net flows with the United States that are more attractive on a volume basis to Chinese than China is to U.S. investors.

14. Greenspan (2003, 2).

15. Helliwell (2004) updates the Feldstein-Horoika calculations that demonstrated tight correlations of domestic savings and investment rates across countries belonging to the Organisation for Economic Co-operation and Development (OECD) by decomposing these correlations into 5-year intervals to find a decline in the correlation in the last years of the 1990s. He does note, however, that "it is quite possible that the greater variance of current account balances reflects the coming and going of these crises more than the operation of more globally fluid investment markets" (pp. 4–5).

16. See the Bank of Canada's *Survey of Foreign Exchange and Derivatives Market Activity in Canada* (28 September 2004).

17. By IMF estimates, that spread is currently the equivalent of 2.3 per cent of world GDP—double the gap of 10 years ago (Roach 2004).

18. Greenspan (2003, 6).

securities may be muting market signals and dulling the flexible system's adjustment mechanisms.[19]

Calculated Inflexibility: The New Bretton Woods System

This brings me to the second possible reason for systemic stability, which I shall term calculated inflexibility. The most celebrated proponents of this approach are Mike Dooley, David Folkerts-Landau, and Peter Garber (DFG) of Deutsche Bank who, in effect, argue that a new international monetary order has emerged. According to DFG, the new Bretton Woods system is self-reinforcing, mutually beneficial to Asia and the United States, and stable enough to endure for decades.[20]

While I do not have time to fully articulate the subtleties and would encourage you to read their work, I think I can fairly summarize their argument as follows:

- There now exists a new de facto Bretton Woods agreement (referred to as BW2) with an Asian-dollar block.
- These Asian economies seek to minimize exchange rate appreciation and volatility in an effort to promote trade and investment.[21]
- DFG employ strong political economy arguments to assert that the system is self-reinforcing. Again, Chinese dynamics are central. According to DFG, the most serious threat to social stability in China is its economy's ability to absorb the sizable pool of surplus labour. The authors argue that China's export-fuelled growth helps to absorb the 15–20 million workers who enter the industrial labour market each year.[22] Assuming that there are 200–300 million surplus workers in China, the lifespan of BW2 is measured in decades.
- American interests are also served. The recycling of dollars back into U.S. treasuries keeps yields down. In turn, low interest rates support valuations of U.S. assets that consumers lever in order to fund further consumption (much of which is of cheap Asian goods).
- Larry Summers has termed this arrangement the balance of financial terror: the end of Asian-dollar purchases would sharply constrain U.S. investment and growth (through higher interest rates) while the ensuing appreciation would undermine the Asian export sectors. According to DFG, in this standoff nobody blinks for the next twenty years.
- U.S. corporations are offered the opportunity to invest in the Asian miracle, which buys their (and ultimately the U.S. governmen's) support for the system. In one aggrandizement of the thesis, it is argued that this dynamic in effect creates a total return swap collateralized on Chinese-owned U.S. Treasuries (which would be defaulted upon if China expropriates American investments in China).
- Eventually (at the end of the decade), the U.S. dollar depreciates against its Asian crosses, thus ensuring a sustainable U.S. net liability position. Asian countries take the eventual capital loss, a cost which is greatly outweighed by the benefits of current export-led growth.
- The ROW, including Canada, Europe, and Latin American emerging markets, represent a periphery of floaters. We are interested bystanders outside of the virtuous circle said to exist between America and Asia.

The Periphery Doesn't Hold: Why BW2 Won't Work

The DFG thesis of a bold new international monetary order is a seductive approach that makes for provocative academic discussions but poor policy choices. Asian reserve accumulation, initially motivated by prudential considerations, then propelled by the policy inertia that inevitably seems to afflict those who choose fixed exchange rate regimes, is now fanned by the quasi-intellectual justification of new-paradigmers

19. Although it is often claimed that these purchases are concentrated in U.S. Treasuries, it is not clear that they take place at the long end of the yield curve.

20. They are by no means alone (see, for example, McKinnon 2003).

21. Crucial to their motivation is the core lesson that they learned from the Asian crisis: namely, that the pre-1998 growth model based on investment financed by external capital had become increasingly hostage to sudden stops and reversals in capital flows. Immediately following the Asian crisis, current account surpluses were run in order to rebuild reserves. Once prudential levels were reached, reserve accumulation has continued as Asian countries intervened heavily to prevent export-retarding exchange rate appreciation.

22. It is never fully explained why export-oriented industries are superior creators of jobs to non-tradable sectors.

who have proclaimed the birth of the new Bretton Woods system.

Yet there are at least five reasons why the BW2 system seems destined to fail.

First, even new paradigms cannot suspend basic economic relationships. Although countries can fix their nominal exchange rates, even with partially liberalized capital flows, they cannot fix their real exchange rates. As a result, relative price adjustments (rather than exchange rate moves) will eventually drive the required real appreciation. Quite simply, Asian inflation will be higher than American. There is already evidence of mounting consumer price inflation in China, which has moved from 1 per cent deflation two years ago to 4 per cent+ inflation this year.[23]

Second, foreign exchange intervention requires sterilization in order to control domestic money supply. This is very costly. For China, the immaturity of the financial system reduces the costs (i.e., financial repression), but this advantage will lessen as China modernizes. In addition to these flows costs, large capital losses (potentially on the order of 3 per cent of GDP) are likely on foreign exchange reserves (Higgins and Klitgaard 2004).

Third, even in my limited experience in government and international relations, I have reason to be skeptical of claims of complex yet seamless simultaneous coordination across borders, between governments, and among public and private actors. For example, in the United States, the interests and influence of U.S. firms who invest in Asia trump those of the domestic manufacturing sector and their employees. How likely is that? And why would that also be the case in Europe and Canada, which currently bear a disproportionate burden of any dollar depreciation? Is it not possible that the balance of winners and losers could increase the likelihood of protectionism?

Fourth, coordination among Asian governments is assumed. However, BW2 has neither the credible commitment to exchange rate stability nor the adjustment mechanism that characterized the old BW system. An emerging pan-Asian supply chain is not equivalent to the development of an institutionally anchored currency block. For example, Asia has as many managed floats as formally pegged exchange rates.[24] Moreover, it is not clear that all countries in the region have the same adjustment time frame. The weight of surplus labour in the rest of NJA is generally smaller, and the level of domestic financial sophistication is generally much greater than in China. This means that inflation pressures and negative carrying costs of sterilization will likely rise faster outside than inside China.

As in any coordinated game without institutional barriers, defection incentives are high. Given that one of the acknowledged elements of the end-game is a large capital loss on reserve holdings, a question must be, why wouldn't Korea or Taiwan want to minimize their loss by getting out first? As Barry Eichengreen has pointed out, even with the institutional strictures of the first BW system, France, Germany, and the United Kingdom did just that by selling their gold to the United States in 1970 (Eichengreen 2004). Defection incentives are further fed by other differences between the original Bretton Woods system and the current situation, including the greater heterogeneity of Asia, the existence of a more appealing alternative to the dollar in the euro, and the relative absence of capital controls (Eichengreen 2004).

Finally, the development process works directly at odds with the maintenance of a long-term peg. In order for the Chinese economy to continue to progress, its domestic financial system must develop. However, it cannot fully do so without interest and exchange rate flexibility.[25] Even before these prices are liberalized, as the financial sector develops, capital controls will become more difficult to enforce and sterilization more expensive. Crucially, this dynamic will be sped by the rapid increase in global cross-border capital flows discussed above.

In sum, the fact that there is more than a little truth in the increased-flexibility argument means that the calculated inflexibility behind the new Bretton Woods system will likely be short-lived.

Our Policy Framework in These Circumstances

I will end as I started: with a bait and switch. Belying the title of my address, I have just argued that there is not a new international monetary order, but rather

23. The impact on social stability of high inflation should not be discounted, as it can have considerable redistributive consequences.

24. International monetary history has consistently shown that the halfway house between fixed and floating exchange rates is a very dangerous place to be.

25. In this regard, the recent move to a more flexible interest rate is more important than the increase in the official rate.

that there currently exists an ad hoc arrangement of two co-existing systems: one floating, the other fixed.

This is not sustainable for major currencies.

Other currencies can fix, but only if they subjugate their monetary policy to the centre. Absent sterilization, countries which fix their currencies will effectively operate a pure gold standard or currency-board arrangement. This will ensure that they quickly bear their share of global adjustment via changes in their inflation rate. If they try to thwart this adjustment through sterilized intervention, countries avoid their responsibilities in exchange for merely postponing the inevitable. In the long run, real exchange rates will adjust, even in China.

However, the time path of adjustment matters, even if the end result is not in doubt. With the sixth largest economy in the world and a 6 per cent share of global trade, China has a major currency. Its economic impact is magnified by the supply-chain incentives for other Asian currencies to track the renminbi. This scale means that the potential costs to the global economy of delaying adjustment could be high. There is likely overinvestment in export industries in Asia and underinvestment in export industries in the United States. In addition, the risks and costs of increased protectionism should not be trivialized.

In a world of free capital movements, the only valid adjustment mechanism is enlightened self-interest.

And to what end are these risks being run? Absent a dramatic retrenchment in global capital mobility, it appears inevitable that the floating system will reassert its primacy. The weight of global capital flows and the benefits of flexibility are simply too great to be ignored. The challenge is thus to smooth the exit path for the fixed block. The sooner this happens, the better market signals will work, and the smoother the adjustment of global imbalances will be.

In a world of free capital movements, the only valid adjustment mechanism is enlightened self-interest. International monetary history suggests that countries usually fail to take systemic concerns into account when making short-term policy decisions, so an appeal to the greater good seems unlikely to work. International policy coordination can play a role but only when it is in the interests of all countries to coordinate policies.[26] That's why the Plaza Accord worked, but the Louvre Accord did not.

One of the principal advantages of the G–7 and G–20 is their ability to promote mutual understanding and to encourage individual members to take steps which are in their interests. By helping to coordinate individually rational policies, the G–7 and G–20 can maximize their collective impact.

Such a situation exists today. It is in China's interest gradually to liberalize interest rates, capital controls, and its exchange rate regime. China simply cannot reach its full potential if it does not, and it risks much more if it delays. The costs of the current policies are multiple: China wastes massive resources; it has an inefficient financial sector prone to connected and speculative lending; its loose monetary policy is feeding inflation and, potentially, asset bubbles; and its undervalued terms of trade are depriving Chinese consumers and further distorting investment decisions.

Similarly, individual country incentives within the G–7 are aligned to reduce global imbalances. Specifically, it is in American interests to reduce their budget deficit and encourage private savings. As Europe and Japan have recognized, it is in their interests to aggressively pursue structural reforms. Finally, it is in Canada's and Britain's interest to maintain our sound macroeconomic policy records while redoubling efforts to maximize the flexibility of our economies, increase the efficiency of our financial systems, and ultimately raise our overall levels of productivity.

All major nations have a common incentive to increase flexibility in the cross-border movement of goods, services, capital, and labour.

All major nations have a common incentive to increase flexibility in the cross-border movement of goods, services, capital, and labour. The new international

26. That is, the doctrines of Adam Smith are as valid at the international level as at the firm level.

monetary order will likely be one in which G–4 currencies—the U.S. dollar, the yen, the euro, and the renminbi—all float against each other, and in which other currencies, including the Canadian dollar, will have a choice: to float on their own or to fix to a block which itself floats.

In this international monetary order, Canada's choice remains clear. A floating Canadian dollar gives us monetary policy independence and an automatic buffer against economic shocks. My former employer, the Bank of Canada, has used this independence to achieve an inflation rate that is low, stable, and predictable, thereby ensuring that Canadians can consume, invest, and save with a high degree of confidence. At the same time, the exchange rate has responded to global shocks, including the Asian crisis in the late 1990s, and to the current robust global growth in a manner that has helped and will help to ensure that our economy undertakes the necessary adjustments to global change. Canada understands the international monetary order, and we will work with our partners to ensure that we can all realize the full potential of a flexible, dynamic global economy.[27]

A floating Canadian dollar gives us monetary policy independence and an automatic buffer against economic shocks.

Thank you for your attention. I would be happy to take any questions.

27. See, for example, Murray (2000).

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J.M. Gabie
Relationship Management
Business Development Manager/Strategic Partner:
J.-R. Bonin
Planning, Communication and Support
Service Leader:
K.L. Donohue
Communications
Team Leader:
S.V. Sondagar
Information Technology
Director:
J.J. Otterspoor
Relationship Management
Businesss Development Managers:
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IT Strategic Planning
Assistant Director:
S.R. Tennenhouse
Senior Project Leaders:
M.M.M. Dagenais; M.J. Kameka; W.J. Skof
Senior Technology Architect:
M.C.A. Tong
Business Applications and Solutions
Assistant Directors:
M.L. Fleming; M.-C.M. Lam
Program Managers:
V. Clermont; E.P. Tompkins; S.M. Webber
Senior Developers:
L.D. Armstrong; M.V. Dern; J.A.A. Gilbert; J.H. Glavine; R.J. Hague; Q.L. Le-Nguyen; M.M.N.M. Letellier; S.D. McIntosh; A. Melesse; S.J. Morrissey; M.P.J. St. Pierre; D.E. Quinn; S.I. Sanderson; A.K.L. Santry; D.W. Trevorrow; S.M. Wong
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Assistant Director:
L.M. Saunders
Senior Developers:
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Assistant Director:
A.G.J. Mageau
Managers:
M. Bélanger; F. Boucher; J.M.F.A. Lemieux; D.J. Schaffler ; N.L. Swift
Senior Technical Analysts:
J.H.C. Boutin; R.D. Bradbury; D.R. Chandonnet; L.F. Coburn; G.N. Davis; B.J. Drummond; P.J. Hotte; A.P. Julien; H.A. Klee; C.D. Lalonde; D.M. MacCara; J.W.P. Mallette; B. Maltais; G. Morin; J.L. Muirhead; N. Rahemtulla; J.R. Rowe; K.L. Woodcock
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S.F. White
Manager, Business Support:
L.M.E. Morin
Facilities Services
Business Line Leader:
A.A. Audette
Service Delivery Manager:
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Service Line Leader:
M.J. Longtin
Building Manager, Ottawa:
M. Potvin
Building Manager, MAOC:
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Building Manager, TAOC:
C.G. Buckingham
Protective Services
Business Line Leader:
J.M. Reinburg
Service Managers:
G.I. Ireland; G.P. Price; C.M. Sullivan
Senior Technical Analyst:
E.G.M. Leduc

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Assistant Directors:
M.N.J. Caron; J. Killeen
Employee/Management Adviser:
C.A. Feiner
HR Partners:
M.R.S. Mougeot; B. Yee
Project Manager:
M.P. McBain
Service Manager:
C. Nault
Senior Consultants:
A.P. Abels; P.S. Batson; G.K. Bouskill; D. Drouin; M.F.F. Girard;.M.J.S. Henri; N.J. Mantle; J.M. Meredith-Pallascio; C. Soumis
Team Leaders:
P. Côte; S. Ewing

Knowledge and Information Management
Business Line Leader:
C.M. Hunt
Project Managers:
M.C.D. Dumoulin; C. Gauthier; M.B. Ward
Service Leaders:
B.M. Graham; J. McBane; H.B. McMullen; M. Simpson
Manager, Systems/Collection Access:
M.S.M. Leblanc
Senior Consultant:
D.H.J. Arseneault

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S. Vokey
Assistant Director, Accounting and Internal Control:
D. Sinclair
Assistant Director, Contracts Management and Procurement :
D. Anderson
Assistant Director, Management Reporting:
A. Guilbault
Principal Contract Practices Consultant:
D. Lennox-Duncan
Senior Consultants:
R. Adams; C. Casaubon; R. Howland; S. Jarman; T. Nguyen; L. Rhéaume; D. Rue

Debt Administration Office

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D.M. Fleck
Assistant Directors:
B.A. Smith; M.L.H. MacLean
Senior Business Consultants:
M.K. Carroll; E. Handy; J.P.C. Miner

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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)
2001	J	1-3	3.0	1.8	5.25	5.75	5.4914	-6.06	5.29	82.36	14.4	9.1	7.7	2.36	2.0	2.0	3.9	3.7	3.0
	F	1-3	2.9	1.7	5.25	5.75	5.4900	-6.94	5.05	80.78	14.3	8.5	7.7	2.27	2.0	1.9	3.6	3.8	3.5
	M	1-3	2.5	1.8	4.75	5.25	4.9927	-7.93	4.66	79.35	13.5	7.7	7.5	2.34	1.7	1.9	4.3	3.8	3.7
	A	1-3	3.6	2.3	4.50	5.00	4.7442	-7.71	4.49	80.28	11.3	7.2	7.3	2.36	1.9	2.4	0.4	4.3	3.5
	M	1-3	3.9	2.3	4.25	4.75	4.6700	-7.60	4.49	80.54	11.7	8.9	7.8	2.45	2.0	2.5	3.6	3.8	4.0
	J	1-3	3.3	2.3	4.25	4.75	4.4935	-7.03	4.38	82.21	10.0	8.0	7.2	2.36	1.9	2.4	3.3	2.8	3.8
	J	1-3	2.6	2.4	4.00	4.50	4.2414	-7.70	4.22	80.97	9.5	8.3	7.0	2.28	2.1	2.4	3.8	2.6	3.3
	A	1-3	2.8	2.3	3.75	4.25	4.1679	-8.28	3.96	80.18	9.1	8.7	7.0	1.99	2.1	2.3	2.8	2.5	2.5
	S	1-3	2.6	2.3	3.25	3.75	3.4858	-9.69	3.19	78.65	11.7	10.7	7.6	2.18	2.0	2.3	1.9	3.5	2.3
	O	1-3	1.9	2.2	2.50	3.00	2.7412	-10.59	2.45	78.28	12.0	10.8	7.8	1.71	1.8	2.1	2.6	1.4	2.5
	N	1-3	0.7	1.7	2.00	2.50	2.5955	-10.78	2.17	78.50	13.7	13.1	8.7	1.91	1.4	1.7	1.8	0.6	3.0
	D	1-3	0.7	1.6	2.00	2.50	2.2444	-10.94	2.08	78.33	14.3	14.0	7.6	1.93	1.3	1.6	2.3	1.0	3.3
2002	J	1-3	1.3	1.8	1.75	2.25	1.9923	-10.82	2.07	78.63	14.4	15.5	8.0	1.95	1.4	1.8	1.7	2.0	3.5
	F	1-3	1.5	2.2	1.75	2.25	1.9926	-11.07	2.16	77.84	12.7	15.5	7.5	1.96	1.4	2.1	0.7	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	7.0	2.30	1.8	2.1	0.5	1.1	3.2
	A	1-3	1.7	2.2	2.00	2.50	2.2440	-10.07	2.46	79.48	11.8	15.3	7.0	2.29	1.9	2.1	-	0.6	2.8
	M	1-3	1.0	2.2	2.00	2.50	2.2471	-9.31	2.68	80.79	12.0	14.5	6.7	2.24	2.0	1.9	1.0	-0.3	2.4
	J	1-3	1.3	2.1	2.25	2.75	2.4964	-9.12	2.78	80.99	13.1	15.8	6.9	2.32	2.1	1.9	0.4	0.6	2.7
	J	1-3	2.1	2.1	2.50	3.00	2.7418	-10.40	2.88	77.71	13.4	14.8	6.8	2.28	2.1	2.0	-0.3	0.5	2.8
	A	1-3	2.6	2.5	2.50	3.00	2.7448	-9.68	3.09	78.90	13.8	15.2	6.7	2.18	2.2	2.4	0.5	1.3	3.0
	S	1-3	2.3	2.5	2.50	3.00	2.7447	-10.27	2.90	77.97	10.7	12.7	6.1	2.18	2.3	2.3	-	0.9	2.8
	O	1-3	3.2	2.5	2.50	3.00	2.7449	-10.06	2.83	78.63	11.4	12.5	5.6	2.18	2.5	2.4	0.5	2.1	2.7
	N	1-3	4.3	3.1	2.50	3.00	2.7431	-10.21	2.85	78.24	9.4	10.2	4.8	2.15	3.1	3.0	1.4	1.8	2.5
	D	1-3	3.9	2.7	2.50	3.00	2.7439	-9.80	2.83	79.24	6.8	8.0	3.8	2.09	3.3	2.4	0.7	2.1	1.9
2003	J	1-3	4.5	3.3	2.50	3.00	2.7439	-9.34	2.91	80.15	7.4	7.2	3.7	2.27	3.3	2.9	1.2	1.1	1.9
	F	1-3	4.6	3.1	2.50	3.00	2.7469	-8.61	2.97	81.78	6.9	6.3	3.3	2.40	3.3	2.9	1.3	1.1	2.1
	M	1-3	4.3	2.9	2.75	3.25	2.9920	-7.72	3.28	83.22	6.3	5.5	3.3	2.50	3.1	2.7	1.4	0.1	1.8
	A	1-3	3.0	2.1	3.00	3.50	3.2373	-6.92	3.35	85.07	6.7	5.3	3.0	2.28	2.8	2.1	2.1	-1.5	1.3
	M	1-3	2.9	2.3	3.00	3.50	3.2416	-6.02	3.27	87.60	7.3	5.5	3.5	2.12	2.5	2.2	1.3	-2.7	1.8
	J	1-3	2.6	2.1	3.00	3.50	3.2449	-5.11	3.11	90.45	7.9	5.5	3.3	2.04	2.1	2.0	1.4	-3.7	1.4
	J	1-3	2.2	1.8	2.75	3.25	2.9947	-6.60	2.89	87.07	10.0	6.7	3.6	2.25	1.7	1.9	1.8	-2.1	2.1
	A	1-3	2.0	1.5	2.75	3.25	2.9972	-6.68	2.80	87.11	9.4	6.7	3.5	2.29	1.7	1.7	1.8	-2.6	2.1
	S	1-3	2.2	1.7	2.50	3.00	2.7490	-5.93	2.64	89.52	8.4	6.5	3.4	2.15	1.8	1.9	1.2	-3.8	2.7
	O	1-3	1.6	1.8	2.50	3.00	2.7492	-4.85	2.71	92.25	7.2	6.1	3.0	2.38	1.8	1.8	1.2	-5.5	2.7
	N	1-3	1.6	1.8	2.50	3.00	2.7481	-4.73	2.73	92.54	8.6	6.7	3.1	2.38	1.8	1.7	0.3	-6.0	2.3
	D	1-3	2.0	2.2	2.50	3.00	2.7481	-4.68	2.66	92.87	9.8	7.5	3.8	2.41	1.5	2.1	0.6	-5.4	2.7
2004	J	1-3	1.2	1.5	2.25	2.75	2.4951	-5.77	2.37	90.68	10.7	8.3	3.7	2.66	1.5	1.5	0.6	-5.3	2.7
	F	1-3	0.7	1.1	2.25	2.75	2.4953	-6.21	2.25	89.82	13.3	9.6	4.4	2.53	1.0	1.2	1.3	-4.3	2.8
	M	1-3	0.7	1.3	2.00	2.50	2.2482	-5.72	2.10	91.55	14.3	10.4	4.6	2.65	1.1	1.2	0.5	-3.5	3.0
	A	1-3	1.6	1.8	1.75	2.25	1.9959	-6.98	2.05	88.28	15.7	12.0	5.1	2.85	1.2	1.7	0.9	-1.3	3.2
	M	1-3	2.5	1.5	1.75	2.25	1.9985	-7.08	2.07	87.98	16.4	13.2	5.2	3.00	1.2	1.8	0.9	2.8	3.0
	J	1-3	2.5	1.7	1.75	2.25	2.0005	-6.36	2.10	89.81	14.6	13.1	5.8	2.96	1.4	1.8	1.0	3.1	3.3
	J	1-3	2.3	1.9	1.75	2.25	1.9973	-6.03	2.12	90.65	11.2	11.8	5.5	2.98	1.4	1.9	0.8	0.6	2.5
	A	1-3	1.9	1.5	1.75	2.25	1.9979	-5.28	2.22	92.43	10.6	10.7	5.2	2.93	1.0	1.7	-	0.2	2.3
	S	1-3	1.8	1.5	2.00	2.50	2.2496	-4.22	2.50	94.63	10.2	10.5	5.2	2.72	1.0	1.6	1.1	-0.1	2.1
	O	1-3	2.3	1.4	2.25	2.75	2.4960	-3.03	2.60	97.77	11.1	10.6	5.7	2.72	0.8	1.7		1.0	2.3
	N	1-3	2.4	1.6	2.25	2.75	2.4977	-1.82	2.74	100.95	10.1	9.8		2.73	1.1	1.8		-0.3	3.1
	D				2.25	2.75	2.4999	-3.02	2.57	97.89				2.81					

* 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)
	1992		7.1	4.2	0.2	5.8	7.1	-3.4	1.8	1.3	8.4	2.2	0.9		-0.7	11.2
	1993		9.4	5.1	-0.7	4.2	6.6	-6.3	0.7	2.3	7.6	3.8	2.3		0.8	11.4
	1994		13.2	8.4	1.4	1.9	6.8	1.6	4.8	7.9	6.4	6.0	4.8		2.0	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		1.9	9.4
	1996		12.2	8.2	3.3	4.4	6.8	1.5	5.5	6.5	4.2	3.3	1.6		0.8	9.6
	1997		16.9	11.2	7.2	0.9	7.2	7.7	10.0	10.0	5.6	5.5	4.2		2.3	9.1
	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	2.7	8.3
	1999		7.6	6.0	4.3	3.6	5.3	2.0	6.2	7.9	4.3	7.4	5.5	5.6	2.8	7.6
	2000		14.7	10.6	8.8	5.9	7.0	6.4	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	-1.2	5.7	6.2	4.1	2.9	1.8	1.9	1.1	7.2
	2002		11.7	10.9	13.7	7.4	6.4	-5.9	3.8	6.0	7.3	4.5	3.4	3.5	2.2	7.7
	2003		8.0	5.1	6.3	4.7	3.4	-2.9	1.7	8.9	8.1	5.3	2.0	2.1	2.2	7.6
	2004														1.7	7.2
Annual rates	2000	IV	9.1	9.8	7.6	3.4	7.0	6.9	7.2	8.1	3.6	4.1	1.1	2.3	3.0	6.9
	2001	I	13.5	7.8	6.1	7.7	8.4	-0.8	5.7	3.8	3.0	4.7	1.4	1.1	0.3	7.0
		II	10.0	12.7	12.1	8.1	7.5	-15.0	2.9	4.2	3.9	0.8	0.9	1.1	0.9	7.1
		III	7.8	7.9	11.2	5.1	5.8	-3.4	5.6	5.1	6.3	-5.6	-0.6	-0.3	0.2	7.2
		IV	22.6	16.4	21.6	13.4	10.4	-0.6	5.7	1.9	7.0	-1.3	4.0	2.6	0.3	7.6
	2002	I	12.7	14.2	17.6	8.4	6.3	-11.2	4.0	4.9	7.3	8.8	5.5	6.1	2.7	7.9
		II	6.7	7.4	10.7	4.2	4.9	-6.0	2.5	8.8	8.8	12.0	3.8	4.7	4.1	7.6
		III	9.1	7.3	7.6	5.8	4.6	-2.7	2.4	9.9	8.2	5.4	4.2	4.0	3.9	7.5
		IV	8.2	5.3	5.3	4.1	3.2	-0.5	2.0	9.6	7.3	6.4	1.9	1.6	2.8	7.6
	2003	I	3.4	0.5	1.9	4.5	1.0	-1.3	1.5	6.7	7.7	9.6	2.8	2.3	1.8	7.5
		II	8.7	5.2	6.9	6.2	4.5	-1.2	0.7	8.8	8.1	-2.6	-0.7	-0.1	0.7	7.7
		III	17.3	11.5	12.8	5.0	5.4	-6.7	1.5	11.5	8.9	4.2	1.4	1.6	0.8	7.9
		IV	5.2	4.0	5.7	0.2	2.4	-10.1	2.5	8.9	9.6	4.8	3.3	4.5	3.6	7.5
	2004	I	20.5	11.2	12.5	5.1	4.7	-4.0	4.3	9.1	8.6	7.3	2.7	3.0	1.1	7.4
		II	19.9	17.8	20.7	9.4	9.0	10.5	6.1	10.9	11.1	10.0	3.9	4.0	2.0	7.2
		III	-1.3	2.9	5.7	4.5	5.1	8.0	6.8	12.5	9.4	7.0	3.2	4.1	1.3	7.1
		IV													1.9	7.1
Last three months			-0.4	0.3	1.2	1.8	3.4	-2.9	2.6	12.7	8.8			3.3	1.9	7.0
Monthly rates	2003	D	1.0	0.3	0.5	0.5	0.1	-0.8	0.4	0.7	0.4			0.6	0.3	7.4
	2004	J	1.7	1.2	1.2	0.4	0.4	-0.1	0.5	0.9	0.8			-	0.1	7.4
		F	2.4	0.7	0.8	0.5	0.6	-0.2	0.2	0.5	0.7			-0.2	-0.1	7.4
		M	1.1	1.5	1.9	0.4	0.3	0.7	0.3	0.7	0.5			1.1	-0.1	7.5
		A	1.9	1.5	1.7	0.8	0.9	0.6	0.4	1.0	1.1			0.1	0.3	7.3
		M	1.7	1.7	1.8	1.0	0.7	1.0	0.7	1.0	0.9			0.1	0.4	7.2
		J	0.1	0.8	1.2	1.2	1.0	2.7	1.0	1.0	1.0			0.6	0.2	7.3
		J	-0.6	-0.2	0.1	0.1	0.2	0.5	0.6	1.0	0.6			0.3	0.1	7.2
		A	-0.3	-0.1	-0.1	-0.1	0.1	-0.6	0.3	1.1	0.8			0.4	-	7.2
		S	-0.4	-0.2	-	-	0.2	-0.7	-	0.8	0.4			0.1	0.3	7.1
		O	0.9	0.6	0.5	0.4	0.4	0.1	0.1	1.1	1.0			-	0.2	7.1
		N	0.3	-	-			0.5	0.7						-	7.3
		D													0.2	7.0

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)	
78.2	76.4	1.5	1.8	1.3		2.0	2.6	-0.3	0.6	7.01	7.86	4.62	1992
80.0	79.9	1.8	2.1	1.4		0.6	0.8	0.5	3.0	3.87	6.57	3.78	1993
82.4	83.5	0.2	1.8	1.1		-	1.2	3.3	7.5	7.14	9.07	4.92	1994
81.6	83.9	2.2	2.3	2.3		0.7	1.4	8.3	11.1	5.54	7.11	4.42	1995
81.2	82.8	1.6	1.7	1.6		0.5	1.8	3.8	-1.2	2.85	6.37	4.09	1996
82.5	83.6	1.6	1.9	1.2		1.1	1.9	-3.7	-4.3	3.99	5.61	4.14	1997
83.4	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
84.5	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
85.4	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
82.7	81.8	2.6	2.1	1.1	2.8	3.3	3.0	-5.2	-6.9	1.95	5.44	3.76	2001
83.0	83.3	2.2	2.3	1.0	0.6	2.9	2.6	-5.9	-6.6	2.63	4.88	3.33	2002
82.9	82.9	2.8	2.2	3.2	1.3	2.9	1.3	20.1	8.8	2.57	4.66	2.79	2003
								20.5	21.4	2.47	4.39	2.11	2004
85.5	86.3	4.2	2.5	3.1	2.7	3.0	2.3	17.0	-7.6	5.49	5.35	3.42	2000 IV
84.1	83.6	1.0	1.5	3.0	4.4	3.9	2.5	11.6	-5.5	4.58	5.41	3.45	2001 I
83.7	82.8	5.2	3.2	-	1.7	3.1	3.0	-16.0	23.0	4.30	5.73	3.53	II
81.9	80.9	0.5	2.2	-5.1	2.4	3.7	3.2	-38.1	-22.2	3.05	5.32	3.68	III
81.0	79.9	-2.1	0.6	-4.8	0.3	3.0	2.4	-41.3	-30.8	1.95	5.44	3.76	IV
81.9	81.7	2.9	2.6	3.1	-0.7	3.1	2.1	15.9	12.3	2.30	5.79	3.68	2002 I
83.1	83.6	4.5	3.2	7.8	-0.1	2.7	2.3	40.0	-1.8	2.70	5.37	3.42	II
83.7	84.4	4.3	3.2	1.1	0.8	3.2	2.5	2.8	-1.5	2.83	4.92	3.25	III
83.1	83.5	3.7	2.1	4.5	3.5	3.3	3.5	20.4	-4.0	2.63	4.88	3.33	IV
83.5	83.8	4.8	3.8	6.8	1.1	2.9	2.4	82.0	14.1	3.14	5.13	3.08	2003 I
82.1	82.0	-1.6	-0.4	-1.8	0.9	3.1	0.3	-17.4	14.8	3.07	4.37	2.99	II
82.2	81.6	1.8	1.1	2.6	1.0	3.2	2.3	0.6	20.8	2.58	4.64	3.08	III
83.8	84.2	2.0	3.4	1.4	-0.2	2.2	1.6	17.6	19.5	2.57	4.66	2.79	IV
83.9	84.6	1.3	1.0	4.7	1.6	2.8	2.7	45.3	38.9	1.98	4.33	2.39	2004 I
84.7	86.4	3.8	1.4	5.8	1.5	-0.4	2.5	36.7	34.4	2.01	4.83	2.37	II
85.7	88.5	1.0	1.1	3.5	-0.3	1.6	0.9	5.4	1.5	2.45	4.58	2.32	III
								13.7	-15.7	2.47	4.39	2.11	IV
		2.0	1.7		-0.3			13.7	-15.7	2.47	4.39	2.11	
		0.3	0.2		0.3			8.5	1.7	2.57	4.66	2.79	2003 D
		-	-		0.2			2.8	2.7	2.25	4.61	2.57	2004 J
		-0.1	-0.1		0.4			-0.1	4.2	2.13	4.41	2.56	F
		0.2	0.1		-0.6			2.6	2.5	1.98	4.33	2.39	M
		0.4	0.2		0.6			3.2	3.4	1.95	4.71	2.46	A
		0.6	0.2		0.1			4.9	1.2	1.98	4.77	2.32	M
		0.1	0.2		0.1			-0.9	0.9	2.01	4.83	2.37	J
		-	0.2		-0.2			0.3	-0.3	2.08	4.82	2.31	J
		-0.2	-0.2		-0.2			1.0	0.5	2.13	4.68	2.22	A
		0.2	0.2		0.5			-1.9	-2.2	2.45	4.58	2.32	S
		0.4	0.2					6.8	-3.6	2.57	4.52	2.28	O
		0.3	0.4					-3.5	-	2.63	4.44	2.17	N
								-0.2	2.0	2.47	4.39	2.11	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)
	1992	-5.1	-9.1	1.3	-3.6	1.2083
	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	1.3	1.1	6.3	2.3	1.5484
	2002	0.8	0.3	4.9	2.0	1.5704
	2003	0.4	0.6	4.8	2.0	1.4015
	2004					1.3015
Annual rates	2000 IV	1.9	2.8	7.1	3.2	1.5258
	2001 I	1.7	2.1	8.0	3.9	1.5280
	II	1.8	2.0	7.0	2.9	1.5409
	III	1.2	0.7	5.1	1.1	1.5453
	IV	0.4	-0.3	5.2	1.1	1.5803
	2002 I	0.6	-0.1	5.4	2.8	1.5946
	II	0.6	0.1	5.1	2.4	1.5549
	III	0.7	0.3	4.7	1.5	1.5628
	IV	1.2	0.9	4.5	1.1	1.5698
	2003 I	0.8	0.9	5.2	1.7	1.5102
	II	-0.8	0.1	4.4	1.8	1.3984
	III	0.7	0.7	4.9	2.2	1.3799
	IV	0.8	0.8	4.6	2.2	1.3160
	2004 I	0.7	0.8	5.1	2.6	1.3179
	II	0.9	1.7	6.0	3.5	1.3592
	III	1.5	1.8	5.3	2.9	1.3072
	IV					1.2203
Last three months						1.2203
Monthly rates	2003 D					1.3128
	2004 J					1.2960
	F					1.3290
	M					1.3284
	A					1.3425
	M					1.3783
	J					1.3577
	J					1.3219
	A					1.3118
	S					1.2878
	O					1.2469
	N					1.1961
	D					1.2191

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 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 4.25% bond 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 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 4.25% bond 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)